INCREASING THE EFFICIENCY OF CHINESE INFRASTRUCTURE INVESTMENTS BY APPLYING MODERN PROJECT MANAGEMENT METHODS

By Miljan Radunović

WORD COUNT 45668
TIME SUBMITTED 15-JAN-2026 12:54PM
PAPER ID 119916760

SINGIDUNUM UNIVERSITY

BELGRADE

DEPARTMENT FOR POSTGRADUATE STUDIES

DOCTORAL THESIS

INCREASING THE EFFICIENCY OF CHINESE INFRASTRUCTURE INVESTMENTS BY APPLYING MODERN PROJECT MANAGEMENT METHODS

Mentor

Professor Goran Avlijaš, PhD

Student

Miljan Radunović

Student ID:465130/2012

BELGRADE, 2026.

Mentor: Professor Goran Avlijaš, PhD, Singidunum University, Belgrade, Serbia

Committee:

1. Professor Goran Avlijaš, PhD , Singidunum University, Belgrade, Serbia
2. Professor Dragan Cvetković, PhD , Singidunum University, Belgrade, Serbia
3. Professor Ágnes Szunomár, Corvinus University, Budapest, Hungary

Date:

Acknowledgements

I am eternally grateful to my wife and my family, who followed me throughout this journey. To me it felt like crossing the river by feeling the stones. However, they are the ones who understood the hurdles of my uncertainties, supported my views of seeking out new perspectives, and helped me carry this weight from the beginning to the very end.

I owe special thanks to:

- My Mentor Prof. Goran Avlijaš, who was decisive, understanding and encouraging in key moments of this journey
- Prof. Dragan Cvetković, who proved to be right from the very beginning of this journey
- Prof Agnes Szunomar, who introduced me to the immense treasure of European knowledge on China that shaped this research
- and Mrs. Diana Orlić who demonstrated unmatched motivational support in the most critical moments of the thesis development

Finally, I dedicate this work in its entirety to my children. They will be the ones living the reality I have researched. If it ever offers them even the slightest help or clarity in life's most important moments, then I will have succeeded in the role that matters to me the most.

"In life, you never lose. You either win or you learn."

Nelson Mandela

Abstract

Large infrastructure megaprojects frequently exhibit persistent underperformance in terms of cost, schedule, and long-term public value, despite advances in engineering capability and project management practice. This dissertation investigates why megaprojects with comparable technical characteristics and investment scale generate measurably different performance outcomes, focusing on the role of project lifecycle governance rather than financing origin or geopolitical context. The central argument advanced is that megaproject performance is primarily conditioned by the quality of institutional governance embedded in early project preparation and lifecycle management, rather than by the nationality of investors, contractors, or financiers.

The research applies Project Cycle Management (PCM) and the Logical Framework Approach (LFA) as analytical frameworks to evaluate how governance structures shape efficiency, effectiveness, and long-term impact across the megaproject lifecycle. Rather than treating PCM and LFA as procedural planning tools, the dissertation conceptualizes them as governance mechanisms that structure decision-making, accountability, and learning from project identification through implementation and evaluation. This perspective enables systematic comparison between projects that embed disciplined front-end appraisal, explicit intervention logic, and measurable performance indicators, and those that do not.

Empirically, the study employs a comparative research design integrating quantitative and qualitative analysis. The dataset comprises 84 large infrastructure megaprojects implemented in European Union member states and Western Balkan countries engaged in the EU accession process, evenly divided between projects affiliated with the Belt and Road Initiative (BRI) and those financed or co-financed by international financial institutions (IFIs). Efficiency is assessed using indicators of cost and schedule deviation, while effectiveness and impact are evaluated through qualitative analysis of project logic, monitoring systems, and institutional arrangements. Given the characteristics of the data, the analysis relies on descriptive statistics and non-parametric tests, complemented by institutional and governance analysis.

The findings demonstrate that projects implemented within governance frameworks aligned with PCM and LFA principles exhibit systematically lower dispersion of efficiency outcomes, greater transparency in performance deviations, and stronger linkage between delivered outputs and intended outcomes. Importantly, the analysis shows that differences in performance between BRI-affiliated and IFI-affiliated projects are largely mediated by host-country institutional capacity and project preparation quality, rather than by financing model or geopolitical alignment. Where PCM-like governance disciplines are embedded institutionally, performance convergence is observed across delivery models.

The dissertation contributes to the literature on megaproject management by reframing PCM and LFA as governance technologies rather than technical checklists and by offering a transferable analytical framework for evaluating infrastructure performance across diverse investment regimes. The findings provide policy-relevant insights for governments, international financial institutions, and foreign investors seeking to improve the efficiency, effectiveness, and sustainability of future megaprojects.

Keywords: Belt and Road Initiative (BRI), Project Cycle Management (PCM), Logical Framework Approach (LFA), Logical Framework Matrix (LFM), megaprojects, China, capital infrastructure investments, project management

Sažetak

Veliki infrastrukturni megaprojekti često pokazuju trajne slabosti u pogledu troškova, rokova realizacije i dugoročne javne vrednosti, uprkos značajnom napretku u inženjerskim kapacitetima i praksi upravljanja projektima. Ova doktorska disertacija ispituje zašto megaprojekti sa uporedivim tehničkim karakteristikama i obimom investicija proizvode merljivo različite performanse, stavljajući fokus na upravljanje projektima tokom životnog ciklusa, a ne na poreklo finansiranja ili geopolitički kontekst. Osnovni argument koji se razvija u radu jeste da su performanse megaprojekata primarno uslovljene kvalitetom institucionalnog upravljanja ugrađenog u rane faze pripreme projekta i upravljanje tokom celog životnog ciklusa, a ne nacionalnošću investitora, izvođača ili finansijera.

Istraživanje primenjuje Ciklus Rukovođenja Projektom (*eng. Project Cycle Management – PCM*) i Pristup Logičkog Okvira (*eng. Logical Framework Approach – LFA*) kao analitičke okvire za procenu načina na koji strukture upravljanja oblikuju efikasnost, efektivnost i dugoročni uticaj tokom životnog ciklusa megaprojekta. Umesto da PCM i LFA tretira kao proceduralne alate za planiranje, disertacija ih konceptualizuje kao mehanizme upravljanja koji strukturiraju donošenje odluka, odgovornost i institucionalno učenje od faze identifikacije projekta do implementacije i evaluacije. Ovakav pristup omogućava sistematsko poređenje između projekata koji uključuju disciplinovanu pripremu u ranim fazama, jasno definisanu logiku intervencije i merljive indikatore performansi, i onih koji takve elemente ne poseduju.

Empirijski, studija primenjuje komparativni istraživački dizajn koji integriše kvantitativnu i kvalitativnu analizu. Skup podataka obuhvata 84 velika infrastrukturna megaprojekta realizovana u državama članicama Evropske unije i zemljama Zapadnog Balkana uključenim u proces pristupanja EU, ravnomerno podeljena između projekata povezanih sa Inicijativom „Pojas i put“ (*eng. Belt and Road Initiative – BRI*) i projekata finansiranih ili kofinansiranih od strane međunarodnih finansijskih institucija (*eng. International Financial Institution – IFI*). Efikasnost se procenjuje na osnovu indikatora odstupanja troškova i rokova, dok se efektivnost i uticaj analiziraju kvalitativno kroz ispitivanje projektne logike, sistema praćenja i institucionalnih aranžmana. S obzirom na karakteristike podataka, analiza se oslanja na deskriptivnu statistiku i neparametarske testove, dopunjene institucionalnom i upravljačkom analizom.

Rezultati istraživanja pokazuju da projekti realizovani u okviru upravljačkih okvira usklađenih sa principima PCM i LFA ispoljavaju sistematski manju disperziju rezultata efikasnosti, veću transparentnost u pogledu odstupanja performansi i snažniju povezanost između isporučenih izlaza i planiranih ishoda. Posebno je značajno što analiza ukazuje da su razlike u performansama između projekata povezanih sa BRI i projekata finansiranih od strane IFI u velikoj meri posredovane institucionalnim kapacitetima zemlje

domaćina i kvalitetom pripreme projekta, a ne modelom finansiranja ili geopolitičkom orijentacijom. Tamo gde su discipline upravljanja slične PCM-u institucionalno ugrađene, uočava se konvergencija performansi između različitih modela realizacije.

Disertacija doprinosi literaturi o upravljanju megaprojektima time što PCM i LFA redefiniše kao tehnologije upravljanja, a ne kao tehničke kontrolne liste, i nudi prenosiv analitički okvir za procenu infrastrukturnih performansi u različitim investicionim režimima. Dobijeni nalazi pružaju relevantne smernice za kreatore javnih politika, međunarodne finansijske institucije i strane investitore koji teže unapređenju efikasnosti, efektivnosti i održivosti budućih megaprojekata.

Ključne reči

Inicijativa „Pojas i put“ (*eng. BRI*), Project Cycle Management (PCM), Pristup Logičkog Okvira (eng. *LFA*), Matrica Logičkog Okvira (eng. *LFM*), megaprojekti, Kina, kapitalne infrastrukturne investicije, upravljanje projektima

Table of Contents

Acknowledgements 3

Abstract 4

Sažetak 6

List of Abbreviations 11

List of Figures 13

List of Tables 15

1. INTRODUCTION 16

1.1 Research problem, subject, and objectives 16

1.2 Research hypotheses 17

1.3 Methodological approach 17

1.4 Scope and limitations 18

1.5 Structure of the dissertation 18

2. CONCEPTUAL AND ANALYTICAL FOUNDATIONS 19

2.1 Defining Megaprojects: Scale, Complexity, and Systemic Characteristics 19

2.2 Structural Drivers of Megaproject Underperformance 20

2.3 Distinguishing Megaprojects from Conventional Infrastructure Projects 23

2.4 The Belt and Road Initiative as an Infrastructure Investment and Delivery Framework 25

2.5 Organizational, Financial, and Governance Features of Chinese SOE Project Delivery 29

2.6 Research Hypothesis 35

3. PROJECT LIFECYCLE GOVERNANCE AND EVALUATION FRAMEWORKS 38

3.1 Project Cycle Management as a Lifecycle Governance Framework 38

3.1.1 The Analysis Phase of the Logical Framework Approach 39

3.1.2 The Planning Phase and the Structure of the Logical Framework Matrix 41

3.1.3 Vertical, Horizontal, and Assumptions Logic in the Logical Framework Matrix 44

3.1.4 Objectively Verifiable Indicators (OVIs) and Means of Verification (MOVs) 46

3.2 The significance of the LFA and LFM in managing megaprojects 48

3.3 Project Initiation, Memoranda of Understanding, and Governance Implications 50

3.4 Comparative Case-Study Methodology for Evaluating BRI Megaproject Performance in Europe 51

3.5 Case Selection Criteria for the Comparative Evaluation of BRI Megaprojects 53

3.6 Megaproject Performance, Risk, and Governance in the Literature? 55

3.7 Conceptualizations of the Project Lifecycle in Global Project Management Frameworks 57

3.8 Institutional Application of PCM and LFA in Large Public Infrastructure Projects 59

3.9 Assessing Chinese Outward Infrastructure Investment and BRI Projects in the Literature 61
3.10 Gaps in Project-Management-Based Evaluation of BRI Megaprojects 65
4. RESEARCH DESIGN AND METHODOLOGY 67
4.1 Applying PCM and LFA as an Analytical Framework for Megaproject Evaluation 67
4.2 Operationalizing Performance Measurement through OVIs and MOVs 69
4.3 Case Selection Criteria for Comparative Megaproject Evaluation 71
4.4 Data Sources, Empirical Material, and Evidence Constraints 76
4.5 Ensuring Analytical Consistency in Comparative Research Design 78
5. EMPIRICAL DATASET AND COMPARATIVE OVERVIEW 80
5.1 Overview of Selected Megaproject Cases and Key Factual Characteristics 80
5.2 Introduction to the empirical cases 81
6. COMPARATIVE PERFORMANCE ANALYSIS OF BRI- AND IFI-AFFILIATED MEGAPROJECTS 91
6.1 Comparative Analysis of Efficiency Outcomes in BRI- and IFI-Affiliated Megaprojects 91
6.1.1 Descriptive comparison of efficiency outcomes: BRI vs IFI megaprojects 93
6.1.2 Non-Parametric Statistical Assessment of Efficiency Differences Between BRI- and IFI-Affiliated Megaprojects 100
6.2. Institutional and Methodological Drivers of Efficiency Performance Differences 102
6.2.1 Interpreting Cost Performance Differences: Governance Rather Than Nationality 103
6.2.2 Interpreting Schedule Performance Differences: Governance Rather Than Nationality 104
6.3 Comparative Effectiveness: Translating Outputs into Outcomes 106
6.4 From Efficiency and Effectiveness to Long-Term Impact and Sustainability 108
7. ASSESSMENT OF RESEARCH HYPOTHESIS, SYNTHESIS AND GOVERNANCE LESSONS 111
7.1 PCM and LFA as Governing Mechanisms in Comparative Megaproject Performance 113
7.2 Policy and Governance Lessons for Host Countries Engaging in Megaprojects 115
7.3 Strategic and Managerial Implications for Chinese Developers and Financiers 118
7.3.1 State-level evolution of performance priorities in overseas infrastructure development 118
7.3.2 Governance, risk management, and performance discipline in Chinese overseas megaproject delivery 121
7.4 Implications for IFIs and EU-Level Governance Frameworks 126
7.5 Theoretical and Practical Contributions to Megaproject Governance Research 128
8. CONCLUSIONS 130
8.1 Synthesis of Findings in Relation to Research Objectives 130

8.2 Limitations of the Research 132
8.3 Directions for Future Research 133
8.4 Broader Policy and Practice Implications for Global Megaproject Development 136
8.5 Concluding Reflections on Advancing Megaproject Governance 138
9. LIST OF REFERENCES 140

List of Abbreviations

1. AIIB – Asian Infrastructure Investment Bank
2. BRI – Belt and Road Initiative
3. CCCC – China Communications Construction Company
4. CDB – China Development Bank
5. CRBC – China Road and Bridge Corporation
6. CREC – China Railway Group Limited
7. CSIS – Center for Strategic and International Studies
8. DAC – Development Assistance Committee (of the OECD)
9. EBRD – European Bank for Reconstruction and Development
10. EIB – European Investment Bank
11. EPC – Engineering, Procurement, and Construction
12. EPC+F – Engineering, Procurement, Construction, and Financing
13. ERP – European Recovery Program (Marshall Plan)
14. EU – European Union
15. FDI – Foreign Direct Investment
16. FISF – Fanhai International School of Finance
17. H1 – Main Hypothesis
18. IAP – Ionian Adriatic Pipeline
19. IFI – International Financial Institution
20. IMF – International Monetary Fund
21. IQR – Interquartile Range
22. ISO – International Organization for Standardization
23. LFA – Logical Framework Approach
24. LFM – Logical Framework Matrix
25. M&A – Mergers and Acquisitions
26. MERICS – Mercator Institute for China Studies
27. MFA – Ministry of Foreign Affairs (China)
28. MOFCOM – Ministry of Commerce (China)
29. MOV – Means of Verification
30. MoU – Memorandum of Understanding
31. NDRC – National Development and Reform Commission (China)
32. OBOR – One Belt One Road

33. OECD – Organisation for Economic Co-operation and Development
34. OFDI – Outward Foreign Direct Investment
35. OVI – Objectively Verifiable Indicator
36. PCM – Project Cycle Management
37. PIMA – Public Investment Management Assessment
38. PMBOK – Project Management Body of Knowledge
39. PPP – Public-Private Partnership
40. PRAG – Practical Guide to Contract Procedures for EU External Actions
41. PRINCE2 – Projects in Controlled Environments, version 2
42. RBM – Results-Based Management
43. SASAC – State-owned Assets Supervision and Administration Commission (China)
44. SOE – State-Owned Enterprise
45. TEN-T – Trans-European Transport Network
46. USD – United States Dollar

List of Figures

#	Figure name	Page number
1	Figure 2.1 – Map of the BRI as announced in 2013 (Source: MERICS)	26
2	Figure 2.2 – Map of countries formally members of BRI (Copyright 2023 Green Finance & Development Center, FISF Fudan University Shanghai, China	28
3	Figure 2.3 – Chinese FDI in Europe: Investment History (2010–2018). Author's compilation based on MERICS–Rhodium Group annual reports on Chinese FDI in Europe (2018–2023)	29
4	Figure 2.4 – Organizational, Financial, and Governing structure (adaptation of https://doi.org/10.1007/s40804-024-00322-9)	32
5	Figure 2.5 – Chinese foreign direct investment in Europe by investment mode, 2010–2018. Source: Author's compilation based on MERICS–Rhodium Group annual report	33
6	Figure 2.6 – Sectoral composition of Chinese foreign direct investment in Europe, 2018–2023. Source: Author's compilation based on MERICS–Rhodium Group annual reports	34
7	Figure 3.1 - General template of the Logical Framework Matrix (LFM)	41
8	Figure 3.2 - Vertical structure information flow in the LFM	42
9	Figure 3.3 – Horizontal structure information flow in LFM	43
10	Figure 3.4 - Key features of the Vertical, Horizontal, and Assumptions Logic in the LFM	44
11	Figure 3.5 – Project lifecycle according to PMI (adaptation from the PMBOK® Guide)	57
12	Figure 3.6 – Project lifecycle according to ISO (adaptation from the ISO 21502:2020)	58
13	Figure 3.7 – Project lifecycle according to PRINCE2 (adaptation from the PRINCE2 7th Edition)	58
14	Figure 4.1 – Geographic distribution of Chinese foreign direct investment in Europe by region, 2018–2023. Source: Author's compilation based on MERICS–Rhodium Group annual reports	72
15	Figure 4.2 – Lifecycle reduction of Chinese infrastructure projects in the Western Balkans (2012–2020). Note: Values indicate number of projects; percentages refer to	73

	the share of projects that entered the pipeline. Source: Author's compilation based on project-level data from the Center for Strategic and International Studies (CSIS)	
16	Figure 4.2 – Completion rates of Chinese infrastructure projects in the Western Balkans by sector (2012–2020). Source: Author's compilation based on project-level data from the Center for Strategic and International Studies (CSIS)	74
17	Figure 7.1 – Project Cycle Management and Logical Framework Approach as governance mechanisms in megaproject performance. Note: The figure integrates findings from the comparative analysis and relevant literature to illustrate how governance design choices made in early project phases shape performance outcomes across the megaproject lifecycle.	114
18	Figure 7.2 – Evolution of state-level performance priorities in overseas infrastructure development (2001–2025). Note: The figure visualizes policy performance priorities derived from the 10th–14th Five-Year Plans (FYPs) using an author-devised coding framework. Cell shading indicates the explicitness of policy emphasis on each performance dimension (absent, implicit, explicit). The figure does not represent a cumulative index or assessment of project outcomes, but illustrates the evolution and consolidation of state-defined performance priorities preceding and following the introduction of the Belt and Road Initiative	119
19	Figure 7.3 – Concentration of Chinese foreign direct investment in Europe by investor group, 2018–2023.Source: Author's compilation based on MERICS–Rhodium Group annual reports	123

List of Tables

	Table name	Page number
1	Table 2.1 Famous global megaprojects with major schedule and cost overruns (Source: Bent Flyvbjerg, 2017, "Introduction: The Iron Law of Megaproject Management," in Bent Flyvbjerg, ed., The Oxford Handbook of Megaproject Management (Oxford: Oxford University Press), Chapter 1, pp. 1-18;)	21
2	Table 3.1 – Structure and key elements of the Logical Framework Approach (LFA)	38
3	Table 5.1 List of IFI projects	83
4	Table 5.2 List of BRI projects	87
5	Table 6.1: Descriptive statistics of schedule deviation (%) – BRI vs IFI megaprojects	95
6	Table 6.2: Descriptive statistics of cost deviation (%) – BRI vs IFI megaprojects	96

1. INTRODUCTION

Large-scale infrastructure megaprojects have become a defining feature of contemporary economic development, regional integration, and global investment flows. Governments increasingly rely on megaprojects to address infrastructure deficits, stimulate economic growth, enhance connectivity, and support long-term development objectives. At the same time, a substantial body of academic and policy-oriented literature has consistently documented persistent challenges in megaproject delivery, particularly in the form of cost overruns, schedule delays, underachievement of intended outcomes, and long-term fiscal and institutional risks. These challenges have raised fundamental questions regarding how megaprojects are planned, governed, financed, and evaluated, and whether performance outcomes are primarily driven by the source of capital or by the quality of project governance across the lifecycle.

In the last decade, these questions have gained renewed relevance in Europe due to the growing presence of Chinese-financed and Chinese-delivered infrastructure projects under the Belt and Road Initiative (BRI). Public and academic debates frequently frame BRI megaprojects through geopolitical or nationality-based lenses, often attributing performance outcomes to the origin of investors, financiers, or contractors. However, such interpretations risk obscuring deeper structural determinants of project performance, including governance arrangements, institutional capacity, project preparation quality, and lifecycle management practices. This dissertation responds to this analytical gap by shifting the focus from the nationality of capital to the quality of governance frameworks within which megaprojects are conceived, implemented, and evaluated.

1.1 Research problem, subject, and objectives

The central research problem addressed in this dissertation concerns the determinants of megaproject performance in large infrastructure investments. Specifically, the study examines whether the efficiency, effectiveness, and long-term impacts of megaprojects are primarily shaped by the quality of project lifecycle governance, rather than by the nationality of investors, financiers, or contractors. The empirical focus is placed on megaprojects implemented in Europe under the BRI framework, compared with functionally similar projects financed and governed within the frameworks of international financial institutions (IFIs).

The subject of the dissertation is a combined theoretical and empirical analysis of megaproject performance in large infrastructure, with particular emphasis on governance models, institutional environments, and evaluation methodologies. Special attention is devoted to Project Cycle Management (PCM) and the Logical Framework Approach (LFA) as structured governance and evaluation instruments

widely applied in IFI-financed projects. The dissertation examines whether and how the systematic application of these frameworks contributes to improved control of costs and schedules, clearer definition of objectives and results, and more effective translation of project outputs into intended outcomes.

The primary objective of the research is to determine whether megaproject performance is predominantly conditioned by the quality of lifecycle governance and institutional arrangements, rather than by the origin of capital or contractors. On this basis, the dissertation aims to formulate analytically grounded conclusions and policy-relevant recommendations for host-country governments, international financial institutions, and foreign investors, including Chinese developers and financiers, with the goal of improving the efficiency, effectiveness, and sustainability of future megaprojects.

1.2 Research hypotheses

Guided by the research problem and objectives, the dissertation advances one main hypothesis supported by three auxiliary hypotheses. The main hypothesis posits that megaproject performance is primarily determined by the quality of project lifecycle governance—particularly the application of PCM and LFA—rather than by the nationality of investors, financiers, or contractors. This core proposition reflects the central argument of the dissertation that systematic lifecycle management, results-based project design, and institutional oversight exert a stronger influence on performance outcomes than the geographic origin of capital.

To enable empirical testing of the main hypothesis, three supporting hypotheses are formulated. The efficiency hypothesis examines whether megaprojects implemented within governance frameworks aligned with PCM principles exhibit smaller average cost and schedule deviations, as well as lower dispersion of efficiency outcomes, compared to projects implemented outside such frameworks. The effectiveness hypothesis focuses on the role of LFA, testing whether projects that explicitly define objectives, objectively verifiable indicators, and means of verification demonstrate greater success in translating delivered outputs into planned outcomes. The institutional mediation hypothesis addresses the contextual dimension of megaproject delivery, positing that host-country institutional capacity and project preparation quality mediate performance outcomes more strongly than financing models or contractor nationality.

1.3 Methodological approach

The research adopts a comparative methodological design that integrates qualitative and quantitative analytical approaches. PCM and LFA are employed not merely as normative standards, but as analytical lenses through which project preparation quality, governance structures, and alignment between

objectives, outputs, and outcomes are systematically evaluated. The empirical analysis covers megaprojects implemented in European Union member states and Western Balkan countries in the EU accession process, ensuring functional comparability across projects while capturing variation in institutional environments.

Quantitative analysis is based on a structured dataset comprising 84 infrastructure megaprojects, divided equally between BRI-affiliated and IFI-affiliated projects. Efficiency is measured using indicators of cost and schedule deviation, while effectiveness and impact are assessed through qualitative examination of project logic, monitoring systems, and institutional arrangements. Given the characteristics of the dataset, the analysis employs descriptive statistics and non-parametric statistical tests to compare performance outcomes between the two groups of projects. These quantitative findings are complemented by institutional and governance analysis, enabling interpretation of observed performance differences beyond purely numerical comparisons.

1.4 Scope and limitations

The dissertation is subject to several limitations. The analysis focuses on Europe and the Western Balkans and does not extend to other regions where Chinese infrastructure investment is significant. Data availability and transparency vary across projects, requiring the use of estimated ranges and midpoint values for some performance indicators. Furthermore, while the statistical analysis identifies robust associations between governance frameworks and performance outcomes, it does not claim strict causal inference due to the presence of contextual and project-specific factors. These limitations are explicitly acknowledged and addressed through methodological transparency and cautious interpretation of results.

1.5 Structure of the dissertation

The dissertation is structured into eight chapters. Following this introductory chapter, Chapter 2 develops the conceptual and analytical foundations of the study, defining megaprojects, examining their systemic characteristics, and reviewing the literature on structural drivers of underperformance. Chapter 3 introduces Project Cycle Management and the Logical Framework Approach as central governance and evaluation frameworks. Chapter 4 presents the research design and methodology, including case selection criteria and data sources. Chapter 5 introduces the empirical dataset and provides an overview of the selected megaproject cases. Chapter 6 constitutes the core empirical analysis, presenting a comparative assessment of efficiency and effectiveness outcomes between BRI and IFI projects. Chapter 7 integrates the findings through systematic hypothesis assessment and discusses their broader implications. The final chapter summarizes the key conclusions, outlines limitations, and proposes directions for future research.

2. CONCEPTUAL AND ANALYTICAL FOUNDATIONS

2.1 Defining Megaprojects: Scale, Complexity, and Systemic Characteristics

Megaprojects are typically defined as large-scale, capital-intensive undertakings involving investments that commonly exceed one billion USD and whose development and implementation unfold over long temporal horizons, often spanning five to fifteen years from conception to commissioning. Contemporary scholarship, however, emphasizes that megaprojects cannot be meaningfully distinguished by cost thresholds alone; rather, they are characterized by systemic complexity, meaning that they embed multiple interdependent technical, managerial, financial, and political subsystems whose interactions generate high uncertainty and emergent risks (Flyvbjerg, 2014; Locatelli et al., 2017). Their defining features include multi-level governance structures, extensive stakeholder participation, large consortia and supply chains, and a scope of intervention capable of influencing entire regions, national development trajectories, or cross-border connectivity (Merrow, 2011).

From a systems perspective, megaprojects operate under conditions of dynamic complexity, where cause–effect relationships are obscured, feedback loops are delayed or distorted, and early strategic decisions lock projects into trajectories that are difficult to reverse. Their prolonged duration exposes them to exogenous uncertainties—including regulatory change, technological shifts, macroeconomic volatility, and political transitions—making them uniquely susceptible to contextual disruption. Empirical research further demonstrates that megaprojects exhibit recurrent patterns of underestimated costs, overestimated benefits, optimism bias, and strategic misrepresentation, which arise from the interaction between technical complexity and organizational or political incentives during early planning and approval phases (Flyvbjerg, 2017). Furthermore, complementary evidence from global benchmarking studies indicates that megaprojects routinely mobilize extensive supply chains, involve multiple contractual interfaces, and require intricate coordination mechanisms to align stakeholder expectations, risk-sharing arrangements, and performance baselines across institutions (McKinsey Global Institute, 2015). This accumulation of interconnected technical and institutional elements differentiates megaprojects fundamentally from standard infrastructure projects and places them at the intersection of engineering systems, public policy, and institutional governance. Contemporary researchers further conceptualize megaprojects as socio-technical systems, in which technical components, organizational structures, institutional arrangements,

and human actors interact dynamically over extended periods of time. Rather than being reducible to discrete engineering challenges, megaprojects evolve through continuous interaction between design choices, governance mechanisms, stakeholder behavior, and external institutional environments. As Davies and Dodgson (2021) argue, these interactions generate emergent properties that cannot be fully anticipated at the planning stage, reinforcing the inherent uncertainty and non-linearity of megaproject delivery. This perspective highlights the institutional embeddedness of megaprojects, whereby early decisions, often shaped by regulatory frameworks, financing arrangements, and political incentives, create path dependencies that constrain future options and lock projects into particular trajectories. Consequently, megaproject performance must be understood not only in terms of scale or technical sophistication, but as the outcome of complex socio-technical systems shaped by cumulative institutional and governance choices over time (Davies & Dodgson, 2021).

In summary, megaprojects are defined not merely by exceptional size or cost, but by the convergence of long timeframes, systemic interdependencies, evolving external conditions, multi-actor governance arrangements, and transformative societal impact. These characteristics jointly create an environment prone to complexity, uncertainty, and performance risk, thereby necessitating levels of methodological rigor in planning, governance, and evaluation that substantially exceed those required for conventional project delivery.

2.2 Structural Drivers of Megaproject Underperformance

Recent empirical research confirms that megaproject underperformance remains a persistent phenomenon despite decades of accumulated experience and methodological advancement. Revisiting large datasets on cost and schedule performance, Cantarelli et al. (2022) demonstrate that the frequency and magnitude of overruns have not declined in a statistically meaningful way over time. This directly challenges the assumptions that learning-by-doing alone leads to improved outcomes. Their findings suggest that repeated exposure to similar project risks does not automatically translate into organizational learning or better performance. Instead, the persistence of overruns is attributed to governance inertia, whereby institutional arrangements, incentive structures, and decision-making routines remain largely unchanged across successive projects. This inertia limits the capacity of project organizations and public authorities to internalize past lessons, resulting in the reproduction of known failure patterns rather than their systematic correction (Cantarelli et al., 2022).

Megaprojects are structurally predisposed to underperformance because they combine technical, organizational, behavioural, and political sources of uncertainty that systematically undermine the accuracy of early forecasts and the effectiveness of execution. A substantial body of evidence shows that megaproject

performance problems begin in the front-end of the project lifecycle, where decisions are made on incomplete information and under institutional pressures that incentivize overly optimistic projections (Flyvbjerg, 2014; Flyvbjerg et al., 2009; Merrow, 2011). The phenomenon of so-called "optimism bias" this being unintentional tendency of planners to underestimate costs and duration while overestimating benefits, is pervasive, and is reinforced by what is labelled as "strategic misrepresentation", where project promoters intentionally distort estimates to secure political approval or funding (Flyvbjerg, 2017). These initial cognitive and political-economy related distortions create baseline conditions that are unrealistic and unachievable, ensuring that deviations accumulate throughout subsequent phases of the project.

Megaprojects also exhibit high technical and systemic complexity. Their designs typically feature innovative engineering, geographically dispersed construction sites, extensive often offshored supply chains, and interfaces across multiple contractors and regulatory authorities (Locatelli et al., 2014). Because such projects operate as tightly coupled socio-technical systems, disruptions in one component can spread across the entire system, creating cascading delays and compounding cost escalation. Global benchmarking studies further highlight that megaproject supply chains are especially vulnerable to fragmented communication, inconsistent performance tracking, and limited transparency, which reduce the ability of project sponsors and contractors to detect early warning signals and intervene before deviations become structurally embedded (McKinsey Global Institute, 2015; McKinsey & Company, 2020). Flyvbjerg (2017) listed some of world's famous megaprojects, whose cost and deadline exceeding should pose a good "lessons learned" source of information, and these are presented in Table 1.1 below, confirming the fact that cost and schedule overruns have been present throughout the history of developing megaprojects.

#	Project name and country of origin	Start & end date	Construction duration [years]	Cost overrun [%]
1	Suez Canal, Egypt	1859 – 1869	10	1,900
2	Scottish Parliament Building, UK	1999 – 2004	5	1,600
3	Sydney Opera House, Australia	1959 – 1973	16	1,400
4	Furka base tunnel, Switzerland	1976 - 1982	16	300
5	Verrazano Narrow bridge, USA	1959 – 1969	10	280
6	Boston's Big Dig artery/tunnel project, USA	1991 – 2007	6	220
7	Denver international airport, USA	1989 – 1995	6	200
8	Panama canal, Panama	1881 – 1914	33	200
9	Minneapolis Hiawatha light rail line, USA	2001 – 2004	3	190

10	Humber bridge, UK	1972 – 1981	9	180
11	Dublin Port tunnel, Ireland	2001 – 2007	6	160
12	Montreal metro Laval extension, Canada	1962 – 1966	4	160
13	Copenhagen metro, Denmark	1996 – 2002	6	150
14	Great Belt rail tunnel, Denmark	1991 – 1998	7	120
15	London Limehouse road tunnel, UK	1989 – 1993	4	110
16	Brooklyn bridge, USA	1869 – 1883	17	100
17	Channel tunnel, UK & France	1988 – 1994	6	80
18	Karlsruhe-Bretten light rail, Germany	1989 – 1992	3	80
19	London Jubilee Line extension, UK	1993 – 1999	4	80
20	Bangkok metro, Thailand	1996 – 2004	8	70
21	High-speed Rail Line South, The Netherlands	1998 – 2009	9	60

Table 2.1 Famous global megaprojects with major schedule and cost overruns (Source: Bent Flyvbjerg, 2017, "Introduction: The Iron Law of Megaproject Management," in Bent Flyvbjerg, ed., The Oxford Handbook of Megaproject Management (Oxford: Oxford University Press), Chapter 1, pp. 1-18;)

Institutional and governance factors also play a central role. Megaprojects typically involve complex constellations of actors that include national, federal or regional governments, subnational authorities, regulators, financiers, contractors, designers, communities, all of whose objectives and incentive structures are not initially aligned. This misalignment leads to coordination failures, contractual disputes, inefficient risk allocation, and slow decision-making, all of which exacerbate cost and schedule drift (Locatelli et al., 2017). In many settings, weak institutional capacity results in inadequate feasibility studies, insufficient due-diligence, and poor procurement practices, which lock the project into flawed assumptions and rigid contractual arrangements that cannot adapt to emerging realities (Merrow, 2011).

In addition, the extensive project lifetime of a megaproject, often a decade or more, exposes them to a wide range of exogenous shocks. These include macroeconomic volatility, inflation, exchange rate fluctuations, political turnover, regulatory changes, shocks and aftershock of pandemic-like global developments, war related commodity (i.e. fuel) supply chain disruptions, evolving environmental standards, and technological shifts. Because megaproject contractual frameworks are often rigid and poorly designed to absorb volatility, external disruptions translate directly into cost inflation and schedule delays. The absence of comprehensive risk registers, adaptive management frameworks, and real-time monitoring tools in many large-scale projects further amplifies systemic exposure to uncertainty.

Taken together, these behavioural, technical, and institutional drivers produce a structural environment in which overruns and shortfalls are not anomalies but statistically predictable outcomes. The

recurrence of similar patterns across geographies, sectors, and governance regimes demonstrates that megaproject underperformance is rooted in fundamental characteristics of their scale, complexity, and governance, rather than in isolated managerial failures. This underscores the importance of rigorous, methodologically grounded preparation, multilevel governance coherence, and continuous transparency throughout the project lifecycle.

2.3 Distinguishing Megaprojects from Conventional Infrastructure Projects

Megaprojects differ fundamentally from standard infrastructure projects in scale, complexity, governance requirements, and strategic significance, to the extent that they constitute a distinct category of investment demanding analytical tools that go well beyond conventional project management approaches. While cost thresholds (typically above one billion USD) and multi-year implementation timelines are common distinguishing markers, the deeper differences lie in the systemic and institutional characteristics of megaprojects. Unlike standard projects, which tend to operate within a single organizational context and a relatively contained technical scope, megaprojects span multiple administrative jurisdictions, regulatory regimes, organizational boundaries, and stakeholder communities (Locatelli et al., 2017). They are multi-actor, multi-level systems that require coordination across ministries, agencies, financiers, private contractors, engineers, environmental authorities, and affected communities. This configuration generates governance arrangements of much higher complexity, often involving politically sensitive negotiations, evolving stakeholder coalitions, and dynamic interdependencies that do not exist in standard projects (Flyvbjerg, 2014).

From a technical perspective, megaprojects integrate diverse engineering subsystems such civil structures, electromechanical systems, digital technologies, logistics networks, each with its own uncertainties, performance assumptions, and interface risks (Locatelli et al., 2014). The recent exponential increase in development, application and consequentially investments in artificial intelligence related technologies only adds to the complexity of future megaprojects. These subsystems interact in ways that produce emergent behaviours, where risks and failures propagate across components rather than remaining isolated. Standard projects, by contrast, tend to have narrower scopes with fewer system interfaces, making their risk profiles more predictable and more manageable with traditional tools. Global benchmarking studies show that megaproject supply chains are typically fragmented across dozens or hundreds of subcontractors, often spanning multiple countries, which increases the difficulty of monitoring performance, maintaining transparency, and coordinating decision-making across organizational boundaries (McKinsey Global Institute, 2015).

Megaprojects also exhibit a markedly different political economy profile. Their strategic relevance, whether relating to national competitiveness, energy security, regional integration, or geopolitical symbolism, means they attract substantial political attention and are often justified through narratives of transformational change. Flyvbjerg (2014) describes this as the "four sublimes":

1) Technological – appealing to cutting-edge engineering
2) Political – incentives of credit claiming
3) Economic – large jobs and growth-related promises
4) Aesthetic – related to iconic and visually impressive design

These forces create incentives for project promoters to overstress benefits and understate risks, a dynamic far less common in standard infrastructure projects. The consequence is that megaprojects are more vulnerable to strategic misrepresentation, shifts in political leadership, and contestation of their long-term societal value, all of which influence planning stability and execution.

Another critical distinction lies in risk allocation and uncertainty management. Standard projects generally operate with well-defined scopes and stable regulatory contexts, allowing risks to be allocated contractually with reasonable precision. Megaprojects, in contrast, face deep uncertainties arising from long durations, exposure to global supply chains, evolving regulations, inflationary pressures, technological change, and sociopolitical contestation. Their inherent unpredictability makes traditional forecasting tools—which assume stable baselines and linear progression—ineffective or misleading (Merrow, 2011). This explains why megaprojects routinely require flexible governance models, robust evaluation frameworks, and adaptive management processes that depart significantly from those used in standard projects.

Finally, megaprojects produce transformational impacts on economies and societies, influencing land use, environmental conditions, regional development trajectories, and institutional capacities for decades beyond their completion. Standard projects rarely generate impacts at this scale. The transformative nature of megaproject outcomes implies that their appraisal cannot be limited to technical or financial metrics; rather, it demands consideration of long-term socioeconomic implications, intergenerational equity, political legitimacy, and institutional readiness.

Taken together, these distinctions—technical and systemic complexity, multi-actor governance, political economy pressures, heightened uncertainty, and long-term societal impact—justify treating megaprojects as a unique category requiring analytical frameworks that incorporate systems engineering, public policy analysis, institutional governance theory, and behavioural economics. Standard project

management approaches are insufficient to capture the risks, dynamics, and strategic implications inherent in megaproject delivery.

2.4 The Belt and Road Initiative as an Infrastructure Investment and Delivery Framework

When first announced in 2013 by the Chinese president Mr. Xi Jinping in Astana, the Belt and Road Initiative (BRI) or One Belt One Road (OBOR) was initially viewed as a grand geopolitical strategy. However, when examined through the lenses of investment behaviour and project delivery, it is more accurately understood as a flexible outward economic engagement framework that enables Chinese firms, particularly state-owned enterprises (SOEs), to internationalize construction capacity, secure long-term commercial opportunities, and expand their global project portfolios. In 2015 it was formally introduced by the Chinese government through the policy document "Vision and Actions on Jointly Building the Silk Road Economic Belt and the 21st-Century Maritime Silk Road", jointly issued by the National Development and Reform Commission, the Ministry of Foreign Affairs, and the Ministry of Commerce of the People's Republic of China (NDRC, MFA, & MOFCOM, 2015). The document presents the BRI as an open and flexible framework for promoting connectivity through infrastructure development, trade facilitation, and financial cooperation, grounded in principles of mutual benefit, sustainability, and respect for host-country conditions. Rather than outlining a fixed investment program, the initiative is framed as an adaptive platform whose implementation is contingent on project feasibility, institutional coordination, and alignment with domestic regulatory environments. This foundational articulation establishes the BRI as a policy umbrella under which diverse actors, financing arrangements, and delivery models operate, providing the reference point against which subsequent interpretations, governance practices, and performance outcomes are assessed.

Upon its launch the BRI seeks to enhance cross-border connectivity through infrastructure development, industrial cooperation, and institutional linkages across Asia, Europe, and beyond (National Development and Reform Commission [NDRC], 2015). While geopolitical interpretations dominate much public discourse, the operational logic of the BRI reflects China's domestic economic imperatives, including the deployment of excess industrial capacity, the export of engineering and construction services, and the creation of overseas demand for Chinese standards and technologies (Rolland, 2017; Hillman, 2020). MERICS publication in 2018 outlined key supply chain pathways and megaproject development roadmap of BRI as shown in Figure 2.1 below.

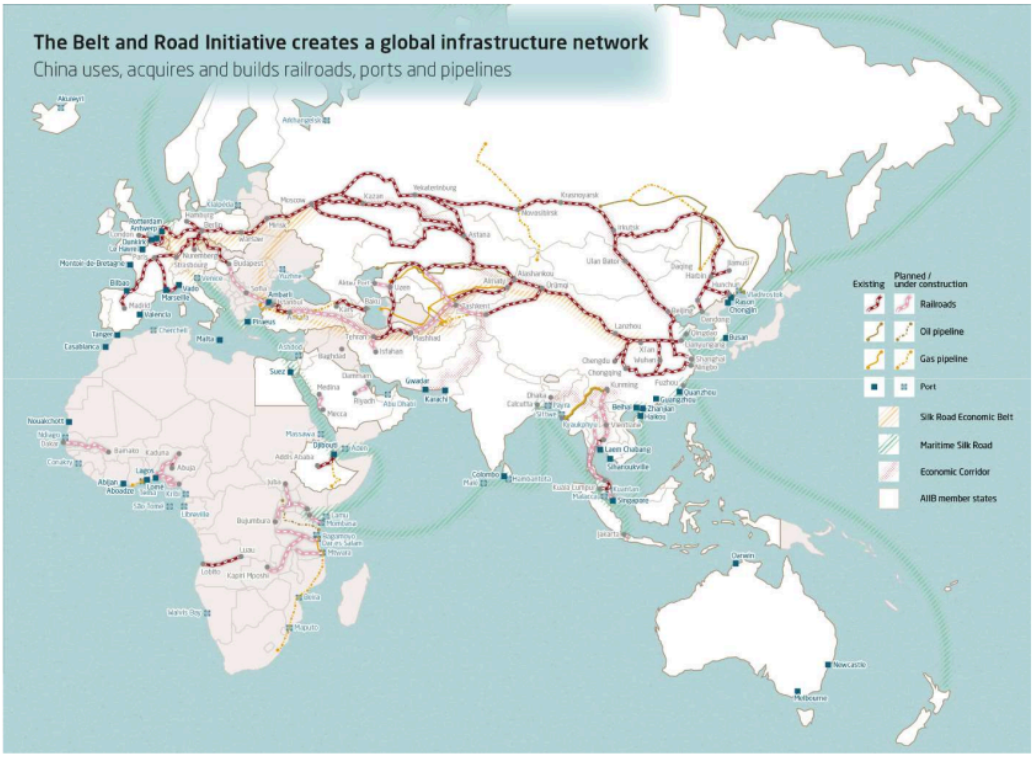


Figure 2.1 – Map of the BRI as announced in 2013 (Source: MERICS)

In its early phase (approximately 2013–2016), BRI implementation in Europe relied predominantly on large-scale transport and energy infrastructure projects delivered through Chinese SOEs using turnkey EPC and EPC+F models. These arrangements bundled engineering, procurement, construction, and financing into integrated packages supported by Chinese policy banks, enabling rapid project initiation in host countries with limited fiscal space or constrained access to international capital markets (Fallon, 2015). From the investor perspective, this model facilitated overseas market entry, stabilized SOE order books, and supported China's broader objective of sustaining construction-sector employment in the post–global financial crisis period. Subsequent official statements further refine the governance orientation of the Belt and Road Initiative by emphasizing a shift toward what Chinese authorities describe as "high-quality" development. The "Joint Communiqué of the Leaders' Roundtable of the Belt and Road Forum" highlights principles of financial sustainability, environmental responsibility, transparency, and risk control as core elements of future BRI cooperation (Belt and Road Portal, 2017). Importantly, the communiqué frames these principles as guiding norms rather than binding operational standards, reaffirming the flexible and decentralized character of BRI implementation across participating countries. This evolution in official

discourse suggests an increasing awareness of governance and sustainability challenges associated with large-scale infrastructure delivery, while simultaneously underscoring the absence of standardized project-level evaluation mechanisms comparable to those employed by multilateral development banks. As such, the communiqué provides further evidence of a growing emphasis on governance quality at the policy level, alongside persistent variability in how these principles are translated into project management practice.

From around 2016 onward, the BRI in Europe underwent a significant recalibration. Internally, China's policy shift toward deleveraging and "high-quality development" reduced tolerance for financially weak or reputationally risky overseas projects. Externally, regulatory tightening within the European Union—most notably through investment screening mechanisms and strengthened procurement and state-aid rules—altered the operating environment for Chinese investors. Independent international market research and regional policy analyses document a marked decline in large-scale acquisitions alongside a rise in greenfield investments in manufacturing, electric vehicles, batteries, and renewable energy technologies, particularly in Central and Eastern Europe (Hanemann et al., 2019; Karásková et al., 2020). This shift indicates that BRI-related engagement increasingly prioritizes industrial integration and production capacity over headline infrastructure megaprojects alone. Large-scale transport infrastructure associated with the Belt and Road Initiative is commonly understood to influence trade patterns and economic performance by lowering transport costs and improving connectivity between markets. Empirical modelling at the corridor level suggests that such investments can generate measurable reductions in trade costs and corresponding increases in trade flows and income, although the magnitude of these effects varies considerably across countries and sectors. Crucially, the realization of these potential benefits depends not only on physical infrastructure provision but also on the quality of complementary policies, institutional capacity, and project-level governance, indicating that infrastructure investment alone is insufficient to guarantee positive development outcomes (World Bank, 2019).

Regional policy analyses further emphasize that China's footprint in Europe has evolved unevenly across countries, shaped by domestic institutional capacity, regulatory rigor, and political alignment with EU norms (Karásková et al., 2020). While some host states have embraced Chinese-financed infrastructure as a development opportunity, others have subjected projects to stringent compliance requirements, leading to divergent outcomes. These assessments highlight that BRI engagement in Europe cannot be understood as a uniform strategy, but rather as a set of bilateral interactions whose effectiveness depends critically on host-country governance frameworks. In 2023 the Green Finance & Development Center of Chinese FISF Fudan University in Shanghai published a list and an accompanying map provided in Figure 2.2 of all countries that have signed a government-to-government Memorandum of Understanding (MoU) on joining the BRI, up to 2023.

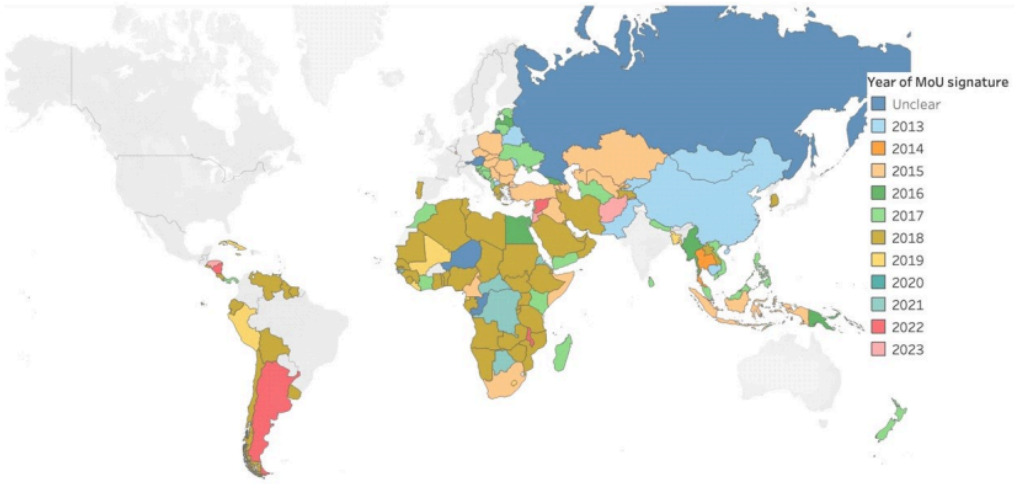


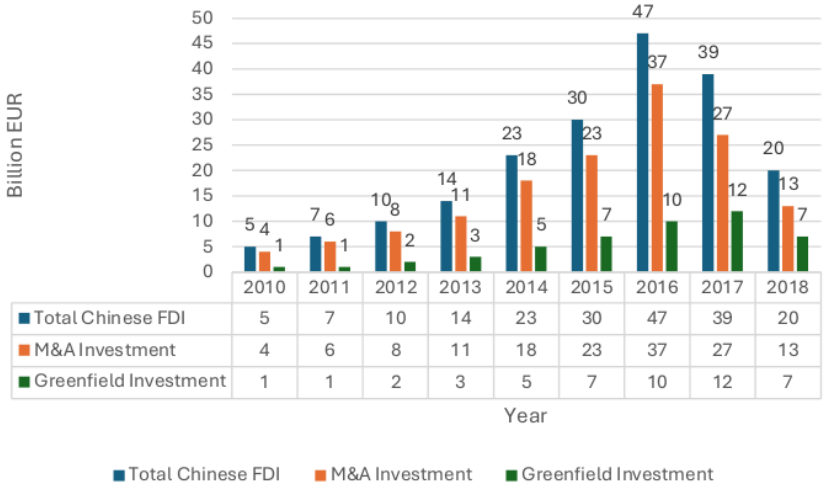
Figure 2.2 – Map of countries formally members of BRI (Copyright 2023 Green Finance & Development Center, FISF Fudan University Shanghai, China)

The BRI has also expanded beyond traditional physical infrastructure. Initiatives such as the Digital Silk Road and Green BRI reflect a growing emphasis on digital connectivity, energy transition, and sustainability, aligning overseas engagement with evolving global development priorities (Zeng, 2020). This diversification reinforces the interpretation of the BRI as an adaptive policy umbrella rather than a fixed blueprint, capable of incorporating new sectors and investment modalities in response to regulatory and market constraints. Recent scholarship highlights that Chinese overseas infrastructure finance operates through coordinated and state-orchestrated credit arrangements rather than through market-based project finance alone. These "coordinated credit spaces" shape the sequencing, risk allocation, and governance logic of Chinese infrastructure projects across their lifecycle, distinguishing them from IFI-anchored investment models (Chin & Gallagher, 2019).

Analysing the BRI through an investor- and project-management perspective, which is what this dissertation does, reveals that project outcomes are shaped less by overarching geopolitical intent than by concrete delivery mechanisms, governance arrangements, and institutional fit. Regional policy analyses underscore that shortcomings in project performance often arise where delivery models are misaligned with host-country regulatory and administrative capacity, rather than from intrinsic deficiencies in Chinese firms or financing (Karásková et al., 2020). This observation motivates the need for structured, lifecycle-based evaluation frameworks capable of assessing how preparation, monitoring, and governance influence megaproject performance across European contexts.

2.5 Organizational, Financial, and Governance Features of Chinese SOE Project Delivery

The long-run overview of the evolution of Chinese foreign direct investment (FDI) in Europe between 2010 and 2018 is outlined in Figure 2.4. The figure illustrates a period of rapid expansion in Chinese investment activity, culminating in a peak in 2016, followed by a sharp contraction in subsequent years. Throughout most of this period, Chinese FDI in Europe was overwhelmingly acquisition-driven, with mergers and acquisitions constituting the dominant mode of market entry.



	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Chinese FDI	5	7	10	14	23	30	47	39	20
M&A Investment	4	6	8	11	18	23	37	27	13
Greenfield Investment	1	1	2	3	5	7	10	12	7

Figure 2.3 – Chinese FDI in Europe: Investment History (2010–2018). Author's compilation based on MERICS–Rhodium Group annual reports on Chinese FDI in Europe (2018–2023)

The pre-2017 investment pattern reflects a strategy centered on rapid asset acquisition, ownership control, and integration into existing European firms and infrastructure. Greenfield investment played a comparatively limited role, largely complementing acquisition activity rather than substituting for it. The pronounced decline after 2016 coincides with the introduction of tighter outbound capital controls in China and the progressive strengthening of investment screening mechanisms across Europe.

Importantly, Figure 2.3 establishes the structural break that underpins the subsequent analysis. It shows that the downturn in Chinese investment was not merely cyclical, but marked the end of an acquisition-led expansion phase. This shift provides the baseline against which post-2018 investment behavior must be assessed, particularly with respect to changes in investment modes and governance implications.

Prior to 2016, Chinese FDI in Europe was largely acquisition-driven, reflecting a strategy of rapid market entry through mergers and acquisitions. Following the tightening of outbound capital controls in China and the expansion of investment screening mechanisms across Europe, M&A activity fell disproportionately. From 2021 onward, greenfield investment emerged as the primary channel for Chinese firms, accounting for a majority of total investment flows despite historically low aggregate volumes.

This shift indicates a process of strategic adaptation rather than disengagement. Chinese firms increasingly relied on project-based and asset-specific investments—particularly in manufacturing and industrial facilities—to maintain a presence in European markets under more restrictive institutional conditions. The resulting investment profile is characterized by lower volumes but higher capital intensity and sectoral concentration, with important implications for project governance, risk allocation, and performance outcomes.

Chinese state-owned enterprises (SOEs) are the principal executors of BRI infrastructure projects, functioning as hybrid commercial–political actors whose international activities combine market expansion with state-directed strategic objectives. Their delivery model is shaped by an institutional environment in which industrial policy, foreign economic engagement, and overseas project management are closely coordinated. SOEs are supervised by the State-owned Assets Supervision and Administration Commission (SASAC), which sets performance benchmarks that incorporate not only profitability, but also strategic contributions such as market acquisition, technology export, and participation in flagship overseas projects (Naughton & Tsai, 2015; Wang & Chen, 2021). This dual mandate incentivizes SOEs to pursue large international contracts even in high-risk environments, expanding China's global construction footprint while reinforcing state priorities in global connectivity and industrial upgrading. Analyses of the Belt and Road Initiative further emphasize that Chinese infrastructure engagement is embedded within an elite-driven development paradigm, where projects may operate under conditions of "sovereign exception" that relax conventional regulatory and governance constraints. This logic enables the mobilization of integrated clusters of Chinese state-owned and private firms within EPCF-style project structures (Gonzalez-Vicente, 2019).

Organizationally, SOEs rely on vertically integrated structures capable of rapidly mobilizing labour, capital, and equipment across borders. Large firms such as CRBC, CCCC, Sinohydro, and PowerChina operate through subsidiaries and project companies that manage local implementation while strategic decisions remain centralized. This hierarchical governance style allows for rapid execution and tight control over complex supply chains, but it also introduces challenges in environments requiring extensive local consultation, transparent procurement, or participatory governance (Garcia-Herrero & Xu, 2019). The organizational culture of SOEs, emphasizing compliance, hierarchy, and engineering solutions, prioritizes

construction efficiency over early conceptual design, stakeholder engagement, or institutional alignment, a pattern well documented in comparative project management literature (Merrow, 2011).

Financially, SOEs operate through a project-delivery model often centered on EPC (engineering, procurement and construction) and EPC+F (engineering, procurement, construction and financing) arrangements, where engineering, procurement, construction, and financing are bundled into a single package. Financing typically comes from China's policy banks, especially the China Development Bank (CDB) and the Export–Import Bank of China, which provide long-term loans structured around sovereign guarantees, commodity-backed repayment, or state-supported credit insurance (Gallagher, 2017; Dollar, 2019). This enables SOEs to enter markets that conventional commercial lenders would consider high-risk. The model is commercially advantageous for SOEs because it reduces their exposure to repayment risk and facilitates contract acquisition, while for host countries it offers immediate access to capital without meeting the stringent evaluative requirements associated with IFI financing (OECD, 2018). However, this financial architecture can create vulnerabilities when feasibility studies are insufficient or when long-term repayment capacity is weak, as highlighted in multiple World Bank and IMF debt-sustainability analyses (Brautigam, 2020).

Chinese financial authorities have further elaborated an analytical approach to assessing fiscal risk in Belt and Road projects through the introduction of a dedicated Debt Sustainability Framework for participating countries. The framework outlines a structured methodology for evaluating debt-carrying capacity, fiscal vulnerability, and potential repayment risks associated with large-scale infrastructure investments, drawing conceptually on international debt sustainability practices while remaining advisory in nature (Ministry of Finance of the People's Republic of China, 2019). Importantly, the framework does not impose binding lending constraints or standardized project appraisal requirements, but instead serves as a reference tool intended to inform financing decisions by Chinese policy banks and host-country authorities. This reinforces the interpretation that while analytical instruments for managing debt risk exist within the BRI governance architecture, their effectiveness in constraining cost escalation and fiscal exposure ultimately depends on host-country institutional capacity and the extent to which such assessments are integrated into project preparation and contracting processes.

Governance mechanisms introduce an additional layer of distinctiveness. SOEs operate within a coordinated state apparatus where ministries, embassies, policy banks, and regulatory bodies collectively support overseas projects (Jones & Zeng, 2019). This "whole-of-government" approach facilitates diplomatic problem-solving and project negotiation, giving SOEs an advantage in navigating host-country bureaucracies. Yet, because projects advance through bilateral state channels rather than competitive multilateral processes, they frequently bypass the ex ante evaluation standards prioritized by IFIs, such as

PCM, LFA, environmental and social safeguards, or transparent procurement (EBRD, 2021). This divergence can create friction in jurisdictions, especially in Europe, where regulatory compliance and due-diligence standards are non-negotiable.

Incentive structures further shape SOE behaviour abroad. Promotion systems reward executives not only for financial performance, but for fulfilling political mandates such as participating in strategic corridors, demonstrating Chinese engineering capabilities, or supporting foreign policy objectives (Shambaugh, 2013). This hybrid incentive model generates strengths, willingness to operate in difficult environments, long-term perspective, ability to coordinate with state actors, but also weaknesses, such as reduced internal pressure for commercial discipline and insufficient scrutiny of project fundamentals (Liao, 2019). Recent policy reforms, especially those framed under China's shift toward a "high-quality BRI," attempt to address these distortions by tightening risk controls, improving debt-sustainability assessments, and requiring stricter oversight of overseas SOE activities (Hillman, 2020). The overall structure is outlined in Figure 2.4 below.

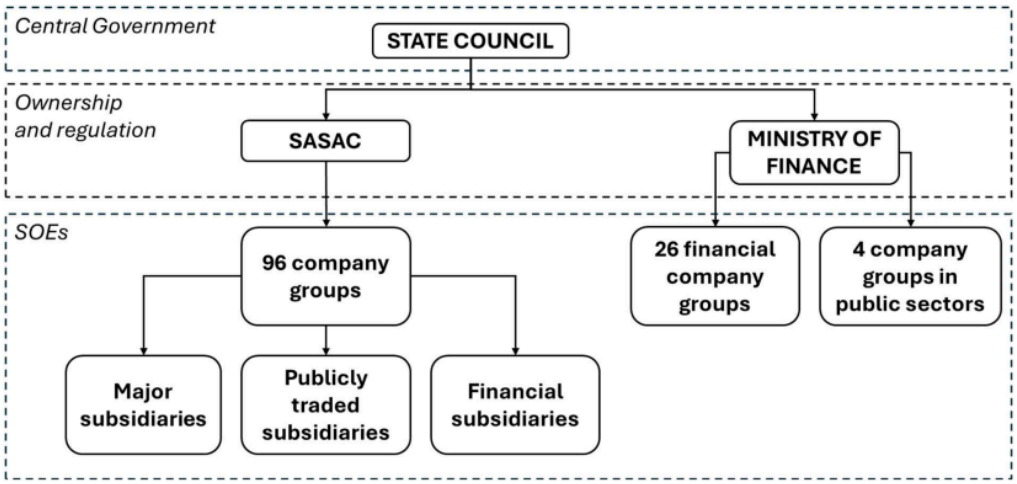


Figure 2.4 – Organizational, Financial, and Governing structure (adaptation of https://doi.org/10.1007/s40804-024-00322-9)

Finally, SOE delivery interacts strongly with host-country institutional capacity**.** In environments with strong regulatory frameworks—such as EU member states—SOEs can perform effectively when compelled to comply with competitive tendering, environmental safeguards, performance monitoring, and contract transparency. Pelješac Bridge is a prime example of this institutional complementarity. Conversely, in settings with weaker institutions or opaque procurement frameworks, the EPC+F model can exacerbate

governance gaps, leading to poorly prepared projects, unrealistic expectations, or debt-related vulnerabilities—outcomes driven not by SOE incompetence, but by misalignment between delivery models and institutional capacity (Carnegie Europe, 2020; Transparency International, 2019).

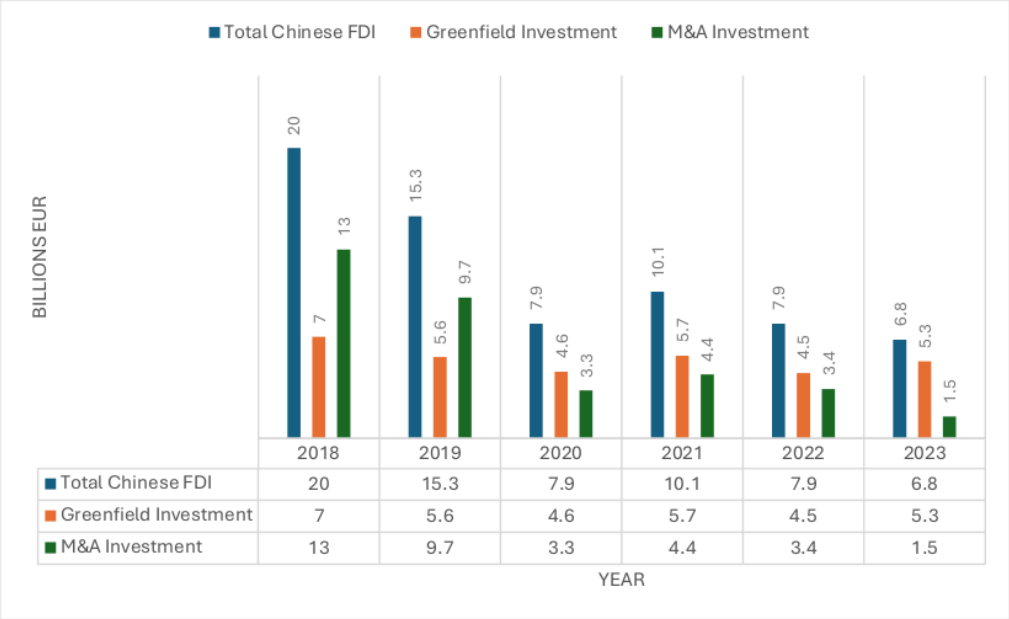


Figure 2.5 – Chinese foreign direct investment in Europe by investment mode, 2010–2018.

Source: Author's compilation based on MERICS–Rhodium Group annual report

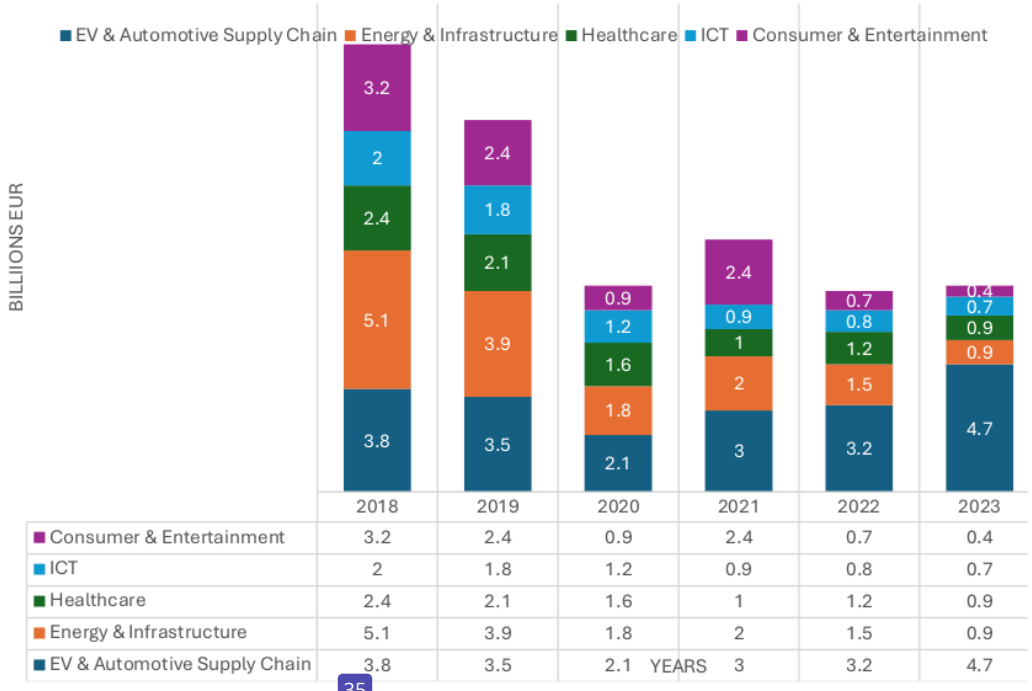
Figure 2.5 focuses on the post-2018 period, using tighter empirical data to examine how Chinese investment behavior in Europe adapted under increasingly restrictive institutional conditions. While aggregate investment volumes remained at historically low levels throughout this period, the figure reveals a pronounced transformation in the composition of Chinese FDI. In contrast to the acquisition-dominated pattern observed prior to 2017, greenfield investment emerged as the primary channel of entry from 2018 onward.

The substitution of greenfield investment for mergers and acquisitions became particularly pronounced after 2020, with greenfield projects accounting for a majority of total Chinese FDI in Europe by value. This shift reflects strategic adaptation rather than disengagement. Faced with heightened scrutiny of acquisitions in sensitive sectors, Chinese firms increasingly relied on project-based investments, industrial facilities, and localized production assets to sustain their presence in European markets.

The resulting investment profile is characterized by lower overall volumes, greater sectoral concentration, and higher capital intensity at the project level. These characteristics have important

implications for governance arrangements, risk allocation, and performance outcomes, as greenfield and project-based investments expose investors and host countries to different coordination challenges than acquisition-led entry. Figure 2.5 therefore provides the empirical foundation for the subsequent analysis of project governance and inefficiency dynamics.

Figure 2.6 summarizes how the organizational, financial, and governance features discussed above translate into the sectoral profile of Chinese investment in Europe.



	2018	2019	2020	2021	2022	2023
Consumer & Entertainment	3.2	2.4	0.9	2.4	0.7	0.4
ICT	2	1.8	1.2	0.9	0.8	0.7
Healthcare	2.4	2.1	1.6	1	1.2	0.9
Energy & Infrastructure	5.1	3.9	1.8	2	1.5	0.9
EV & Automotive Supply Chain	3.8	3.5	2.1	3	3.2	4.7

YEARS

Figure 2.6 – Sectoral composition of Chinese foreign direct investment in Europe, 2018–2023. Source: Author's compilation based on MERICS–Rhodium Group annual reports.

A different structural perspective, this being the sectoral composition of Chinese foreign direct investment (FDI) in Europe during the post-2018 period, is presented in Figure 2.6, highlighting a marked increase in sectoral concentration alongside declining aggregate investment volumes. The figure shows that Chinese investment has become increasingly focused on a narrow set of capital-intensive sectors, most notably the electric vehicle and automotive supply chain. By 2023, EV-related investments accounted for a dominant share of total Chinese FDI in Europe, largely driven by large-scale battery plants and associated upstream and downstream industrial facilities.

In contrast, investment in traditional infrastructure, energy, consumer-oriented sectors, and services declined sharply over the same period. While healthcare and information and communication technology retained a modest but persistent presence, their relative importance diminished as industrial and manufacturing projects came to dominate Chinese investment activity. This shift reflects both regulatory pressures—particularly heightened scrutiny of acquisitions in sensitive sectors—and strategic efforts by Chinese firms to localize production and secure positions in European industrial ecosystems.

The resulting sectoral profile has important implications for project delivery and governance. Industrial and infrastructure-related investments are typically characterized by higher capital intensity, longer project lifecycles, and more complex coordination requirements involving multiple stakeholders, including state-owned enterprises, policy banks, host governments, and regulators. Figure 2.6 therefore complements Figures 2.4 and 2.5 by demonstrating that the transformation of Chinese investment in Europe involved not only changes in volume and mode, but also a fundamental reorientation toward sectors associated with greater governance complexity and higher performance risk. The dominance of large-scale industrial and infrastructure-related investments highlighted in Figure 2.6 has important implications for project performance, risk allocation, and efficiency, which are examined in the following chapter.

In sum, Chinese SOE delivery of BRI infrastructure projects abroad is defined by a distinctive configuration of state support, internal governance, financing mechanisms, and incentive structures. This model enables rapid execution and access to large-scale financing but also introduces structural vulnerabilities when implemented in institutional environments lacking regulatory strength or robust project-preparation methodologies. Understanding SOE behaviour through this investor-managerial lens, rather than through geopolitical rhetoric, provides a more realistic foundation for evaluating megaproject performance, risk allocation, and long-term development impact.

2.6 Research Hypothesis

The hypotheses are formulated to reflect the central analytical premise of the dissertation: that megaproject performance is fundamentally a function of governance quality and lifecycle management discipline rather than of geopolitical affiliation or contractor origin. One main hypothesis and three supporting hypotheses are proposed. Together, they guide the comparative analysis of Belt and Road Initiative (BRI)–affiliated and international financial institution (IFI)–affiliated megaprojects implemented in European Union member states that joined after 2004 and in Western Balkan countries engaged in the EU accession process.

Main Hypothesis (H1):

The performance of megaprojects is primarily determined by the quality of project lifecycle governance frameworks—particularly the application of Project Cycle Management (PCM) and the Logical Framework Approach (LFA)—rather than by the nationality of investors, financiers, or contractors.

This main hypothesis reflects the core argument of the dissertation: that systematic lifecycle governance, results-based design, and institutional oversight exert a stronger influence on efficiency, effectiveness, and long-term impact than the geographic origin of capital or delivery firms.

Supporting Hypotheses

To operationalize the main hypothesis and enable empirical testing, three supporting hypotheses are formulated, each corresponding to a specific analytical dimension examined in subsequent chapters.

H1.1 (Efficiency Hypothesis):

Megaprojects implemented within governance frameworks aligned with PCM principles exhibit lower average schedule and cost deviations, as well as lower dispersion of efficiency outcomes, than megaprojects delivered outside such frameworks, irrespective of financing origin.

This hypothesis focuses on implementation efficiency and is examined through a descriptive comparative analysis of schedule and cost deviations across BRI-affiliated and IFI-affiliated megaprojects.

H1.2 (Effectiveness Hypothesis):

Megaprojects that explicitly apply the Logical Framework Approach, including the definition of objectives, Objectively Verifiable Indicators (OVIs), and Means of Verification (MOVs), demonstrate higher effectiveness in translating delivered outputs into intended outcomes than projects lacking results-based design.

This hypothesis addresses the relationship between project design quality and outcome realization and is assessed through analytical examination of project logic, monitoring structures, and outcome alignment.

H1.3 (Institutional Mediation Hypothesis):

Host-country institutional capacity and project preparation quality mediate megaproject performance outcomes more strongly than financing modality or contractor nationality.

This hypothesis captures the contextual dimension of megaproject delivery and underpins the comparative interpretation of results across different institutional environments, emphasizing the role of domestic governance systems in shaping project outcomes.

Taken together, these hypotheses provide a coherent analytical framework linking governance structures, project design methodologies, and institutional capacity to observed performance outcomes. They are tested through a combination of conceptual analysis, comparative case-study methodology, and descriptive statistical examination in the chapters that follow.

To examine these hypotheses systematically, the next chapter establishes the theoretical and methodological foundations of the study, focusing on megaproject theory, project lifecycle governance, and the analytical tools used to assess efficiency, effectiveness, and impacts.

3. PROJECT LIFECYCLE GOVERNANCE AND EVALUATION FRAMEWORKS

3.1 Project Cycle Management as a Lifecycle Governance Framework

Project Cycle Management (PCM) is the European Union's formal methodology for planning, appraising, implementing, and evaluating public-sector projects. It provides a structured and iterative governance framework that ensures public investments are justified by evidence, aligned with strategic priorities, and accountable to taxpayers and end users (European Commission, 2004). PCM divides the project life cycle into distinct phases, these being programming, identification, formulation, financing, implementation, monitoring, and ex post evaluation, each requiring documented analysis, stakeholder consultation, and transparent decision-making. As such, PCM functions not only as a technical methodology but as an institutional safeguard that protects public resources from politically motivated or poorly prepared investments (European Court of Auditors, 2015). The Logical Framework Approach (LFA) is the analytical engine of PCM. LFA structures the design of a project through systematic problem analysis (problem tree), objective formulation (objective tree), stakeholder mapping, risk assessment, and the construction of a Logical Framework Matrix (LFM). Table 2.1 outlines the key structure of the LFA with its key steps.

#	ANALYSIS PHASE	#	PLANNING PHASE
1.1	*Stakeholder analysis*	*2.1*	*Developing Logical Framework matrix*
	- Identifying and characterizing potential major stakeholders - Assessing their capacity		- Defining project structure, testing its internal logic and risks, formulating measurable indicators of success
1.2	Problem analysis	2.2	Activity scheduling
	- Identifying key problems, constraints & opportunities - Determining cause and effect relationships		- Determining the sequence and dependency of activities - Estimating their duration, and assigning responsibility
1.3	*Objective analysis*	*2.3*	*Resource scheduling*
	- Developing solutions from the identified problems - Identifying means to end relationships		- From the activity schedule, developing input schedules and a budget
1.4	*Strategy analysis*		
	- Identifying different strategies to achieve solutions - Selecting most appropriate strategy		

Table 3.1 – Structure and key elements of the Logical Framework Approach (LFA)

Within European public-sector governance, Project Cycle Management is not merely a project management methodology, but a fiscal control instrument designed to ensure disciplined use of public

resources across the entire investment lifecycle. The European Commission's Better Regulation Toolbox emphasizes that public interventions should be grounded in evidence-based appraisal, clearly defined objectives, and systematic evaluation, in order to minimize waste, inefficiency, and unintended consequences (European Commission, 2021). By structuring decision-making around successive lifecycle stages, ex ante assessment, implementation monitoring, and ex post evaluation, PCM embeds financial discipline directly into project governance rather than treating cost control as a downstream concern. This lifecycle approach is closely linked to the principle of value-for-money, as it requires that public investments demonstrate not only technical feasibility, but also economic justification and measurable societal benefits. In this sense, PCM operationalizes the broader regulatory objective of aligning public expenditure with strategic priorities, fiscal sustainability, and accountability to taxpayers throughout the duration of large-scale projects (European Commission, 2021).

3.1.1 The Analysis Phase of the Logical Framework Approach

The Logical Framework Approach (LFA) begins with a structured analysis phase designed to establish a shared, evidence-based understanding of the problem context in which a project is conceived. This phase precedes any decisions regarding project design, activities, or financing and serves as a safeguard against premature solution selection—a common source of failure in large infrastructure and megaprojects. Within the Project Cycle Management (PCM) methodology, the analysis phase ensures that project interventions are grounded in clearly identified needs, stakeholder interests, and causal relationships rather than political imperatives or technical preferences (European Commission, 2004). The analysis phase consists of four interrelated analytical steps:

1) Stakeholder analysis
2) Problem analysis
3) Objectives analysis
4) Strategy selection

Together, these steps transform an initially broad and often ambiguous development challenge into a coherent and testable intervention logic suitable for large-scale project planning and evaluation.

Stakeholder analysis is the first step and aims to identify all relevant actors who influence or are affected by the project. In the context of megaprojects, this typically includes national and subnational authorities, project sponsors, financiers, contractors, regulatory bodies, affected communities, end users, and, in some cases, cross-border stakeholders. Stakeholder analysis goes beyond simple identification as it assesses stakeholder interests, influence, incentives, and potential conflicts. This step is particularly critical in megaproject environments characterized by multiple layers of governance and competing objectives, as

failure to recognize stakeholder asymmetries often leads to implementation delays, opposition, or renegotiation at later stages.

Problem analysis follows and seeks to define the core problem that the project is intended to address, along with its underlying causes and observable effects. This is typically conducted through the construction of a problem tree, where the central problem is placed at the core, its causes are structured below, and its effects above. The problem tree enforces causal discipline by distinguishing symptoms from root causes, thereby preventing the common error of designing projects that treat surface-level issues rather than structural constraints. In megaproject planning, problem analysis is essential for avoiding oversized or misaligned interventions that fail to address the fundamental drivers of underperformance, such as institutional bottlenecks, regulatory gaps, or demand-side weaknesses.

Building on the problem analysis, objectives analysis converts identified problems into positive, achievable objectives through the construction of an objectives tree. Each problem statement is reformulated into a desired future condition, maintaining the same causal structure. The objectives tree establishes a preliminary hierarchy of means and ends, illustrating how lower-level achievements contribute to higher-level development goals. This step is particularly important for megaprojects, where political narratives often conflate outputs (e.g., kilometers of road built) with outcomes or impacts (e.g., improved connectivity or economic growth). Objectives analysis helps to clarify these distinctions and prepares the ground for results-based evaluation.

101

The final step of the analysis phase is strategy analysis and selection, in which alternative intervention strategies are assessed and compared. Not all objectives identified in the objectives tree can or should be addressed by a single project. Strategy analysis involves selecting a coherent subset of objectives that are feasible given institutional capacity, financial constraints, and risk tolerance. This step explicitly acknowledges trade-offs and constraints, which is particularly important in megaproject contexts where ambition frequently exceeds implementation capability. The selected strategy defines the boundaries of the project and directly informs the structure of the Logical Framework Matrix in the subsequent planning phase.

In sum, the analysis phase of the LFA provides a systematic mechanism for transforming complex development challenges into structured, causally coherent project concepts. By enforcing clarity on stakeholders, problems, objectives, and strategic choices before project design begins, this phase reduces the likelihood of misalignment between project scope, institutional capacity, and long-term development objectives. For megaprojects—where early decisions lock in costs, risks, and performance trajectories for

decades—the analytical discipline imposed by this phase is a critical determinant of eventual success or failure.

3.1.2 The Planning Phase and the Structure of the Logical Framework Matrix

The planning phase of the Logical Framework Approach (LFA) translates the analytical outputs generated during the analysis phase into a structured project design suitable for implementation, monitoring, and evaluation. While the analysis phase focuses on understanding what problems exist and which strategic objectives should be pursued, the planning phase addresses how these objectives will be achieved and how success will be measured. The central product of this phase is the Logical Framework Matrix (LFM), which operationalizes the project's intervention logic into a concise and transparent governance tool (European Commission, 2004). The general template of the Logical Framework Matrix (LFM) is outlined in Figure 2.2.

RATIVE SUMMARY	**OBJECTIVELY VERIFIABLE INDICATORS (OVI)**	**MEANS OF VERIFICATION (MOV)**	**ASSUMPTIONS**
Overall objective			
Specific objectives:			
Expected results:			
Activities:	Means: 1. 2. … n	Costs: 1. 2. … n	

Figure 3.1 - General template of the Logical Framework Matrix (LFM)

The Logical Framework Matrix is a standardized four-by-four matrix that synthesizes the core elements of project design: objectives, indicators, verification sources, and assumptions. Its purpose is not merely to summarize project information, but to impose logical discipline by making explicit the causal relationships between project activities, expected results, and higher-level development objectives. In the context of megaprojects, where scale, duration, and institutional complexity significantly increase the risk of ambiguity, the LFM serves as a critical mechanism for aligning stakeholders around a shared and testable understanding of the project's logic.

The vertical structure of the LFM reflects the project's results hierarchy and consists of four interrelated levels. At the lowest level are Activities, which represent the concrete actions undertaken by the project, such as construction works, procurement processes, or capacity-building measures. Successful

implementation of activities is expected to produce Expected results, which are the direct, tangible deliverables of the project – for example, physical infrastructure assets or operational systems. Expected results, in turn, are intended to generate Specific objectives, defined as the changes in behaviour, performance, or conditions that can be reasonably attributed to the project, such as improved connectivity, reduced travel times, or enhanced service reliability. At the highest level stands the Overall Objective (Impact), which captures the long-term, broader development goal to which the project contributes, often beyond the project's direct control. Figure 3.2 outlines the vertical structure information flow.

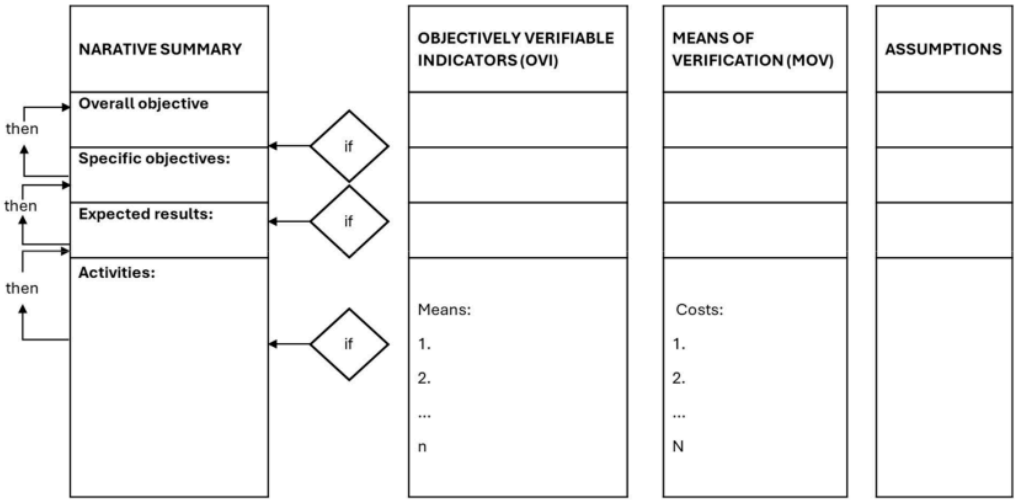


Figure 3.2 - Vertical structure information flow in the LFM

This hierarchical structure is fundamental to results-based project management, as it enforces a clear distinction between what the project does (activities), what it delivers (outputs), what it achieves (outcomes), and what it ultimately contributes to (impact). In megaproject contexts, this distinction is frequently blurred in political or public discourse, where Expected results are presented as proxies for success. The LFM counters this tendency by explicitly separating delivery from achievement and contribution, thereby creating the conceptual foundation for meaningful performance evaluation.

The horizontal structure of the LFM presented in Figure 3.3 complements the results hierarchy by specifying how progress and success at each level will be measured and verified. For each level of the intervention logic, the matrix requires the identification of Objectively Verifiable Indicators (OVIs) and corresponding Means of Verification (MOVs). This requirement ensures that objectives are not expressed in vague or aspirational terms, but are instead linked to measurable criteria and credible data sources, widely adopted and acceptable to all stakeholders involved in the project. The horizontal logic thus embeds

accountability directly into the project design, enabling monitoring and evaluation to be conducted systematically throughout the project lifecycle.

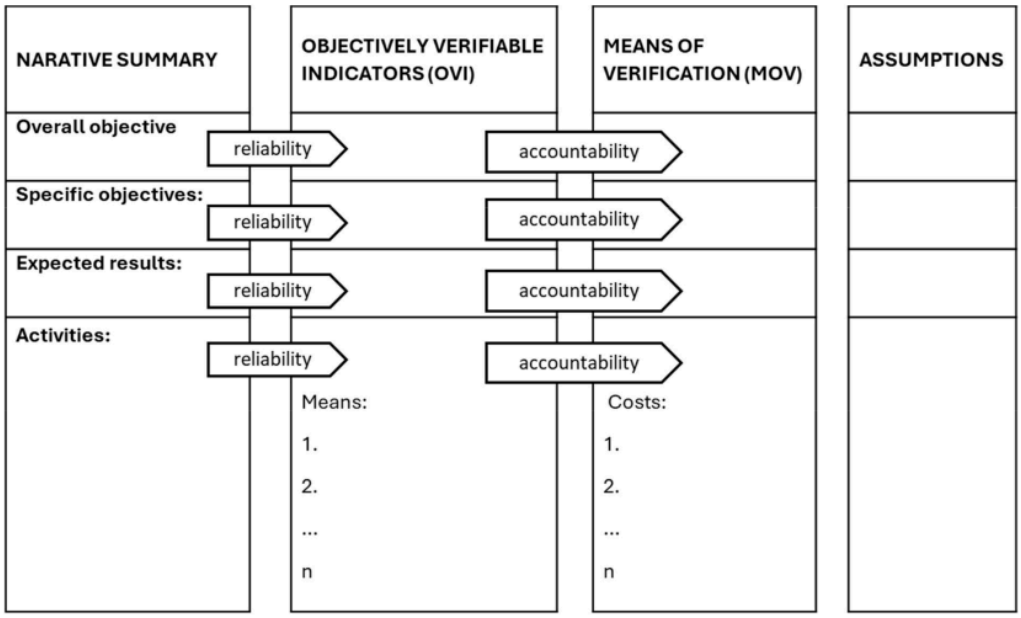


Figure 3.3 – Horizontal structure information flow in LFM

addition to objectives and indicators, the LFM incorporates a column for Assumptions, which captures external conditions necessary for the causal links between levels to hold. These assumptions explicitly recognize that project success depends not only on internal performance, but also on contextual factors of external nature such as regulatory stability, political support, macroeconomic conditions, and stakeholder cooperation. By documenting assumptions at each level of the results chain, the LFM provides a structured approach to risk identification and management, which is particularly important for megaprojects exposed to long-term uncertainty and environmental volatility.

Crucially, the planning phase does not occur in isolation from institutional and governance considerations. The formulation of the LFM typically involves consultation with key stakeholders and, in the case of publicly funded or IFI-supported projects, is subject to review and validation by financing institutions and oversight bodies. This process enhances transparency and reduces the likelihood of later disputes regarding project scope, objectives, or performance criteria. Within PCM-based governance frameworks, the approved Logical Framework Matrix effectively functions as a reference document against which implementation progress, modifications, and final outcomes are assessed.

In sum, the planning phase of the LFA transforms analytical insights into an operational project design anchored in results-based logic and measurable commitments. The Logical Framework Matrix produced at this stage provides a compact yet comprehensive representation of the project's rationale, objectives, risks, and accountability mechanisms. For megaprojects, where early design choices have long-lasting implications and opportunities for correction are limited, the discipline imposed by this phase is essential for aligning ambition with feasibility and for ensuring that subsequent implementation and evaluation remain anchored in clearly defined development objectives

3.1.3 Vertical, Horizontal, and Assumptions Logic in the Logical Framework Matrix

The analytical strength of the Logical Framework Matrix (LFM) lies not merely in its tabular structure, but in the internal logic that governs the relationships between its components. This logic operates simultaneously along three dimensions: vertical logic, horizontal logic, and assumptions logic. Combined which together, they establish a coherent causal framework linking project activities to long-term development objectives. Understanding and correctly applying these interrelated logics is essential for using the LFM as an effective governance and evaluation tool, particularly in the context of megaprojects characterized by complexity, long time horizons, and high exposure to external risks (European Commission, 2004). Figure 3.4 below outlines the key features of the Vertical, Horizontal, and Assumptions Logic explained below in the text.

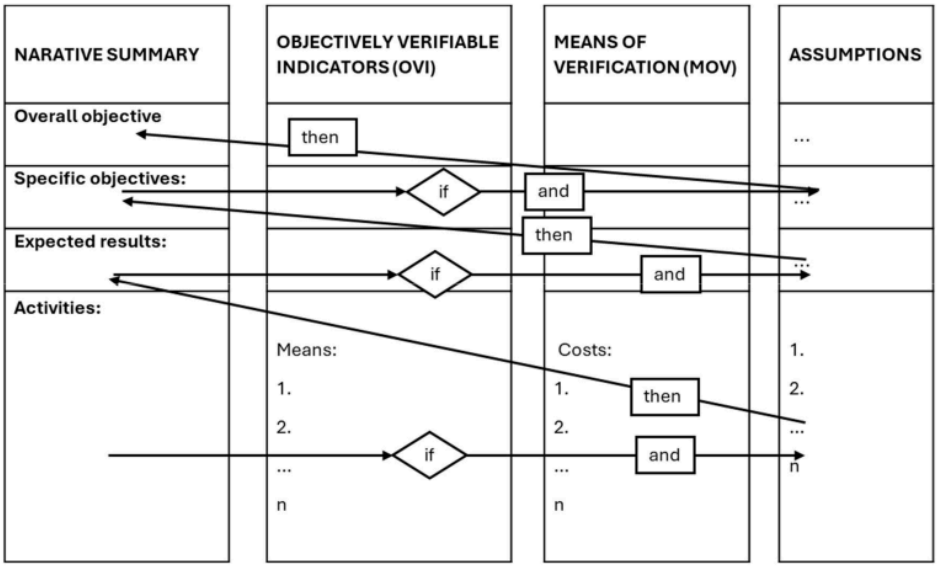


Figure 3.4 - key features of the Vertical, Horizontal, and Assumptions Logic in the LFM

Vertical logic, often referred to as the *means–ends logic*, defines the causal relationships between the different levels of the project's results hierarchy. It specifies how the successful completion of activities is expected to generate outputs, how outputs contribute to outcomes, and how outcomes support the achievement of broader impact objectives. This logic is typically expressed through conditional "if–then" relationships: *if* activities are implemented as planned, *then* outputs should be delivered; *if* outputs are delivered and relevant assumptions hold, *then* outcomes should materialize; *if* outcomes are achieved and external conditions remain favorable, *then* the project will contribute to its intended impact.

In megaproject environments, vertical logic is particularly important because causal links are often weakened by scale, institutional fragmentation, and temporal distance between intervention and impact. Large infrastructure projects frequently assume that physical delivery automatically leads to desired socioeconomic outcomes, without adequately testing intermediate causal steps. The LFM forces project designers and decision-makers to articulate these causal chains explicitly, thereby exposing weak or speculative assumptions that might otherwise remain implicit. As such, vertical logic serves as a diagnostic mechanism for identifying where project rationale may be overstated or insufficiently grounded in evidence.

Horizontal logic complements the causal structure by linking each level of the intervention logic to corresponding measurement and verification mechanisms. For every objective—whether at the level of outputs, outcomes, or impact—the LFM requires the specification of Objectively Verifiable Indicators (OVIs) and Means of Verification (MOVs). This ensures that progress and performance are assessed using predefined, measurable criteria rather than retrospective or subjective judgments. Horizontal logic thus transforms the LFM from a conceptual planning tool into an operational instrument for monitoring, reporting, and evaluation across the project lifecycle.

The importance of horizontal logic is particularly evident in megaproject evaluation, where performance disputes often arise due to ambiguous success criteria or the absence of credible data sources. By defining indicators and verification methods ex ante, the LFM reduces informational asymmetries among stakeholders and constrains the scope for post hoc reinterpretation of project objectives. In governance systems influenced by PCM and IFI standards, horizontal logic provides the evidentiary backbone for accountability to financiers, oversight bodies, and ultimately to taxpayers and end users.

The third dimension, assumptions logic, addresses the external conditions that must hold for the causal relationships defined by the vertical logic to remain valid. Assumptions capture factors beyond the direct control of project management, such as regulatory stability, macroeconomic conditions, political commitment, stakeholder cooperation, and environmental constraints. In the LFM, assumptions are

specified for each level of the results chain, making explicit the dependencies that link internal project performance to external context.

For megaprojects, assumptions logic is of particular significance due to the long duration and exposure of such projects to changing political, economic, and institutional environments. Failure to identify and monitor critical assumptions can result in projects that are technically successful but substantively ineffective, delivering outputs that fail to generate intended outcomes or impacts. The systematic documentation of assumptions within the LFM enables proactive risk management by allowing project managers and oversight bodies to monitor contextual changes and assess whether adaptive measures or strategic realignments are required.

Importantly, the three dimensions of logic in the LFM are interdependent. Weaknesses in vertical logic undermine the credibility of horizontal measurement, while poorly defined indicators limit the usefulness of assumptions monitoring. Effective use of the LFM therefore requires coherence across all three dimensions. This coherence is what distinguishes results-based governance from purely procedural compliance and explains why LFA remains a central element of PCM-based project management in public-sector and IFI-funded infrastructure programs.

In sum, vertical, horizontal, and assumptions logic together transform the Logical Framework Matrix into a comprehensive governance instrument capable of addressing both the technical and institutional challenges of megaproject delivery. By making causal relationships explicit, embedding measurement into design, and systematically accounting for external risk factors, the LFM provides a structured foundation for evaluating efficiency, effectiveness, and impact—dimensions that form the core analytical focus of the subsequent chapters of this dissertation.

3.1.4 Objectively Verifiable Indicators (OVIs) and Means of Verification (MOVs)

Objectively Verifiable Indicators (OVIs) and Means of Verification (MOVs) constitute the measurement and accountability backbone of the Logical Framework Matrix (LFM). While the vertical and assumptions logic define *what* a project intends to achieve and *under what conditions*, OVIs and MOVs determine *how* achievement is assessed and *on what empirical basis*. Together, they operationalize results-based governance by translating abstract objectives into measurable commitments and verifiable evidence, thereby enabling systematic monitoring and evaluation throughout the project lifecycle (European Commission, 2004).

Objectively Verifiable Indicators specify the criteria by which progress and success at each level of the results hierarchy—outputs, outcomes, and impact—can be assessed. To fulfill their function, OVIs

must be clearly defined, measurable, time-bound, and relevant to the corresponding objective. In PCM-based practice, well-formulated indicators answer three fundamental questions: *what* is to be measured, *how much* change is expected, and *by when* that change should occur. This requirement imposes analytical discipline at the design stage, forcing project planners to articulate expected results in concrete terms rather than relying on aspirational or politically appealing formulations.

In the context of megaprojects, the role of OVIs is particularly critical. Large infrastructure investments frequently conflate physical delivery with success, treating the completion of construction activities as an endpoint rather than as a means toward broader socioeconomic outcomes. OVIs counter this tendency by requiring explicit differentiation between delivery metrics—such as kilometers constructed or capacity installed—and performance metrics—such as reduced travel time, improved service reliability, or increased economic accessibility. By anchoring evaluation to predefined indicators, OVIs help prevent retrospective redefinition of success and reduce the scope for strategic misrepresentation in performance reporting.

Means of Verification complement OVIs by identifying the sources and methods through which indicator values will be measured. MOVs specify where data will come from, how it will be collected, and who is responsible for verification. Typical sources include administrative records, financial statements, technical reports, independent audits, user surveys, and official statistics. The explicit identification of MOVs enhances transparency by ensuring that indicators are not only measurable in principle but verifiable in practice. Without credible MOVs, indicators remain nominal and cannot support accountability or learning.

The distinction between OVIs and MOVs is essential for maintaining the objectivity of project evaluation. OVIs define *what constitutes success*, while MOVs ensure that success claims can be independently substantiated. This distinction is particularly relevant in megaproject environments, where informational asymmetries between project sponsors, contractors, financiers, and the public are pronounced. By requiring agreement on both indicators and verification sources at the outset, the LFM constrains post hoc disputes over data quality and interpretation.

Beyond measurement, OVIs and MOVs play a crucial role in adaptive project management. Continuous monitoring of indicators allows early identification of deviations from planned performance, enabling corrective action before inefficiencies become structurally embedded. In long-duration megaprojects, this function is especially important, as delays or cost overruns identified late in the lifecycle are often irreversible. The systematic use of OVIs and MOVs thus supports not only ex post evaluation but also real-time governance and risk management.

Importantly, OVIs and MOVs are closely linked to the distinction between efficiency, effectiveness, and impact, which underpins the analytical framework of this dissertation. Efficiency indicators typically relate to outputs and measure whether activities are delivered within planned time and budget constraints. Effectiveness indicators assess whether outputs lead to intended outcomes, capturing functional or behavioural change attributable to the project. Impact indicators operate at the highest level, reflecting longer-term contributions to broader development objectives. MOVs provide the evidentiary basis for assessing each of these dimensions, ensuring that evaluation is grounded in verifiable facts rather than subjective judgments.

In sum, OVIs and MOVs transform the Logical Framework Matrix from a planning artifact into a governance instrument capable of supporting accountability, learning, and evidence-based decision-making. By embedding measurement and verification into project design, they address key sources of megaproject underperformance, including vague objectives, weak monitoring, and retrospective rationalization. Their systematic application is therefore indispensable for evaluating megaproject performance in a manner that is transparent, comparable, and consistent with the principles of public-sector accountability that underpin PCM-based governance frameworks.

3.2 The significance of the LFA and LFM in managing megaprojects

The Logical Framework Approach (LFA) and its central planning and governance instrument, the Logical Framework Matrix (LFM), are of particular significance in the context of megaprojects due to the scale, complexity, and long-term risk exposure inherent in such investments. Megaprojects are systematically vulnerable to optimism bias, scope inflation, vague objective formulation, and politically driven decision-making, especially during early stages of the project lifecycle when strategic commitments are made under conditions of high uncertainty (Flyvbjerg, 2014; Merrow, 2011). By enforcing a structured articulation of objectives, causal relationships, assumptions, and measurable indicators, LFA directly addresses these structural weaknesses and introduces analytical discipline at precisely the stages where governance failures are most consequential.

The primary contribution of LFA/LFM to megaproject governance lies in its ability to formalize the distinction between delivery, achievement, and long-term contribution. By separating activities, outputs, outcomes, and impact within a single coherent framework, the LFM prevents the common conflation of physical completion with project success. This distinction is particularly important in large infrastructure projects, where political narratives often emphasize visible outputs while neglecting whether those outputs translate into functional improvements or sustainable socioeconomic benefits. Through its vertical and horizontal logic, the LFM embeds results-based thinking into project design and creates a transparent basis

for evaluating efficiency, effectiveness, and impact across the full project lifecycle (European Commission, 2004; OECD, 2019).

Equally important is the role of OVIs and MOVs as governance mechanisms rather than merely technical monitoring tools. By requiring ex ante agreement on how performance will be measured and verified, the LFM reduces informational asymmetries between project sponsors, contractors, financiers, and oversight institutions. This enhances accountability to public authorities and end users, particularly in projects financed through public or concessional resources, where taxpayers ultimately bear financial and operational risks (European Court of Auditors, 2015). In megaproject environments characterized by long implementation horizons and evolving external conditions, the systematic use of OVIs and MOVs also enables adaptive management by providing early warning signals of deviation and underperformance. The Logical Framework Approach is closely aligned with the principles of Results-Based Management (RBM) as articulated in international evaluation standards. The OECD-DAC evaluation framework emphasizes that effective public investment governance requires a clear results chain linking inputs and activities to outputs, outcomes, and long-term impact, supported by explicitly defined indicators at each level (OECD, 2021). The LFM operationalizes this logic by embedding Objectively Verifiable Indicators and Means of Verification directly into project design, thereby ensuring that performance assessment is grounded in measurable and verifiable evidence rather than ex post interpretation. This indicator discipline is particularly critical in megaprojects, where scale, duration, and political salience increase the risk of vague objectives and retrospective redefinition of success. By enforcing clarity on what is measured, how it is measured, and at which level of the results chain, the LFA provides a robust governance mechanism for aligning megaproject delivery with internationally recognized evaluation and accountability standards (OECD, 2021).

Finally, the relevance of LFA/LFM extends beyond individual project management to the broader institutional governance of infrastructure investment. When embedded within PCM-based frameworks and enforced through regulatory or financing conditionality, LFA functions as a coordinating mechanism that aligns stakeholder expectations, constrains opportunistic behaviour, and supports institutional learning across project cycles (Ika, 2018; Locatelli et al., 2017). This governance function is central to the analytical framework adopted in this dissertation, which uses the logic of LFA and LFM to evaluate megaproject performance comparatively. By treating LFA not as a compliance exercise but as a governing technology, the thesis positions it as a critical tool for improving megaproject outcomes irrespective of financing source or delivery model.

3.3 Project Initiation, Memoranda of Understanding, and Governance Implications

A fundamental yet often underexamined issue in megaproject analysis concerns the definition of when a project formally begins. This question is not merely procedural; it has profound implications for how cost overruns, schedule delays, and performance outcomes are measured and interpreted. In large infrastructure projects, the absence of a clearly defined and commonly accepted project starting point allows assessments to be shaped by selective interpretations, thereby obscuring accountability and undermining comparability across cases (Flyvbjerg, 2014).

From a project management and investment perspective, megaprojects do not begin with physical construction, financial close, or notice-to-proceed, but rather at the moment when key project parameters—scope, timeframe, and indicative budget—are first formally articulated and endorsed by the principal stakeholders. In practice, this often occurs through the signing of a Memorandum of Understanding (MoU) or a comparable preliminary agreement between governments, investors, or implementing entities. Although MoUs are typically non-binding and lack the legal enforceability of contracts, they represent the earliest formal institutional commitment to a project concept and establish expectations that shape subsequent decision-making (Merrow, 2011).

Defining the project start at the MoU stage is particularly important in the context of megaprojects because early commitments generate strong path dependency. Once a project is publicly announced and endorsed at the political and institutional level, subsequent stages—feasibility studies, financing negotiations, procurement strategies, and regulatory approvals—are frequently conducted under pressure to validate the initial decision rather than critically reassess it. Megaproject research consistently demonstrates that the most consequential cost, schedule, and benefit risks are locked in during these early conceptual phases, long before construction begins (Flyvbjerg, 2014; Flyvbjerg et al., 2003). Excluding this period from performance analysis systematically underestimates true project risk and distorts efficiency assessments.

In the context of the Belt and Road Initiative, MoUs play an especially prominent role. They are frequently used as public signalling instruments, allowing governments and implementing agencies to demonstrate participation in flagship initiatives and announce large investment volumes well before projects reach technical, financial, or institutional maturity (Rolland, 2017; Hillman, 2020). While breaching an MoU does not constitute a legal violation, the reputational and credibility costs associated with abandoning publicly announced projects are often substantial. As a result, MoUs function as *de facto* commitment devices that constrain future choices and influence project trajectories, even in the absence of

binding contractual obligations. Theoretical work on "Global China" suggests that Chinese state capital can exert an emboldening effect on host-country state capacity by expanding policy space and implementation discretion, particularly in infrastructure sectors. This dynamic contrasts with the disciplinary mechanisms typically associated with global private capital and IFI conditionality (Lee, 2018).

Importantly, this interpretation is consistent with established project management standards. The Project Management Institute defines the project charter as the document that formally authorizes a project and grants the project manager authority to apply organizational resources to project activities (PMI, 2017). While the PMBOK Guide does not prescribe a single mandatory form suggests, it explicitly acknowledges that formal authorization can be achieved through various instruments, depending on institutional context. In large public-sector and international projects, preliminary agreements such as MoUs frequently fulfill this role by defining initial objectives, scope boundaries, key stakeholders, and governance arrangements. When an MoU performs these functions, it can be analytically treated as equivalent to a project charter for the purposes of lifecycle analysis and performance measurement.

From an evaluative standpoint, anchoring project analysis at the MoU stage enhances methodological rigor and transparency. It ensures that assessments of efficiency capture the full duration of project development, including delays associated with feasibility reassessments, regulatory alignment, financing renegotiations, and institutional capacity constraints. This approach aligns with both megaproject scholarship and best-practice project management principles, which emphasize that project outcomes are largely determined during early decision-making phases rather than during execution alone (Merrow, 2011; Flyvbjerg, 2014).

In summary, defining the formal start of a megaproject at the point of initial public and institutional commitment—typically marked by the signing of an MoU—provides a more accurate and analytically defensible basis for evaluating project performance and efficiency. This definition captures the full lifecycle of decision-making, reflects the realities of path dependency and public commitment, and prevents the systematic understatement of time and cost overruns that arises when analysis begins only at later contractual or construction milestones.

3.4 Comparative Case-Study Methodology for Evaluating BRI Megaproject Performance in Europe

Evaluating the performance of megaprojects requires methodological approaches capable of capturing complexity, institutional variation, and context-specific dynamics. Large-sample quantitative studies have been highly effective in identifying systemic patterns of cost overruns, schedule delays, and

benefit shortfalls in megaproject delivery (Flyvbjerg, 2014; Flyvbjerg et al., 2003). However, such approaches are limited in their ability to explain *why* performance outcomes diverge across projects that are similar in scale, technology, and contractual form but embedded in different institutional environments. A comparative case-study methodology is therefore particularly appropriate for the evaluation of BRI megaprojects in Europe, where governance quality and regulatory capacity vary significantly across host countries.

Comparative case studies enable in-depth examination of causal mechanisms operating across the full project lifecycle, from early public and institutional commitment through preparation, financing, procurement, implementation, and early operation (Yin, 2018). This is especially relevant for megaprojects, where early-stage decisions—often formalized through memoranda of understanding—create strong path dependencies that shape subsequent project trajectories (Flyvbjerg, 2014; Merrow, 2011). By tracing these processes longitudinally, case studies capture how institutional constraints and governance arrangements interact with delivery models to influence project outcomes. Comparative case-study methodology is particularly well suited to the analysis of complex infrastructure governance arrangements, where causal mechanisms are context-dependent and not readily captured through large-sample quantitative techniques alone. As emphasized by George and Bennett (2021), case studies are especially valuable for theory development and refinement in settings characterized by causal complexity, institutional interaction, and path-dependent outcomes. Megaprojects exemplify such conditions, as their performance is shaped by interdependent technical, organizational, financial, and political processes unfolding over long time horizons. Comparative case studies allow researchers to trace how governance structures, project preparation practices, and institutional capacity interact to produce divergent performance outcomes across otherwise similar projects. By focusing on within-case process tracing and cross-case comparison, this approach enables the identification of explanatory mechanisms that underpin efficiency and effectiveness differences in BRI-affiliated and IFI-affiliated megaprojects.

Existing research emphasizes the heterogeneous nature of Chinese investment engagement in Central and Eastern Europe, shaped by host-country institutional capacity, sectoral composition, and domestic policy priorities rather than by a uniform regional strategy (Szunomár, 2018). Europe provides a particularly valuable analytical setting for such comparison. While EU member states operate within a broadly harmonized legal and regulatory framework, they exhibit substantial variation in administrative capacity, public procurement practices, and experience with large infrastructure projects (European Court of Auditors, 2015). This variation allows for controlled comparison between projects implemented under strong PCM-based governance regimes and those developed in weaker or transitional institutional contexts. Moreover, Chinese SOEs operating in Europe are required to adapt their EPC and EPC+F delivery models

to host-country regulatory requirements, making Europe an ideal environment for assessing institutional compatibility and performance implications (Hillman, 2020; Rolland, 2017).

A comparative case-study methodology also mitigates the risk of politicized or anecdotal interpretations that frequently characterize discussions of BRI performance. By applying a consistent analytical framework across cases, it becomes possible to distinguish outcomes driven by project preparation quality, governance alignment, and risk allocation from those attributed to nationality, geopolitical intent, or cultural explanations (Flyvbjerg, 2014). This approach aligns with the dissertation's explicit objective of evaluating BRI megaprojects through an investor- and project-management lens rather than through geopolitical narratives.

Finally, comparative case studies allow for systematic application of Project Cycle Management and the Logical Framework Approach as evaluative tools. The Logical Framework Matrix, supported by Objectively Verifiable Indicators and Means of Verification, provides a structured basis for comparing whether projects delivered their intended outputs, outcomes, and broader impacts under different institutional conditions (European Commission, 2004; Ika, 2018). Applying these tools consistently across cases strengthens internal validity while enabling the derivation of lessons applicable to future megaprojects beyond the specific cases examined.

3.5 Case Selection Criteria for the Comparative Evaluation of BRI Megaprojects

The selection of case studies is a critical methodological step, as it determines the analytical leverage of comparative research and directly affects the validity of derived conclusions. In this dissertation, case selection is guided by theoretically informed and methodologically transparent criteria designed to isolate the relationship between project delivery models, institutional environments, and performance outcomes. Rather than seeking statistical representativeness, the objective is analytical depth and causal insight, consistent with best practice in comparative case-study research (Yin, 2018).

First, selected cases must qualify as megaprojects according to the criteria established earlier in the chapter. Projects must involve large-scale infrastructure investment, extended implementation timelines, and significant economic or societal impact. This ensures comparability across cases and prevents conflation of megaproject dynamics with those of standard infrastructure projects, whose risk profiles and governance requirements differ substantially (Flyvbjerg, 2014).

Second, cases must involve Chinese state-owned enterprises as principal contractors or developers, operating under EPC or EPC+F delivery arrangements associated with the Belt and Road Initiative. This

criterion ensures that the projects examined share a broadly similar delivery logic and organizational model, allowing performance differences to be attributed to institutional and governance factors rather than to contractor nationality or technological variance (Merrow, 2011; Hillman, 2020).

Third, cases are selected to maximize institutional variation within a broadly comparable regional context. Europe provides a unique analytical environment in which projects are implemented under diverse regulatory regimes ranging from highly institutionalized EU member states to accession or neighboring countries with weaker administrative capacity. By holding the contractor model constant while varying institutional strength, the comparative design enables examination of how governance quality, regulatory enforcement, and project-preparation standards shape megaproject outcomes (European Court of Auditors, 2015; Locatelli et al., 2017).

Fourth, case selection prioritizes variation in observed performance outcomes, including differences in cost control, schedule adherence, scope stability, and operational readiness. Comparing projects that have delivered successfully with those that have experienced delays, renegotiations, or cost escalation strengthens causal inference by allowing identification of mechanisms associated with both positive and negative outcomes. This logic corresponds to the “most similar systems” approach commonly employed in comparative research designs (Yin, 2018).

Fifth, cases must offer sufficient data availability and transparency to support rigorous analysis. This includes access to official project documentation, audit reports, procurement records, parliamentary or institutional reviews, and credible secondary analyses. Transparency and documentation are essential preconditions for meaningful evaluation, particularly in publicly funded infrastructure projects (European Commission, 2004).

Finally, the selection process is informed by analytical relevance rather than political prominence. Highly visible or controversial projects are not chosen for symbolic reasons but for their ability to illuminate key methodological questions concerning project preparation, institutional alignment, risk allocation, and governance performance. This approach aligns with established recommendations to avoid selection bias and politicization in case-study research (Flyvbjerg, 2006).

In summary, the case-selection strategy combines theoretical relevance, institutional variation, delivery-model consistency, outcome diversity, and data accessibility. This structured approach ensures that the comparative analysis yields meaningful insights into how and why BRI megaprojects perform differently across European contexts, thereby supporting analytically grounded conclusions about project governance and investment efficiency.

3.6 Megaproject Performance, Risk, and Governance in the Literature?

The literature on megaprojects has developed substantially over the past two decades and now constitutes a well-established interdisciplinary field spanning project management, economics, political science, and institutional governance. Across this diverse body of work, a strong empirical consensus has emerged: megaprojects are systematically prone to cost overruns, schedule delays, and benefit shortfalls. Early comparative studies demonstrated that these outcomes are not isolated failures attributable to poor management or exceptional circumstances, but recurring patterns observable across sectors, countries, and governance systems (Flyvbjerg et al., 2003). Subsequent large-sample quantitative studies reinforced these findings, showing that a majority of megaprojects exceed initial cost estimates and fail to deliver anticipated socioeconomic benefits, regardless of technological domain or geographic context (Flyvbjerg, 2014).

One dominant explanatory strand in the literature attributes megaproject underperformance to behavioural and political mechanisms that distort early decision-making. The concepts of optimism bias and strategic misrepresentation have become central analytical tools for explaining why project promoters systematically underestimate costs, risks, and implementation complexity while overstating benefits in order to secure political approval, funding, or institutional support (Flyvbjerg, 2006; Flyvbjerg et al., 2009). These distortions are particularly acute in megaprojects because their scale amplifies political visibility and symbolic value, creating incentives for decision-makers to prioritize project approval over long-term performance. Importantly, the literature emphasizes that these biases are not merely individual cognitive errors, but are embedded within organizational and political structures that reward early commitment and penalize reconsideration.

A second major body of scholarship emphasizes technical and systemic complexity as a fundamental source of megaproject risk. From this perspective, megaprojects are conceptualized as complex socio-technical systems composed of interacting engineering subsystems, organizational arrangements, financial structures, and regulatory frameworks (Locatelli et al., 2014). The interdependencies among these elements generate emergent risks that cannot be effectively managed through linear planning or traditional risk registers. Systems-based analyses highlight how interface risks, coordination failures, and delayed feedback loops increase vulnerability to cascading disruptions, particularly when responsibilities are fragmented across multiple contractors, agencies, and jurisdictions (Merrow, 2011).

Governance-oriented contributions further extend the analytical lens by examining how institutional arrangements shape megaproject outcomes. This literature highlights the role of fragmented authority, misaligned incentives, and weak accountability mechanisms in undermining effective project

oversight (Miller & Lessard, 2000; Flyvbjerg, 2014). Scholars increasingly argue that conventional project management approaches—focused narrowly on cost, time, and scope—are insufficient for projects whose outcomes depend on long-term political commitment, regulatory stability, and stakeholder legitimacy. As a result, governance frameworks that integrate stakeholder engagement, transparency mechanisms, and adaptive decision-making processes have gained prominence in the literature (Locatelli et al., 2017).

More recent research synthesizes behavioural, technical, and governance perspectives by emphasizing the decisive importance of front-end decision-making and project preparation. Empirical studies consistently demonstrate that the quality of early-stage planning—particularly scope definition, risk assessment, institutional alignment, and governance design—is the strongest predictor of megaproject performance (Merrow, 2011; Flyvbjerg, 2014). This insight has shifted scholarly attention away from execution-phase control toward the conditions under which projects are conceived, justified, and approved. Consequently, increasing emphasis is placed on methodologies and governance mechanisms capable of imposing discipline before irreversible financial and political commitments are made.

Despite its analytical richness, the megaproject literature exhibits several important limitations. First, much of the empirical evidence is derived from Western-led infrastructure projects or portfolios financed by multilateral development banks, raising questions about the generalizability of findings to projects delivered under alternative institutional and financial models. Second, while governance failures are widely acknowledged, relatively few studies operationalize governance quality through concrete evaluative tools that enable systematic cross-case comparison. Finally, the literature has paid limited attention to Chinese-led infrastructure megaprojects associated with the Belt and Road Initiative, particularly from a project management and investment-performance perspective rather than a geopolitical one.

These gaps motivate the present dissertation's analytical approach. By applying structured methodologies such as Project Cycle Management and the Logical Framework Approach to BRI megaprojects implemented in Europe, the research seeks to complement existing megaproject theory with a governance- and preparation-focused evaluation framework. In doing so, it contributes to the literature by moving beyond descriptive accounts of failure toward analytically grounded explanations of how institutional context, delivery models, and early decision-making shape megaproject performance.

3.7 Conceptualizations of the Project Lifecycle in Global Project Management Frameworks

Global project management frameworks provide structured representations of the project lifecycle intended to guide planning, execution, monitoring, and closure across a wide range of organizational and sectoral contexts. While these frameworks differ in terminology and emphasis, they share a common objective: to decompose complex projects into manageable phases and to provide decision-makers with standardized processes for controlling time, cost, scope, quality, and risk. Among the most influential and widely adopted frameworks are those developed by the Project Management Institute (PMI), the International Organization for Standardization (ISO), and the UK government's PRINCE2 methodology.

The Project Management Institute (PMI) conceptualizes the project lifecycle as a sequence of phases that collectively enable project delivery from initiation to closure. In the PMBOK® Guide, the lifecycle is framed around five process groups: initiating, planning, executing, monitoring and controlling, and closing, which are applied iteratively throughout the project rather than strictly sequentially (Project Management Institute, 2017). This process-oriented structure emphasizes managerial control and flexibility, allowing project managers to tailor practices to project complexity and organizational context. Importantly, the PMBOK framework distinguishes between the project lifecycle and the product lifecycle, underscoring that project governance focuses on delivery processes rather than long-term operational outcomes. Figure 3.5 depicts the mentioned process groups with underlying activities included.

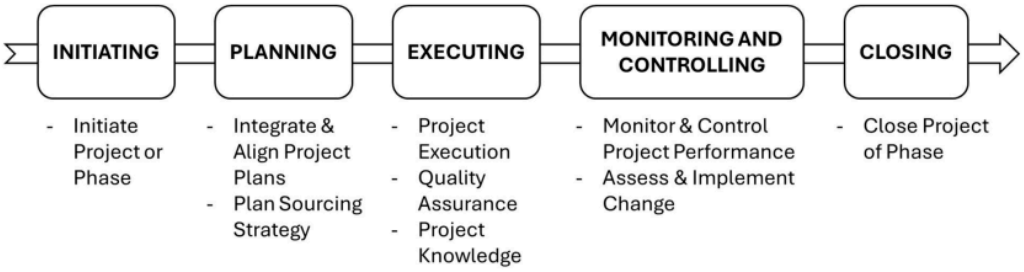


Figure 3.5 – Project lifecycle according to PMI (adaptation from the PMBOK® Guide)

ISO standards adopt a similar but more principle-based approach. ISO 21502:2020 defines the project lifecycle as a set of phases that provide a logical framework for managing projects from start to completion, while deliberately avoiding prescriptive sequencing in order to accommodate diverse organizational environments (International Organization for Standardization, 2020). As presented in Figure 3.6 the ISO framework emphasizes governance, value delivery, stakeholder engagement, and alignment

with organizational strategy, reflecting a shift toward outcome-oriented project management. However, like PMBOK, ISO standards are largely agnostic with respect to public accountability mechanisms and do not prescribe detailed ex ante appraisal requirements.

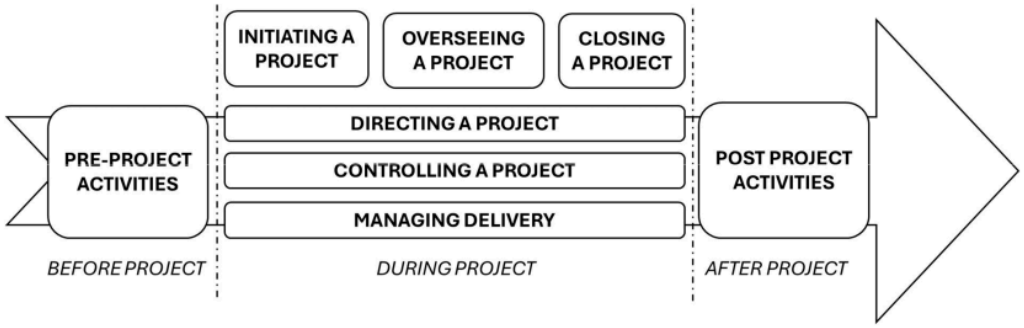


Figure 3.6 – Project lifecycle according to ISO (adaptation from the ISO 21502:2020)

PRINCE2 offers a more explicitly structured lifecycle model, dividing projects into defined stages governed by management decision points. The methodology shown in Figure 3.7 emphasizes business justification through the "continued business case" principle, requiring that projects remain viable at each stage before proceeding further (AXELOS, 2017). PRINCE2's stage-gate logic strengthens control over scope and risk escalation and introduces a clearer separation between strategic oversight and day-to-day management. Nevertheless, PRINCE2 remains primarily execution-focused and is designed to be adaptable across both public and private-sector contexts, rather than explicitly oriented toward taxpayer accountability or development impact.

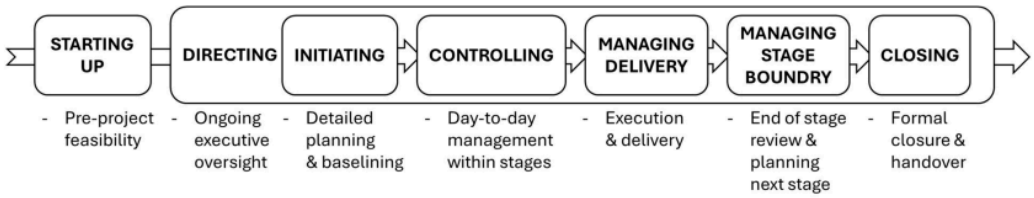


Figure 3.7 – Project lifecycle according to PRINCE2 (adaptation from the PRINCE2 7th Edition)

Despite their widespread adoption, these global frameworks exhibit common limitations when applied to large public-sector infrastructure megaprojects. First, they focus predominantly on project execution and managerial control rather than on the political, institutional, and societal dimensions that shape project outcomes over long time horizons (Flyvbjerg, 2014). Second, while they acknowledge the importance of early-stage planning, they provide limited guidance on how to conduct rigorous ex ante appraisal, institutional readiness assessment, or stakeholder alignment in environments characterized by

complex governance and public scrutiny. As a result, these frameworks are often supplemented by sector-specific or institutionally grounded methodologies when applied to large-scale public investments.

This observation provides a critical bridge to Project Cycle Management. While PMBOK, ISO, and PRINCE2 offer valuable managerial tools, they do not impose the level of analytical discipline, public accountability, and results-orientation required for publicly financed megaprojects. PCM addresses these gaps by embedding project management within a broader policy and governance framework that explicitly links project design to development objectives, stakeholder needs, and long-term societal outcomes. Understanding the strengths and limitations of global project management frameworks is therefore essential for positioning PCM and the Logical Framework Approach as complementary—and, in certain contexts, superior—mechanisms for governing megaprojects.

3.8 Institutional Application of PCM and LFA in Large Public Infrastructure Projects

Project Cycle Management (PCM) and the Logical Framework Approach (LFA) have been widely applied as governance and evaluation frameworks in publicly funded infrastructure projects, particularly those financed by multilateral development banks, development agencies, and supranational institutions. Originating in development cooperation practice in the 1970s and 1980s, LFA was introduced as a response to recurrent project failures linked to vague objectives, weak monitoring, and insufficient stakeholder alignment (Gasper, 2000). Over time, PCM emerged as an integrated lifecycle framework within which LFA functions as the core analytical and decision-support tool, structuring project identification, formulation, implementation, and evaluation (European Commission, 2004).

Within the European Union, PCM has been institutionalized as the standard methodology for managing externally financed development projects and, in adapted form, for major public infrastructure investments. European Commission guidelines require systematic application of LFA during project preparation, including problem analysis, stakeholder analysis, risk assessment, and construction of the Logical Framework Matrix with Objectively Verifiable Indicators and Means of Verification (European Commission, 2004). Empirical evaluations conducted by the European Court of Auditors indicate that projects applying PCM principles more rigorously tend to demonstrate clearer intervention logic, stronger monitoring systems, and improved accountability compared to projects lacking structured ex ante appraisal (European Court of Auditors, 2015).

In addition to its analytical role, the Logical Framework Approach is formally mandated within the European Union's project governance architecture for externally funded actions. Under the Practical Guide

to Contract Procedures for EU External Actions (PRAG), the preparation and use of a Logical Framework Matrix is a required component of project identification, formulation, and financing decisions for EU-funded interventions (European Commission, 2023). This requirement reflects the EU's commitment to results-based management, transparency, and accountability in the allocation of public and concessional finance. By mandating explicit intervention logic, Objectively Verifiable Indicators, and Means of Verification prior to financing approval, PRAG embeds LFA as a control mechanism designed to protect taxpayer resources and ensure that funded projects deliver measurable and verifiable public value.

Beyond the EU, PCM and LFA have been extensively employed by international financial institutions such as the World Bank, regional development banks, and bilateral donors as tools for ensuring value for money and development effectiveness in large-scale infrastructure investments. Studies of donor-funded transport, energy, and water projects show that LFA-based designs facilitate clearer articulation of outcomes and impacts, enabling more systematic performance monitoring throughout the project lifecycle (Ika et al., 2012). In particular, the use of OVIs and MOVs has been shown to strengthen results-based management by linking financial inputs to measurable outputs and longer-term development objectives.

The academic literature also highlights important limitations and critiques of PCM and LFA. Scholars note that rigid application of the Logical Framework Matrix can oversimplify complex development processes and underrepresent dynamic institutional and political factors (Gasper, 2000; Ika, 2012). Others argue that LFA's linear causality assumptions may be poorly suited to highly complex or adaptive environments. However, more recent applications emphasize flexible and iterative use of PCM principles, combining structured planning with adaptive management approaches that allow for revision of assumptions, indicators, and risk mitigation strategies over time (Ika et al., 2012).

In the context of large infrastructure megaprojects, PCM and LFA have been particularly valuable as governance instruments rather than merely technical planning tools. By requiring explicit articulation of objectives, stakeholder responsibilities, and verification mechanisms before financial commitment, PCM imposes discipline at the front end of the project lifecycle—precisely where megaproject literature identifies the greatest risk of failure (Flyvbjerg, 2014; Merrow, 2011). This governance function distinguishes PCM-based projects from those advanced primarily through bilateral negotiations or contractor-driven delivery models, where systematic ex ante evaluation is often limited.

Overall, the literature demonstrates that PCM and LFA are most effective when applied as part of a broader institutional framework that values transparency, accountability, and learning. While not a panacea, their structured emphasis on intervention logic, measurable results, and lifecycle-based decision-making has made them central tools in public-sector infrastructure governance. These characteristics make

PCM and LFA particularly relevant for evaluating BRI megaprojects implemented in European contexts, where public accountability standards and regulatory oversight are high and where project performance must be assessed not only in financial terms but also in relation to long-term societal outcomes.

3.9 Assessing Chinese Outward Infrastructure Investment and BRI Projects in the Literature

The literature on Chinese outward foreign direct investment (OFDI) and the Belt and Road Initiative (BRI) has expanded rapidly since the initiative's formal launch in 2013, spanning international political economy, development studies, finance, and infrastructure governance. A central theme across this literature is that China's overseas infrastructure engagement cannot be explained through a single causal logic. Instead, it reflects the interaction of domestic industrial policy, outward economic strategy, and host-country institutional conditions (Shambaugh, 2013; Naughton & Tsai, 2015). Within this framing, the BRI is commonly interpreted as an umbrella initiative that coordinates state agencies, policy banks, and state-owned enterprises around overseas investment and contracting opportunities, while remaining flexible in its geographic and sectoral priorities (Rolland, 2017; Hillman, 2020). A related strand of the literature conceptualizes Chinese overseas infrastructure finance as operating within "coordinated credit spaces," in which policy banks, state-owned enterprises, and government agencies jointly shape investment decisions and risk management practices. Rather than relying on arm's-length project finance, this model emphasizes strategic coordination across institutions, enabling rapid mobilization of capital and alignment with broader industrial and foreign policy objectives. At the same time, scholars note that such coordination can blur the boundaries between commercial and policy rationales, placing greater weight on host-country institutional capacity and project preparation in determining long-term performance outcomes (Chin & Gallagher, 2019).

Beyond financial and contractual governance, Chinese authorities identified technical standards and regulatory interoperability as critical determinants of long-term infrastructure performance. The "Standards Connectivity Jointly Building the Belt and Road – Action Plan (2018–2020)" emphasizes the alignment of engineering, safety, environmental, and operational standards across participating countries as a means of reducing implementation friction and improving project sustainability (Belt and Road Portal, 2018). Rather than mandating the adoption of Chinese standards, the action plan promotes mutual recognition, coordination, and gradual convergence, reflecting an awareness that misaligned technical and regulatory frameworks can generate lifecycle inefficiencies, maintenance challenges, and operational risks. This focus on standards connectivity reinforces the broader argument that long-term megaproject outcomes depend not only on financing and construction performance, but also on the institutional compatibility of regulatory and technical systems governing project operation and integration. Chinese authorities have also

articulated formal financial governance principles intended to guide Belt and Road infrastructure financing practices. The "Guiding Principles on Financing the Development of the Belt and Road" emphasize debt sustainability, market-oriented financing, risk-sharing arrangements, and the alignment of financing structures with host-country fiscal capacity (Ministry of Finance of the People's Republic of China, 2017). Rather than prescribing standardized project appraisal procedures, the principles outline broad norms for responsible financing, encouraging lenders and project sponsors to account for repayment capacity, project viability, and long-term fiscal impacts. This approach reinforces the interpretation that governance challenges in BRI-affiliated megaprojects stem less from the absence of articulated financial rules than from variability in how these principles are operationalized through contracts, project preparation processes, and host-country institutional frameworks.

Complementing institutional and financial interpretations, another strand of the literature cautions against viewing the Belt and Road Initiative primarily as a coherent grand strategy directed from the centre. Instead, the BRI is characterized as a flexible and evolving policy framework that accommodates diverse actors, interests, and implementation practices across sectors and regions. From this perspective, variation in project design, financing arrangements, and performance outcomes reflects decentralized decision-making and negotiation processes rather than uniform strategic intent, reinforcing the importance of host-country institutional conditions and project-level governance in shaping outcomes (Jones & Zeng, 2019). A substantial empirical strand focuses on the financial architecture underpinning BRI projects. Building on these interpretive perspectives, a substantial empirical strand focuses on the financial architecture underpinning BRI projects. Scholars emphasize the central role of Chinese policy banks and state-backed financial instruments in enabling large-scale overseas infrastructure investment, particularly in environments where commercial finance is limited or risk-averse (Gallagher, 2017; Dollar, 2019). This literature highlights how EPC and EPC+F delivery models—bundling engineering, procurement, construction, and financing—can accelerate project initiation and implementation. At the same time, it identifies potential vulnerabilities related to debt sustainability, risk allocation, and long-term fiscal exposure when project fundamentals are weak or when host-country institutional capacity is limited (Brautigam, 2020). Drawing on prior analytical work by the author, the widespread characterization of Chinese overseas infrastructure finance as "debt-trap diplomacy" obscures more than it explains, as debt distress outcomes are neither systematic nor unique to Chinese lending but instead reflect the interaction of project design, financing structure, and host-country fiscal and governance conditions (Radunović, 2020). Framing debt risks primarily through geopolitical intent risks diverting attention from the institutional and managerial factors that shape project sustainability and debt performance in practice. Analyses further note that repayment structures based on sovereign guarantees or resource-backed mechanisms differentiate

Chinese financing models from those of multilateral development banks, with important implications for accountability and risk management (Gallagher, 2017; Brautigam, 2020).

Chinese policy frameworks also emphasize science, technology, and innovation cooperation as mechanisms for enhancing the long-term developmental impact of Belt and Road infrastructure projects. The "Science, Technology and Innovation Cooperation Plan for Jointly Building the Belt and Road Initiative" outlines objectives related to joint research platforms, technology transfer, standards development, and capacity building across participating countries, positioning infrastructure projects as vehicles for broader innovation collaboration (Belt and Road Portal, 2017). Rather than focusing narrowly on construction outputs, the plan frames innovation cooperation as a means of improving lifecycle performance, operational sustainability, and institutional learning. This perspective reinforces the argument that long-term impacts of BRI megaprojects depend not only on initial investment and delivery efficiency, but also on the extent to which project implementation is linked to knowledge exchange and host-country absorptive capacity.

Another prominent body of scholarship evaluates the BRI through geopolitical and strategic lenses, emphasizing connectivity, corridor development, and China's growing role in global infrastructure provision (Rolland, 2017; Shambaugh, 2013). More recent contributions, however, caution against over-deterministic geopolitical interpretations and instead stress the importance of implementation-level factors—such as contracting arrangements, governance frameworks, and regulatory compatibility—in shaping project outcomes (Jones & Zeng, 2019). This perspective aligns with the view that BRI project performance is not predetermined by strategic intent alone, but emerges from interactions between delivery models and host-country institutional environments.

A further strand of the literature examines firm-level behavior and organizational capabilities, focusing on Chinese state-owned enterprises as hybrid actors embedded within state oversight systems while competing in international construction markets (Liao, 2019; Wang & Chen, 2021). These studies highlight how SOE incentives combine commercial objectives with strategic mandates, such as market entry, technology export, and participation in high-profile overseas projects (Naughton & Tsai, 2015; Wang & Chen, 2021). While hierarchical governance structures and centralized coordination can facilitate rapid mobilization and execution, empirical analyses also document frictions in jurisdictions that require transparent procurement, participatory decision-making, and strict regulatory compliance (Garcia-Herrero & Xu, 2019; Hillman, 2020).

For the European context in particular, the literature documents a significant evolution in Chinese investment patterns over time. Independent European market-research and think-tank assessments show

that large-scale mergers and acquisitions declined after the mid-2010s, while greenfield investments increased in manufacturing and technology-related sectors such as electric vehicles, batteries, and renewable energy (Hanemann et al., 2019; Kratz et al., 2023). These findings suggest that Chinese engagement in Europe is increasingly shaped by regulatory screening mechanisms, industrial policy interaction, and host-country governance standards, rather than by expansion of infrastructure megaprojects alone (Hillman, 2020). Parallel policy-oriented analyses raise concerns regarding procurement practices, governance compatibility, and the alignment of bilateral delivery models with EU regulatory norms (European Court of Auditors, 2015).

Despite the breadth of this literature, important gaps remain. Much of the existing scholarship evaluates BRI projects through geopolitical, macroeconomic, or debt-sustainability lenses, while fewer studies operationalize project performance using structured project governance methodologies that enable systematic comparison across cases (Jones & Zeng, 2019; Brautigam, 2020). Moreover, although institutional context is frequently acknowledged as relevant, it is rarely translated into concrete evaluative frameworks that link project preparation, monitoring systems, and verification mechanisms to performance outcomes. These gaps motivate the present dissertation's use of Project Cycle Management and the Logical Framework Approach as analytical lenses for evaluating BRI megaprojects in Europe, enabling structured, lifecycle-based comparison grounded in measurable indicators and accountability mechanisms (European Commission, 2004; Flyvbjerg, 2014).

A further contribution to this literature conceptualizes Chinese overseas infrastructure finance as a distinct form of development finance shaped by China's domestic political economy and institutional configuration. Rather than replicating the project appraisal and conditionality frameworks of multilateral development banks, this model emphasizes state coordination, policy-bank lending, and close integration between financing and implementation through state-owned enterprises. While this approach enables rapid project mobilization and flexibility in contexts underserved by commercial finance, scholars note that it places greater responsibility on host-country institutions to ensure project quality, fiscal sustainability, and effective risk management, as formal ex ante safeguards are less standardized than in IFI-financed projects. From this perspective, performance outcomes in BRI megaprojects are best understood as co-produced through the interaction of Chinese development finance practices and host-country governance capacity, rather than as the automatic result of lender intent or financing modality (Development Finance with Chinese Characteristics, 2020).

3.10 Gaps in Project-Management-Based Evaluation of BRI Megaprojects

Despite the rapid expansion of scholarship on megaprojects, Chinese outward infrastructure investment, and the Belt and Road Initiative, significant gaps remain in how BRI megaproject performance is conceptualized and evaluated. While megaproject literature has generated robust empirical evidence on cost overruns, schedule delays, and benefit shortfalls, it has largely focused on projects delivered under Western governance models or financed by multilateral development banks (Flyvbjerg, 2014; Merrow, 2011). Consequently, insights derived from this literature are not always systematically extended to projects delivered through alternative institutional arrangements, such as those characterizing many BRI infrastructure investments. Prior analytical work by the author further indicates that the performance of Chinese infrastructure investments in the Western Balkans is strongly conditioned by the degree to which Chinese delivery models are adapted to host-country legal, procurement, and administrative frameworks, suggesting that institutional compatibility plays a more decisive role in project outcomes than firm-level capability alone (Radunović, 2020).

A first major gap concerns the dominant analytical lenses applied to BRI projects. Much of the existing literature evaluates BRI through geopolitical, strategic, or macroeconomic perspectives, emphasizing issues such as influence projection, connectivity corridors, or debt sustainability (Shambaugh, 2013; Rolland, 2017; Brautigam, 2020). While these approaches provide valuable contextual insights, they often treat projects as instruments of state strategy rather than as complex investment undertakings governed by lifecycle decisions, contractual structures, and institutional constraints. As a result, project-level performance dynamics—how projects are prepared, monitored, and evaluated—remain underexplored.

A second gap relates to the limited operationalization of governance quality in empirical studies. Although governance failures are widely acknowledged as central to megaproject underperformance, few studies translate governance concepts into concrete evaluative frameworks that can be applied consistently across cases (Flyvbjerg, 2014; Locatelli et al., 2017). In particular, existing research rarely specifies how institutional capacity, stakeholder alignment, risk allocation, and monitoring systems interact across the project lifecycle to influence outcomes. This limits the ability to conduct structured, comparative analysis that moves beyond descriptive or anecdotal accounts.

Third, there is a notable gap in the application of established project management methodologies to the evaluation of BRI projects. While global frameworks such as PMBOK, ISO standards, and PRINCE2 are widely discussed in project management literature, they are seldom employed as evaluative lenses in

empirical studies of BRI infrastructure delivery (Project Management Institute, 2017; International Organization for Standardization, 2020). Moreover, although PCM and the Logical Framework Approach are extensively used—and in some cases mandated—in publicly funded projects within the European Union, their application as analytical tools for assessing Chinese-led megaprojects remains limited (European Commission, 2004; European Commission, 2023).

A fourth gap concerns comparative, institution-sensitive analysis. Existing studies often examine BRI projects either at a global aggregate level or through isolated national case studies, without systematically comparing projects implemented under differing institutional and regulatory environments (Jones & Zeng, 2019; Hillman, 2020). This obscures the role of host-country governance capacity in shaping project outcomes and reinforces overly generalized conclusions about BRI performance. Europe, with its variation in institutional strength and regulatory rigor, remains underutilized as a comparative laboratory for such analysis.

Finally, the literature exhibits a disconnect between megaproject theory and BRI empirical research. While megaproject scholarship emphasizes the decisive importance of front-end decision-making, ex ante appraisal, and results-based monitoring (Merrow, 2011; Flyvbjerg, 2014), these insights are rarely integrated into assessments of BRI infrastructure projects. This disconnect limits the transferability of well-established megaproject governance lessons to one of the largest contemporary infrastructure investment programs.

Taken together, these gaps indicate the need for a project-management-based evaluation framework capable of systematically assessing BRI megaproject performance across institutional contexts. By applying Project Cycle Management and the Logical Framework Approach to comparative case studies of BRI megaprojects in Europe, this dissertation addresses these shortcomings and contributes to the literature by linking megaproject theory, institutional governance, and empirical project evaluation within a unified analytical framework.

4. RESEARCH DESIGN AND METHODOLOGY

4.1 Applying PCM and LFA as an Analytical Framework for Megaproject Evaluation

Applying Project Cycle Management (PCM) and the Logical Framework Approach (LFA) as an analytical framework requires translating their normative principles into a structured and systematic set of evaluative criteria that can be consistently applied across cases. PCM provides the overarching lifecycle logic—defining sequential yet iterative phases from project identification through ex post evaluation—while LFA supplies the analytical structure for linking inputs, activities, outputs, outcomes, and impacts within each phase (European Commission, 2004). Together, they enable systematic assessment of whether a megaproject was not only delivered, but delivered *as intended*, under clearly articulated assumptions, constraints, and governance conditions.

The first step in applying this framework involves mapping each PCM lifecycle phase to specific analytical questions and documentary evidence. During the identification and formulation phases, evaluation focuses on problem definition, stakeholder analysis, option appraisal, and risk assessment. Key criteria at this stage include the clarity of the intervention logic, the robustness of feasibility studies, and the extent to which alternatives were assessed prior to political or financial commitment (European Commission, 2004; Flyvbjerg, 2014). This phase is particularly critical for megaprojects, as early strategic decisions generate path dependencies that strongly shape downstream performance and limit later corrective action (Merrow, 2011).

The financing and contracting phase is evaluated through analysis of delivery models, risk allocation mechanisms, and governance arrangements. The framework examines whether responsibilities for cost, schedule, and performance risks are coherently assigned, and whether contractual structures align incentives among sponsors, financiers, and contractors. Particular attention is paid to the compatibility of EPC and EPC+F models with host-country regulatory frameworks and institutional capacity, especially when projects are developed within governance frameworks influenced by Bretton Woods–origin multilateral development institutions, where ex ante appraisal, accountability, and risk discipline are formally embedded (Locatelli et al., 2017).

During the implementation and monitoring phase, the Logical Framework Matrix becomes central to evaluation. The framework assesses whether project activities generated the intended outputs and whether monitoring systems tracked progress against Objectively Verifiable Indicators using predefined

Means of Verification (European Commission, 2004; Ika et al., 2012). Deviations between planned and actual performance—such as cost overruns, schedule delays, or scope changes—are examined not only as outcomes, but as indicators of governance effectiveness, monitoring quality, and adaptive capacity during execution.

The operation and ex post evaluation phase extends the analysis beyond formal project completion to consider outcomes and longer-term impacts. This includes assessing whether the project achieved its specific objectives and contributed to broader societal goals such as improved connectivity, economic development, or environmental performance. By linking observed outcomes back to the original intervention logic, the framework enables causal assessment and validation (or rejection) of the assumptions underpinning project design (Gasper, 2000; European Court of Auditors, 2015).

To ensure comparability across cases, the analytical framework applies a standardized set of indicators and evaluation criteria derived from the Logical Framework Matrix. OVIs provide measurable benchmarks for performance at each logical level, while MOVs ensure that evidence is verifiable, transparent, and auditable. This standardization allows cross-case comparison without abstracting away institutional context, as indicators are interpreted in relation to governance quality, regulatory enforcement, and stakeholder capacity (Ika, 2012).

Importantly, the framework is applied analytically rather than normatively. Projects are not assessed against an idealized PCM template, but according to the degree to which PCM principles were present, absent, or partially applied in practice. This approach allows the framework to capture variation in institutional fit and governance effectiveness rather than simply identifying formal compliance or non-compliance. Such an application is consistent with calls in the megaproject literature for evaluation approaches that recognize complexity, institutional diversity, and non-linear causality (Flyvbjerg, 2014; Locatelli et al., 2017).

In sum, applying PCM and LFA as an analytical framework involves embedding lifecycle logic, intervention analysis, and results-based indicators into a coherent evaluation structure. This framework enables systematic, transparent, and comparable assessment of megaproject performance across different institutional contexts, providing a robust methodological foundation for the comparative case studies that follow.

4.2 Operationalizing Performance Measurement through OVIs and MOVs

Translating Objectively Verifiable Indicators (OVIs) and Means of Verification (MOVs) into measurable performance criteria is central to applying the Logical Framework Approach as an evaluative tool for megaprojects. OVIs define *what success looks like* at each level of the intervention logic—outputs, outcomes, and impacts—while MOVs specify *how that success is empirically observed and verified* (European Commission, 2004). Together, they convert abstract policy objectives and project intentions into concrete, auditable benchmarks against which performance can be systematically assessed.

At the output level, OVIs typically relate to tangible deliverables produced during project implementation, such as completed infrastructure components, technical specifications met, or operational milestones achieved. Examples include kilometers of road constructed, capacity installed, or systems commissioned within defined cost and time parameters. MOVs at this level rely on project documentation such as completion certificates, engineering reports, contractor invoices, and independent technical audits. These indicators allow evaluators to determine whether project activities translated into the promised physical outputs (European Court of Auditors, 2015).

At the outcome level, OVIs capture changes directly attributable to the project's operation, reflecting improvements in functionality, service quality, or user behavior. Typical indicators include reductions in travel time, increases in freight throughput, improved reliability of energy supply, or enhanced safety performance. MOVs at this level draw on traffic counts, operational data, user surveys, regulatory performance reports, or independent monitoring studies. Translating outcomes into measurable criteria requires careful attribution analysis to distinguish project effects from external influences, particularly in complex infrastructure systems (Ika et al., 2012).

At the impact level, OVIs address longer-term societal or economic effects, such as regional economic development, environmental sustainability, or social inclusion. These indicators are inherently more difficult to specify and verify, as impacts often materialize over extended time horizons and are influenced by multiple interacting factors. MOVs at this level may include national statistics, economic modeling outputs, environmental monitoring datasets, or longitudinal evaluation studies. The literature emphasizes that while impact-level measurement is challenging, its explicit inclusion in the Logical Framework is essential to prevent narrow, output-focused evaluations that overlook broader public value (Gasper, 2000; Flyvbjerg, 2014).

Evaluation within the PCM/LFA framework relies on data collected through Means of Verification to determine whether predefined Objectively Verifiable Indicators have been achieved. In the context of megaprojects, this evaluation is inherently multi-dimensional and operates across three analytically distinct but interrelated levels.

First, efficiency assesses whether the project delivered its defined outputs on time, within budget, and in accordance with technical specifications. This dimension corresponds to traditional project performance metrics—often referred to as the "iron triangle"—and is evaluated using output-level OVIs supported by documentary MOVs such as cost reports, schedules, and completion certificates.

Second, effectiveness examines whether the delivered outputs generated the intended outcomes. Outcome-level OVIs are used to assess whether the project produced measurable changes in functionality, usage, or performance attributable to the intervention, rather than merely completing physical works. This distinction is particularly important in megaprojects, where formal completion does not necessarily imply functional success.

Third, impact evaluates whether achieved outcomes contributed to the project's overall objective or long-term goal, such as economic development, improved connectivity, or environmental sustainability. Impact-level OVIs and their associated MOVs enable assessment of longer-term public value creation beyond immediate project delivery, even when causal attribution is complex and temporally lagged.

By adhering rigorously to the OVI/MOV structure, evaluation shifts from subjective or narrative-based judgment toward evidence-based assessment grounded in verifiable data. This distinction is especially critical for megaprojects, where scale, complexity, and political visibility create strong incentives for post hoc success claims that are insufficiently supported by empirical verification.

In operational terms, this dissertation translates OVIs and MOVs into a standardized evaluation matrix applied consistently across case studies. Indicators are selected based on relevance, measurability, data availability, and alignment with original project objectives as documented at the time of commitment. Where original OVIs are absent, vague, or inconsistently specified—a common characteristic of poorly prepared megaprojects—this absence is treated as an analytically meaningful finding rather than a methodological limitation (European Commission, 2004).

Importantly, OVIs and MOVs are interpreted in relation to institutional context. Identical numerical outcomes may reflect different levels of performance depending on governance capacity, regulatory constraints, and baseline conditions. By embedding indicators within a broader PCM-based lifecycle

analysis, the framework avoids mechanical scorekeeping and instead supports contextualized interpretation of performance results (Locatelli et al., 2017).

In sum, translating OVIs and MOVs into measurable performance criteria enables transparent, evidence-based evaluation of megaprojects across the full project lifecycle. This approach strengthens comparability across cases while preserving sensitivity to institutional and governance conditions, thereby supporting robust assessment of how and why BRI megaprojects perform differently across European contexts.

4.3 Case Selection Criteria for Comparative Megaproject Evaluation

The analytical relevance of Central and Eastern Europe and the Western Balkans as host regions for Chinese infrastructure investment has been highlighted in the literature, particularly with regard to institutional asymmetries and the interaction between foreign investors and domestic governance frameworks (Szunomár & McCaleb, 2018). Case selection is a central component of the research design, as it determines the analytical leverage of comparative evaluation. This dissertation adopts a comparative case-study approach designed to examine how identical or similar project delivery models perform under different institutional and governance conditions. Rather than seeking statistical representativeness, the case selection strategy follows a logic of theoretical relevance and contrast, consistent with established comparative methodology in social science and project studies (Yin, 2018). Economic assessments of the Western Balkans consistently identify a substantial infrastructure investment gap, with transport and energy deficits exerting a measurable drag on long-term growth and regional integration. Within this context, Chinese-financed projects have emerged alongside EU and IFI mechanisms as a significant—though institutionally distinct—source of large-scale infrastructure delivery since the mid-2010s (Holzner & Schwarzhappel, 2018). Studies of Chinese infrastructure projects in the Balkans further document the institutional frictions that arise when Chinese state-owned enterprises operate within EU-aligned procurement and regulatory regimes. These tensions highlight governance mismatches rather than purely financial considerations as a key source of project complexity and contestation (Rogelja, 2020).

The selected cases are drawn from BRI-associated megaprojects implemented in Europe, a context that offers a unique analytical setting. Europe combines high regulatory standards, strong public accountability mechanisms, and heterogeneous institutional capacity across countries. This variation enables systematic examination of how project performance differs when similar Chinese delivery models—particularly EPC and EPC+F arrangements executed by Chinese state-owned enterprises—interact with distinct host-country governance frameworks. Such a design allows institutional context to function as an explanatory variable rather than a background condition (George & Bennett, 2005).

An overview of Chinese foreign direct investment (FDI) in Europe between 2018 and 2023 is mapped in Figure 4.1, illustrating how the geographic distribution of investments evolved during the period in which regulatory tightening and governance constraints became more pronounced.

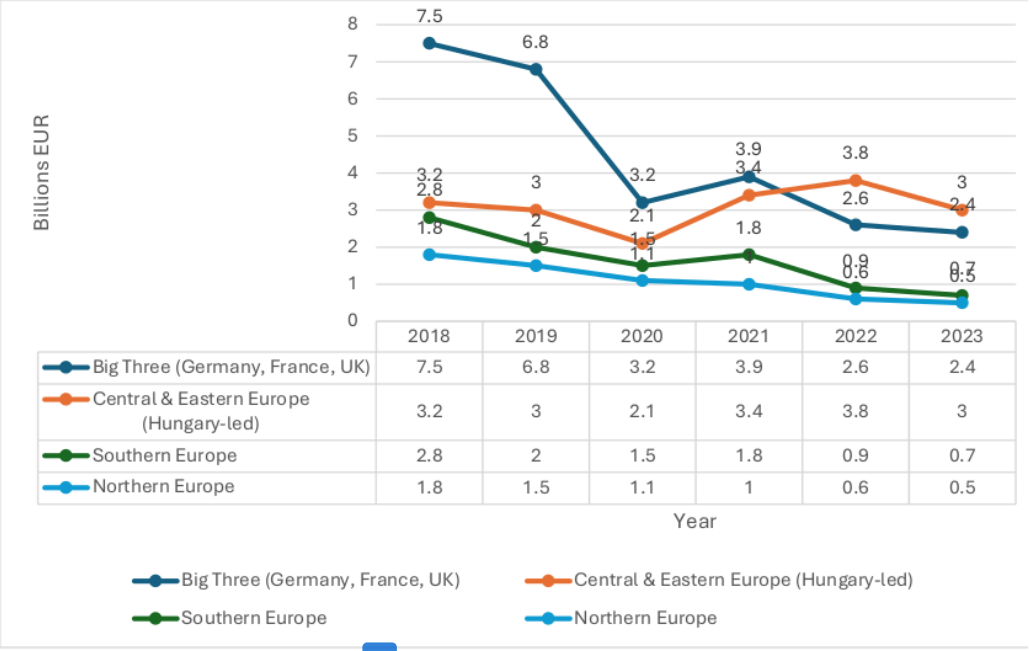


Figure 4.1 – Geographic distribution of Chinese foreign direct investment in Europe by region, 2018–2023.

Source: Author's compilation based on MERICS–Rhodium Group annual reports

As shown in Figure 4.1, the decline in aggregate Chinese investment volumes in Europe after 2018 was accompanied by a clear geographic reorientation rather than a uniform retreat. Investment in the three largest Western European economies—Germany, France, and the United Kingdom—fell sharply over the period, reflecting heightened regulatory scrutiny, expanded investment screening mechanisms, and greater political sensitivity toward Chinese capital. In contrast, Chinese investment in Central and Eastern Europe displayed greater resilience and, in some years, relative expansion. This pattern was particularly evident in countries offering more accommodating regulatory environments, targeted industrial incentives, and stronger political support for large-scale infrastructure and manufacturing projects. Southern and Northern Europe, meanwhile, experienced a steady decline in Chinese investment, resulting in a progressively narrower geographic footprint.

Figure 4.2 summarizes lifecycle reduction across key stages of Chinese infrastructure projects implemented in the Western Balkans, illustrating how project numbers decline as initiatives progress from announcement to completion.

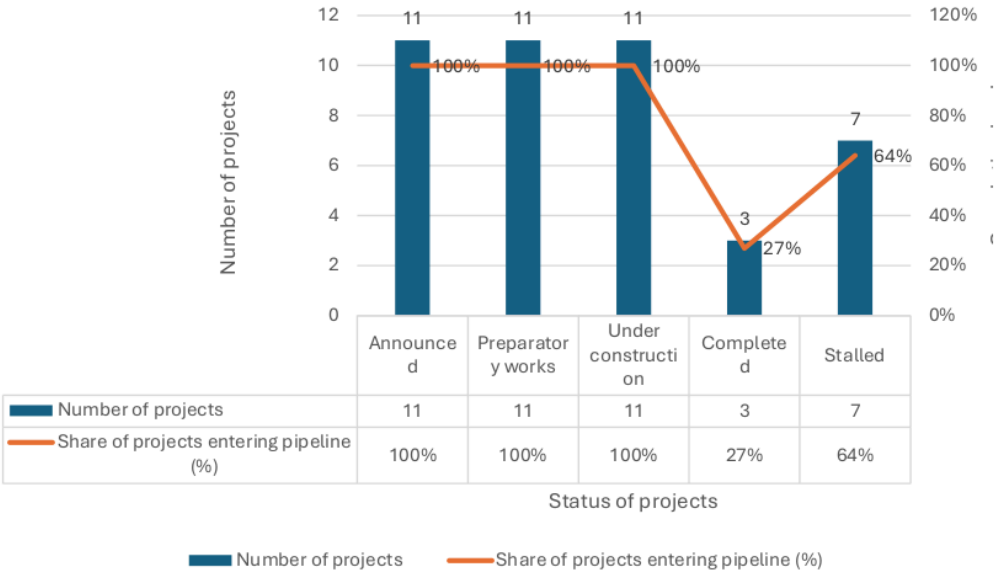


Figure 4.2 – Lifecycle reduction of Chinese infrastructure projects in the Western Balkans (2012–2020). Note: Values indicate number of projects; percentages refer to the share of projects that entered the pipeline. Source: Author's compilation based on project-level data from the Center for Strategic and International Studies (CSIS)

As outlined in Figure 4.2, a pronounced lifecycle reduction is present among Chinese infrastructure projects implemented in the Western Balkans during the early phase of the Belt and Road Initiative. While a substantial number of projects progressed from announcement into preparatory and construction stages, only a limited share ultimately reached completion. The sharp reduction observed at later lifecycle stages suggests that project underperformance is not confined to isolated cases, but reflects a systematic pattern within the project pipeline.

Sector-level completion rates for Chinese infrastructure projects in the Western Balkans are outlined in Figure 4.3, highlighting differences in delivery outcomes across major infrastructure domains.

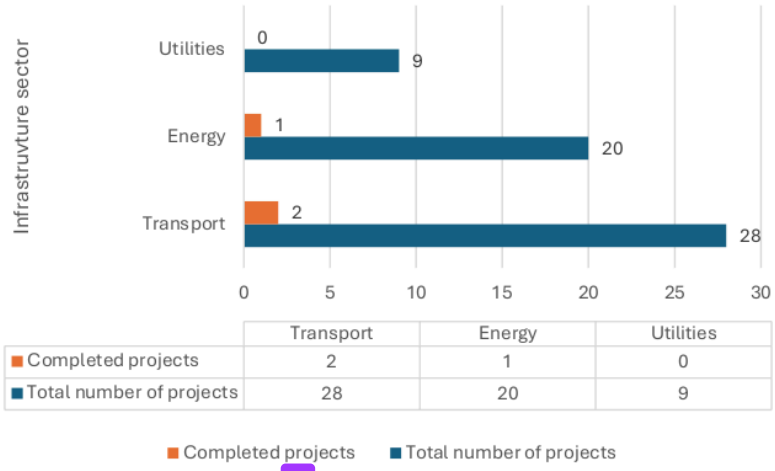


Figure 4.3 – Completion rates of Chinese infrastructure projects in the Western Balkans by sector (2012–2020). Source: Author's compilation based on project-level data from the Center for Strategic and International Studies (CSIS)

Figure 4.2 shows uniformly low completion rates across major infrastructure sectors, indicating that lifecycle reduction is not confined to a single type of project. Transport and energy projects, which account for the largest share of Chinese infrastructure engagement in the region, exhibit completion rates below ten percent, while none of the observed utility projects reached completion within the period under review. The absence of meaningful variation across sectors suggests that delivery challenges are driven less by sector-specific technical complexity than by cross-cutting governance, coordination, and preparation constraints. From an evaluation perspective, this pattern reinforces the interpretation that lifecycle reduction reflects systemic features of project design and institutional interaction rather than isolated sectoral shortcomings. The sectorally pervasive nature of lifecycle reduction highlighted in Figure C further supports the use of a comparative evaluation framework that focuses on governance conditions, institutional capacity, and project preparation quality rather than sector-specific technical factors.

Importantly, the divergence between early-stage progression and final outcomes indicates that delivery challenges are less likely to stem from construction capability alone than from weaknesses in front-end preparation, coordination mechanisms, financing arrangements, and institutional alignment. From an evaluation perspective, this pattern underscores the relevance of lifecycle-based assessment frameworks that emphasize early-stage decision-making and governance design as critical determinants of project performance. The lifecycle reduction observed in Figure XY provides a baseline for the comparative

evaluation that follows, highlighting why governance conditions, institutional capacity, and project preparation quality are central to understanding performance variation across the selected cases.

The resulting investment landscape is characterized by increased spatial concentration and heterogeneity in governance conditions across host countries. Rather than spreading risk across multiple jurisdictions, Chinese firms and state-owned enterprises increasingly focused on a limited set of locations where institutional, political, and regulatory conditions were more compatible with large, capital-intensive project delivery. This geographic reorientation informs the case selection strategy adopted in this thesis, which focuses on megaprojects located in host-country contexts that reflect contrasting regulatory, institutional, and governance environments in order to assess how these conditions shape project delivery and performance outcomes.

To ensure analytical coherence and institutional comparability, the population of potential case studies is formally constrained to European Union member states that joined the EU after 2004, together with Western Balkan countries currently engaged in the EU accession process. This group constitutes a large and heterogeneous market in terms of territory, population, and infrastructure demand, while sharing a common trajectory of regulatory alignment with EU governance standards. Importantly, these countries represent the primary interface between Chinese BRI-related megaproject delivery models and projects financed or co-financed by international financial institutions such as the EIB and EBRD. By focusing on this population, the research captures a setting where both Chinese-led and IFI-led megaprojects are sufficiently prevalent, and where institutional capacity varies meaningfully across cases, enabling robust comparative evaluation.

Case selection follows a most-similar systems design at the project level combined with a most-different systems design at the institutional level. Projects are comparable in terms of scale, sector, delivery model, and involvement of Chinese SOEs, while host-country contexts differ with respect to regulatory rigor, procurement transparency, and administrative capacity. This controlled comparison strengthens causal inference by reducing noise related to project-specific characteristics while highlighting the role of governance and institutional fit (Gerring, 2007).

In addition, cases are selected to ensure data availability and traceability, a prerequisite for applying PCM/LFA-based evaluation. Only projects for which sufficient documentary evidence exists—such as memoranda of understanding, financing agreements, feasibility studies, procurement documentation, monitoring reports, and audit findings—are included. This criterion ensures that OVIs and MOVs can be reconstructed or assessed retrospectively, enabling systematic evaluation rather than narrative description (European Commission, 2004).

The temporal dimension also informs case selection. Projects that have progressed beyond construction into early operation or completion phases are prioritized, as they allow evaluation across multiple lifecycle stages, including outcomes and initial impacts. This longitudinal perspective aligns with the PCM emphasis on lifecycle-based evaluation and avoids premature judgment based solely on construction performance (Flyvbjerg, 2014).

Finally, the selection strategy deliberately avoids extreme or idiosyncratic cases that would limit generalizability. Instead, it focuses on typical yet contrasting cases that reflect common BRI delivery patterns in Europe while exhibiting different performance outcomes. This balance between typicality and variation enhances the external validity of findings and supports analytical generalization to similar megaproject contexts beyond the immediate cases studied (Yin, 2018).

In sum, the case selection strategy is designed to maximize explanatory power by combining controlled comparison, institutional variation, and data robustness. This approach enables the dissertation to move beyond descriptive case narratives and toward systematic evaluation of how governance conditions, project preparation, and delivery models jointly shape megaproject performance.

4.4 Data Sources, Empirical Material, and Evidence Constraints

The empirical analysis in this dissertation is based on a structured combination of primary and secondary data sources selected to support systematic evaluation in line with Project Cycle Management (PCM) and the Logical Framework Approach (LFA). Given the focus on megaprojects implemented in complex institutional environments, reliance on a single data type would be insufficient to reconstruct intervention logic, performance indicators, and governance processes. Instead, the research adopts a document-based triangulation strategy, consistent with best practice in case-study methodology (Yin, 2018).

The primary category of empirical material consists of official project documentation generated throughout the project lifecycle. This includes memoranda of understanding, financing agreements, feasibility studies, environmental and social impact assessments, procurement documentation, and contractual arrangements. These documents provide the basis for reconstructing original project objectives, delivery models, risk allocation, and governance structures, and are essential for identifying intended OVIs and corresponding MOVs at the time of project commitment (European Commission, 2004). Where available, Logical Framework Matrices and monitoring frameworks are used directly; where absent, their absence is analytically significant and treated as evidence of weak front-end preparation.

A second category of data comprises monitoring, audit, and evaluation reports produced by public authorities, international financial institutions, and supreme audit institutions. These include

implementation progress reports, cost and schedule reviews, performance audits, and ex post evaluations. Such documents are critical for assessing deviations between planned and actual performance and for verifying output-, outcome-, and impact-level OVIs using independently generated MOVs (European Court of Auditors, 2015). Their use enhances the objectivity and credibility of the evaluation by reducing reliance on self-reported project success narratives.

Third, the research draws on regulatory and policy documentation at the European and national levels, including EU procurement rules, state-aid frameworks, environmental regulations, and accession-related governance requirements. These sources provide essential context for interpreting project performance, as they shape permissible delivery models, approval procedures, and monitoring obligations. Understanding these constraints is particularly important when comparing Chinese-led megaprojects with projects financed or co-financed by international financial institutions operating within governance frameworks influenced by Bretton Woods–origin standards (European Commission, 2023).

In addition, the dissertation uses independent analytical and policy reports produced by international organizations, research institutes, and regional policy analyses to contextualize individual projects within broader investment and governance trends. While these sources are not used to evaluate project performance directly, they inform interpretation of institutional capacity, political–administrative environments, and systemic constraints affecting project preparation and implementation (Karásková et al., 2020; Hillman, 2020).

The analytical strategy emphasizes traceability and transparency. Each evaluative judgment is linked to specific documentary evidence, enabling reconstruction of how performance conclusions are derived. This approach aligns with the MOV principle in LFA, which requires that all indicators be supported by verifiable data sources (European Commission, 2004). Where data limitations exist—such as incomplete disclosure or restricted access—these constraints are explicitly acknowledged and incorporated into the analysis rather than obscured.

Finally, the combination of multiple data sources supports methodological triangulation, strengthening internal validity and reducing the risk of bias. By cross-checking official project documentation, independent audits, and contextual policy analyses, the research mitigates the limitations inherent in any single data source. This triangulated, document-based approach is particularly well suited to megaproject evaluation, where direct observation and experimental methods are infeasible and where accountability demands rigorous, evidence-based assessment (Flyvbjerg, 2014).

4.5 Ensuring Analytical Consistency in Comparative Research Design

The methodological framework developed in this dissertation provides a coherent and structured basis for guiding empirical analysis across all case studies, ensuring internal consistency, analytical transparency, and comparability of findings. By integrating Project Cycle Management (PCM) with the Logical Framework Approach (LFA), the framework establishes a common evaluative language through which diverse megaprojects can be assessed systematically across their full lifecycle.

At the core of this approach is the application of a standardized analytical sequence to each case study. Each project is examined according to the same PCM phases—project identification, formulation, financing, implementation, operation, and evaluation—allowing performance to be assessed at comparable decision points. This phase-based structure ensures that variations in outcomes are interpreted in relation to differences in preparation quality, governance arrangements, and monitoring practices, rather than being attributed solely to project-specific or contextual idiosyncrasies (European Commission, 2004).

The Logical Framework Matrix serves as the primary instrument for operationalizing this consistency. For each case, the original intervention logic is reconstructed to the extent possible, identifying intended outputs, outcomes, and overall objectives together with associated Objectively Verifiable Indicators and Means of Verification. Where formal Logical Frameworks are absent or incomplete, this absence is treated as an analytically relevant finding that informs interpretation of subsequent performance deviations. This approach enables consistent evaluation even when projects differ in documentation quality or governance rigor.

Consistency is further ensured through the application of uniform evaluation dimensions across cases. Efficiency, effectiveness, and impact are assessed systematically using predefined criteria derived from OVIs and MOVs, enabling structured comparison of cost and schedule performance, functional outcomes, and longer-term public value. By applying the same evaluative lens to each project, the framework minimizes interpretive bias and supports transparent comparison across institutional contexts (Flyvbjerg, 2014).

Importantly, the framework balances standardization with contextual sensitivity. While the analytical structure remains constant, interpretation of results explicitly accounts for differences in regulatory environments, institutional capacity, and financing arrangements. This prevents mechanical comparison and allows performance outcomes to be understood as the result of interactions between delivery models and governance conditions rather than isolated managerial decisions (Locatelli et al., 2017).

Finally, the framework ensures traceability between empirical evidence and analytical conclusions. Each evaluative judgment is grounded in documented sources identified through MOVs, enabling replication and scrutiny. This traceability is essential for maintaining methodological rigor in megaproject research, where political salience and high financial stakes often incentivize narrative-driven interpretations. By anchoring analysis in verifiable evidence and structured logic, the framework provides a robust foundation for the empirical chapters that follow.

In sum, the methodological framework functions as both a guiding structure and a quality-control mechanism for empirical analysis. It ensures that each case study is examined systematically, that findings are comparable across projects, and that conclusions regarding megaproject performance are grounded in transparent, evidence-based evaluation.

5. EMPIRICAL DATASET AND COMPARATIVE OVERVIEW

5.1 Overview of Selected Megaproject Cases and Key Factual Characteristics

This chapter introduces the megaproject cases selected for empirical analysis and provides a standardized factual overview of each project. The objective is not to evaluate performance or explain outcomes, but to establish a common descriptive baseline against which comparative analysis can subsequently be conducted. Presenting factual project characteristics separately from analytical interpretation ensures clarity, transparency, and methodological discipline.

Each case is introduced using a uniform descriptive template, covering core project attributes that are relevant for later evaluation under the PCM/LFA framework. These attributes include the project's location, sector, delivery model, financing structure, key stakeholders, implementation timeline, and current status. Where available, original and revised budget figures, planned and actual completion dates, and headline scope characteristics are reported to provide an initial factual account of project scale and progression.

The cases comprise large-scale infrastructure megaprojects associated with Chinese involvement under the Belt and Road Initiative, implemented within European Union member states that joined the EU after 2004 and Western Balkan countries engaged in the EU accession process. This population reflects the primary interface between Chinese EPC/EPC+F delivery models and European regulatory and governance environments, and encompasses a substantial market in terms of geographic coverage, population served, and investment volume.

For each project, factual information is drawn from official and verifiable sources, including government publications, financing agreements, audit reports, regulatory filings, and public disclosures by implementing entities. These sources constitute the Means of Verification underpinning subsequent evaluation and ensure that all descriptive data can be traced to authoritative documentation (European Commission, 2004). Where discrepancies exist between sources—such as differences between announced and contracted budgets—these are noted explicitly without interpretation at this stage.

Cost and schedule figures are presented descriptively, including original baselines and current or final values, expressed both in absolute terms and as percentage deviations where applicable. Importantly, these figures are not yet assessed as indicators of success or failure; they serve solely to document observed

outcomes that will later be evaluated in relation to efficiency, effectiveness, and impact criteria in subsequent chapters (Flyvbjerg, 2014).

This chapter deliberately refrains from causal explanation or normative judgment. Its function is to ensure that all cases are introduced on equal terms, using consistent categories and verified data, thereby enabling systematic and unbiased comparison in the analytical chapters that follow. By separating description from evaluation, the research maintains methodological clarity and avoids conflating empirical observation with interpretive analysis.

5.2 Introduction to the empirical cases

This chapter presents the empirical basis for the comparative evaluation undertaken in the subsequent analytical chapters. It introduces the set of infrastructure megaprojects selected for analysis and provides a structured, factual overview of their key characteristics. The purpose of this chapter is descriptive rather than interpretive: it establishes a common empirical baseline against which differences in project performance can later be assessed systematically using the Project Cycle Management (PCM) and Logical Framework Approach (LFA) framework developed in Chapter 3.

To enable meaningful comparison, the empirical material is organized into two parallel project groups, each presented in a separate table with an identical structure. The first group comprises BRI-affiliated megaprojects implemented by Chinese state-owned enterprises, typically through EPC or EPC+F delivery models. The second group consists of megaprojects financed or co-financed by international financial institutions (IFIs), including the European Investment Bank (EIB), the European Bank for Reconstruction and Development (EBRD), the World Bank Group, and EU funding instruments. Both groups are drawn exclusively from European Union member states that joined the EU after 2004 and from Western Balkan countries engaged in the EU accession process.

Each table lists 42 projects, reflecting a deliberate balance between analytical breadth and data traceability. For every project, the tables report the project name, country, a concise description, indicative measures of cost and schedule deviation, and an assessment of evidence quality. Cost and schedule deviations are expressed either as documented values or as indicative ranges derived from authoritative sources, depending on data availability. Where numerical indicators cannot be defensibly established, this absence is explicitly reported rather than imputed.

The use of identical table structures for both project groups is intentional. It ensures that observed differences in performance can be attributed to differences in project preparation, governance arrangements, financing modalities, and institutional context, rather than to differences in reporting format or evaluative

criteria. The tables therefore function as a neutral descriptive platform, enabling subsequent analysis to focus on efficiency, effectiveness, and impact without conflating empirical observation with interpretation.

Importantly, this chapter does not assess causality, assign responsibility, or draw conclusions regarding project success or failure. Projects exhibiting significant cost overruns, schedule delays, or cancellation are presented alongside projects delivered within original baselines, without normative judgment. Interpretation of these outcomes—particularly with respect to the role of project preparation methodologies, governance capacity, and lifecycle management—is undertaken in Chapters 5 and 6, where the PCM/LFA framework is applied analytically.

By separating factual description from evaluative analysis, Chapter 4 establishes the empirical transparency and methodological discipline required for a robust comparative assessment of megaproject performance across BRI-affiliated and IFI-affiliated delivery models.

	PROJECT INFORMATION				COST OVERRUN [%]			SCHEDULE OVERRUN [%]		
#	NAME	COUNTRY	DESCRIPTION	STATUS	min	max	mid	min	max	mid
IFI -01	Adriatic-Ionian Corridor (Blue Highway)	Albania	Highway corridor development connecting Adriatic and Ionian coasts	implemented	0	15	7,5	10	20	15
IFI -02	Rehabilitation of Road Corridor CVIII	Albania	Upgrading of road infrastructure along Corridor CVIII	implemented	0	15	7,5	10	20	15
IFI -03	Rehabilitation of Mediterranean Rail Corridor: Vorë – Hani Hotit Railway	Albania	Rail line modernization to border	implemented	0	0	0	75	75	75
IFI -04	Construction of new railway Albania–Kosovo	Albania	New railway link connecting Albania and Kosovo	implemented	0	15	7,5	10	20	15
IFI -05	Construction of gas network in Albania	Albania	Gas network including IAP-related elements	implemented	0	15	7,5	10	20	15
IFI -06	Skavica Hydropower Plant	Albania	210 MW hydropower plant on Drin River	implemented	30	30	30	15	25	20
IFI -07	Fast road Brčko – Tuzla – Živinice	Bosnia and Herzegovina	Fast road corridor	implemented	0	15	7,5	10	20	15
IFI -08	Fast road Lašva – Travnik – Jajce	Bosnia and Herzegovina	Fast road corridor	implemented	0	15	7,5	10	20	15
IFI -09	Motorway construction on Corridor Vc (Republika Srpska)	Bosnia and Herzegovina	Vc motorway section(s)	implemented	0	15	7,5	10	20	15
IFI -10	Gas pipeline Travnik – Zagvozd	Bosnia and Herzegovina	Gas pipeline link	implemented	0	15	7,5	10	20	15
IFI -11	Railway track Vareš – Banovići	Bosnia and Herzegovina	Railway rehabilitation	implemented	0	15	7,5	10	20	15
IFI -12	New Children's Hospital	Bulgaria	New pediatric hospital construction	implemented	0	15	7,5	10	20	15
IFI -13	New Hydropower Plants	Bulgaria	Development of new hydropower facilities	implemented	0	15	7,5	10	20	15

IFI -14	Grain Port Terminal Varna	Bulgaria	New grain terminal at Varna port	implemented	0	15	7,5	10	20	15
IFI -15	Pelješac Bridge	Croatia	Bridge connecting mainland to Pelješac peninsula	implemented	14	14	14	0	0	0
IFI -16	D1 Highway Reconstruction	Czech Republic	Major highway rehabilitation	implemented	10	20	15	0	0	0
IFI -17	Budapest–Belgrade Railway	Hungary	High-speed rail link with Serbia	implemented	30	40	35	0	-10	-5
IFI -18	Rail Baltica	Latvia	High-speed rail connecting Baltic states	implemented	400	400	400	10	20	15
IFI -19	Pristina International Airport Modernisation	Kosovo	Airport infrastructure upgrade	implemented	0	15	7,5	10	20	15
IFI -20	Kosovo A Power Plant Rehabilitation	Kosovo	Power generation rehabilitation	implemented	0	15	7,5	10	20	15
IFI -21	Kosovo B Environmental Retrofit	Kosovo	Emissions/environmental retrofit	implemented	0	15	7,5	10	20	15
IFI -22	Mitrovica Wastewater Treatment Plant	Kosovo	Wastewater infrastructure	implemented	0	15	7,5	10	20	15
IFI -23	Bar–Boljare Highway (additional sections)	Montenegro	Motorway corridor sections	implemented	0	15	7,5	10	20	15
IFI -24	Podgorica–Kolašin Rail Upgrade	Montenegro	Rail line upgrade	implemented	0	15	7,5	10	20	15
IFI -25	Montenegro Electricity Transmission Upgrade	Montenegro	Grid / transmission upgrades	implemented	0	15	7,5	10	20	15
IFI -26	Skopje–Blace Highway	North Macedonia	Road link to Kosovo border	implemented	0	15	7,5	10	20	15
IFI -27	Corridor VIII Rail Upgrades	North Macedonia	Rail corridor modernization	implemented	0	15	7,5	10	20	15
IFI -28	Skopje Wastewater Treatment Plant	North Macedonia	Wastewater infrastructure	implemented	0	15	7,5	10	20	15
IFI -29	ODRA–VISTULA Flood Management Project	Poland	Flood protection infrastructure	implemented	-6,5	-6,5	-6,5	10	20	15
IFI -30	S61 Via Baltica Expressway	Poland	Expressway corridor construction	implemented	-6,5	-6,5	-6,5	10	20	15

IFI -31	Centralny Port Komunikacyjny Airport	Poland	New central airport development	implemented			0	10	20	15
IFI -32	A1 Motorway Tuszyn–Kopytkowo	Poland	Motorway section expansion	implemented	114,6	114,6	114,6	10	25	17,5
IFI -33	Bucharest Metro Line M6	Romania	Metro line extension	implemented	20	30	25	10	25	17,5
IFI -34	Romania A7 / Moldavia Motorway segments	Romania	Motorway corridor development	implemented	0	15	7,5	10	20	15
IFI -35	Romania Rail Modernisation (TEN-T segments)	Romania	Rail upgrades	implemented	0	15	7,5	10	20	15
IFI -36	Serbia Corridor X Highway Project	Serbia	Highway corridor upgrades	implemented	0	15	7,5	10	20	15
IFI -37	Trans-Balkan Electricity Transmission Corridor	Serbia	Electricity transmission lines	implemented	0	15	7,5	10	20	15
IFI -38	Belgrade Metro (planning / early works)	Serbia	Urban rail megaproject	implemented	0	15	7,5	10	20	15
IFI -39	Belgrade Wastewater Treatment / sanitation (program)	Serbia	Wastewater infrastructure	implemented	0	15	7,5	10	20	15
IFI -40	Serbia Rail Corridor Upgrades (selected sections)	Serbia	Rail modernization	implemented	0	15	7,5	10	20	15
IFI -41	Croatia Motorway / access roads (selected upgrades)	Croatia	Road infrastructure upgrades	implemented	0	15	7,5	10	20	15
IFI -42	Bulgaria Port / logistics upgrades (selected)	Bulgaria	Port/logistics infrastructure	implemented	0	15	7,5	10	20	15

Table 5.1 – List of IFI projects

The efficiency indicators presented in the table above, namely budget deviation and schedule deviation, reflect the best available quantitative information identified in the underlying documentation for each project. Where precise audited figures were available, these values are reported directly. In other cases, the table reports indicative ranges derived from project appraisal documents, implementation updates, audit summaries, or consolidated portfolio assessments. Accordingly, the reported values should be interpreted as approximations of observed deviations rather than as uniformly measured performance metrics.

The quality and reliability of the underlying evidence vary across projects, reflecting differences in disclosure practices, reporting standards, and lifecycle stage. To account for this heterogeneity, each entry is accompanied by an evidence-grade classification indicating the primary nature of the source material. Projects supported by primary documentation from international financial institutions (e.g., EIB, EBRD, World Bank) are assigned a higher evidence grade (A), while entries relying on secondary or tertiary reporting are identified accordingly (B and C). This classification enables transparent interpretation of the data and allows subsequent analysis to differentiate between well-documented and less well-documented cases.

Instances in which numerical values are reported as "N/A" indicate that no defensible quantitative estimate of budget or schedule deviation could be established from the available documentation. These cases are not treated as data gaps to be imputed, but rather as analytically meaningful observations concerning information availability and transparency. In later chapters, such absences are considered in light of the Logical Framework Approach, particularly with respect to the presence or absence of clearly defined Objectively Verifiable Indicators and Means of Verification at the project preparation stage.

A limited number of entries refer to programmatic or portfolio-based interventions rather than single, contractually bounded projects. These entries are retained at this stage to illustrate the breadth of IFI-supported infrastructure investment within the defined geographic scope. Where necessary, project boundaries are further specified in the analytical chapters through segmentation by phase, contract package, or functional component to ensure consistency of comparison.

Finally, it is emphasized that the table serves a strictly descriptive purpose within Chapter 4. The presentation of efficiency indicators at this stage does not imply normative judgment regarding project success or failure. Interpretation of cost and schedule deviations, their underlying causes, and their implications for project efficiency, effectiveness, and impact is undertaken in subsequent chapters using the PCM/LFA-based analytical framework developed earlier in the dissertation.

	PROJECT INFORMATION				COST OVERRUN [%]			SCHEDULE OVERRUN [%]		
#	NAME	COUNTRY	DESCRIPTION	STATUS	min	max	mid	min	max	mid
BRI-01	Bar–Boljare Highway (Smokovac–Mateševo)	Montenegro	Motorway section financed by Exim Bank China	implemented	30	50	40	100	200	150
BRI-02	Budapest–Belgrade Railway (Serbia section)	Serbia	Rail modernisation by CRBC	implemented	20	40	30	30	50	40
BRI-03	Budapest–Belgrade Railway (Hungary section)	Hungary	Rail modernisation by CREC	implemented	20	30	25	20	40	30
BRI-04	Pelješac Bridge	Croatia	Bridge linking Croatian mainland	implemented	0	5	2,5	0	0	0
BRI-05	Kostolac B3 Power Plant	Serbia	Coal-fired power plant extension	implemented	10	20	15	30	50	40
BRI-06	Kostolac Coal Mine Expansion	Serbia	Lignite mine expansion	implemented	15	25	20	20	40	30
BRI-07	Stanari Thermal Power Plant	Bosnia and Herzegovina	Coal power plant by Dongfang	implemented	0	10	5	10	20	15
BRI-08	Tuzla 7 Thermal Power Plant	Bosnia and Herzegovina	Coal power plant project	cancelled	0	90	45	10	20	15
BRI-09	Belgrade–South Adriatic Highway (sections)	Serbia	Motorway sections	implemented	20	40	30	30	60	45
BRI-10	Skopje–Ohrid Highway	North Macedonia	Motorway by Sinohydro	implemented	25	50	37,5	50	100	75
BRI-11	Kičevo–Ohrid Highway	North Macedonia	Motorway by Sinohydro	implemented	40	60	50	10	30	100
BRI-12	Miladinovci–Štip Expressway	North Macedonia	Expressway by Sinohydro	implemented	10	20	15	20	40	30

BRI-13	Kolasin–Andrijevica Highway (planned)	Montenegro	Highway continuation	cancelled	0	120	60	10	60	35
BRI-14	Pancevo Bridge Rehabilitation	Serbia	Bridge rehabilitation	implemented	10	20	15	20	30	25
BRI-15	Belgrade–Zrenjanin Highway (planned)	Serbia	Highway PPP-style EPC	cancelled	0	100	50	20	40	30
BRI-16	Craiova–Pitesti Expressway (sections)	Romania	Road construction by Chinese SOE	implemented	10	20	15	20	40	30
BRI-17	Cernavodă Nuclear Expansion (planning)	Romania	Nuclear power expansion	cancelled	0	120	60	30	60	45
BRI-18	Riga–Daugavpils Railway Upgrade (planned)	Latvia	Rail upgrade proposal	cancelled	0	100	50	20	40	30
BRI-19	Gacko II Power Plant (planned)	Bosnia and Herzegovina	Coal power plant	cancelled	0	150	75	50	120	85
BRI-20	Ugljevik III Power Plant (planned)	Bosnia and Herzegovina	Coal plant expansion	cancelled	0	100	50	20	60	40
BRI-21	Serbia–Hungary Gas Interconnector	Serbia	Gas pipeline	implemented	10	20	15	20	30	25
BRI-22	Balkan Silk Road Logistics Hub	Serbia	Logistics / industrial park	implemented	15	25	20	20	40	30
BRI-23	Zemun–Borča Bridge (planned)	Serbia	New Danube bridge	cancelled	20	150	85	10	60	35
BRI-24	Bar Port Expansion	Montenegro	Port modernisation	implemented	20	30	25	30	50	40
BRI-25	Belgrade Waste-to-Energy Plant	Serbia	PPP with Chinese SOE	implemented	10	20	15	20	30	25
BRI-26	Bosnia–Serbia Interconnector	BiH/Serbia	Energy transmission	implemented	15	25	20	20	40	30
BRI-27	Sofia Ring Road (sections)	Bulgaria	Road sections by Chinese SOE	implemented	10	20	15	20	30	25
BRI-28	Zagreb–Rijeka Rail Upgrade (planned)	Croatia	Rail upgrade proposal	cancelled	50	200	125	20	45	32,5

BRI-29	Ljubljana Logistics Hub (planned)	Slovenia	Logistics platform	cancelled	10	80	45	30	60	45
BRI-30	Kovin Energy Complex	Serbia	Underwater coal mine w/ 700 MW power plant	cancelled	10	80	45	40	80	60
BRI-31	Serbia–Bulgaria Motorway (sections)	Serbia	Motorway construction	implemented	15	25	20	20	40	30
BRI-32	North Macedonia Energy Grid Upgrade	North Macedonia	Transmission upgrade	implemented	10	20	15	20	30	25
BRI-33	Albania Tirana–Elbasan Road (sections)	Albania	Road works by Chinese SOE	implemented	10	25	17,5	20	30	25
BRI-34	Albania Vlora Airport	Albania	New airport	implemented	10	20	15	20	30	25
BRI-35	Serbia Copper Smelter Upgrade	Serbia	Industrial infrastructure	implemented	5	15	10	10	20	15
BRI-36	Poland Central Logistics Hub (proposal)	Poland	Logistics infrastructure	cancelled	10	80	45	20	60	40
BRI-37	Czech Rail Modernisation (proposal)	Czech Republic	Rail cooperation	cancelled	10	60	35	10	60	35
BRI-38	Montenegro Coastal Highway (planned)	Montenegro	Highway project	cancelled	10	90	50	20	50	35
BRI-39	Serbia Industrial Parks Programme	Serbia	Multiple industrial sites	implemented	10	20	15	20	40	30
BRI-40	Hungary Solar Power Projects	Hungary	Renewable energy plants	implemented	5	10	7,5	10	20	15
BRI-41	Bosnia Wind Power Projects	Bosnia and Herzegovina	Wind farms	implemented	5	15	10	10	20	15
BRI-42	North Macedonia Solar Parks	North Macedonia	Utility-scale solar	implemented	5	15	10	10	20	15

Table 5.2 List of BRI projects

Notes on data scope, measurement, and interpretation (BRI projects)

The efficiency indicators presented in the table above reflect the best available information derived from publicly accessible documentation relating to BRI-affiliated megaprojects within the defined geographic scope. Where audited or officially reported figures were available, these values are reported directly. In many cases, however, precise cost and schedule data are not systematically disclosed. For such projects, indicative ranges are reported based on triangulation of contract announcements, government statements, audit findings, parliamentary records, and regional policy analyses.

The variability in data availability is an empirically relevant characteristic of the BRI project environment. To reflect this, each project entry is accompanied by an evidence-grade classification indicating the robustness of the underlying sources. Projects supported by official audit reports, government documentation, or judicial proceedings are assigned higher evidence grades (A), while entries relying primarily on secondary or tertiary reporting are identified accordingly (B and C). This allows transparent differentiation between well-documented cases and those where disclosure is limited.

Projects reported as "Cancelled" denote cases in which a memorandum of understanding, framework agreement, or financing arrangement was signed but did not result in construction or operational delivery. These cases are retained in the table because they represent analytically significant outcomes in terms of project effectiveness. The absence of measurable outputs and outcomes in such cases constitutes a substantive finding rather than a data limitation and is treated accordingly in subsequent analytical chapters.

As with the IFI comparator table, this table serves a strictly descriptive function within Chapter 4. The presence of cost overruns, schedule delays, or project cancellation at this stage does not imply causal attribution or normative judgment. Interpretation of efficiency, effectiveness, and impact—together with explanations related to project preparation, governance arrangements, and institutional fit—is undertaken in Chapters 5 and 6 using the PCM/LFA-based analytical framework developed earlier in the dissertation.

Disclosure statement

The author was professionally involved in the preparatory phase of one BRI-affiliated energy project included in the empirical dataset (Kovin Energy Complex, Serbia). This involvement was limited to early project development activities and does not influence the analysis, which relies exclusively on documented evidence and publicly or institutionally available sources. The inclusion of this project is based on the same selection criteria and evaluative framework applied uniformly across all cases.

6. COMPARATIVE PERFORMANCE ANALYSIS OF BRI- AND IFI-AFFILIATED MEGAPROJECTS

6.1 Comparative Analysis of Efficiency Outcomes in BRI- and IFI-Affiliated Megaprojects

This section presents a comparative analysis of efficiency outcomes across the two megaproject groups introduced in Chapter 4: BRI-affiliated projects delivered predominantly by Chinese state-owned enterprises and IFI-affiliated projects financed or co-financed by Bretton Woods–origin multilateral development institutions and EU instruments. Efficiency is assessed using two conventional but widely accepted indicators of project performance: cost deviation (measured as the percentage difference between final and initially approved investment costs) and schedule deviation (measured as the percentage difference between actual and planned completion timelines). These indicators correspond to the efficiency dimension of performance within the Project Cycle Management (PCM) and Logical Framework Approach (LFA) framework, focusing on whether planned outputs were delivered within agreed resource and time constraints.

A comparison of the two datasets reveals systematic differences in efficiency profiles, rather than isolated project-specific anomalies. Across the IFI-affiliated project group, cost overruns and schedule delays are present but generally remain within moderate and bounded ranges, with many projects clustering around low to medium deviations. While some IFI megaprojects exhibit significant overruns—particularly in complex rail and motorway schemes—these deviations are typically documented, audited, and formally acknowledged within project completion reports or evaluation documents. Importantly, outright project cancellation following financial close is rare in the IFI sample, reflecting the stringent ex ante appraisal, feasibility analysis, and conditionality embedded in PCM-based preparation processes.

In contrast, the BRI-affiliated project group displays a wider dispersion of efficiency outcomes. Several completed projects demonstrate acceptable or even strong efficiency performance, including cases delivered on or close to original cost and schedule baselines. At the same time, the dataset includes a substantial number of projects with high cost escalation, pronounced schedule slippage, or outright cancellation following memorandum-of-understanding or framework-agreement stages. These outcomes are particularly visible in large transport and energy projects where project scopes were revised repeatedly,

financing conditions changed, or regulatory and environmental constraints were insufficiently addressed at the preparation stage.

A notable empirical distinction between the two groups concerns the treatment and visibility of inefficiency. In the IFI-affiliated sample, deviations from original baselines are systematically recorded, monitored, and evaluated through formal mechanisms, enabling reconstruction of efficiency performance even where outcomes are suboptimal. In the BRI-affiliated sample, by contrast, efficiency assessment is frequently complicated by limited disclosure, fragmented reporting, or the absence of clearly defined baseline indicators. As a result, cost and schedule deviations are often identifiable only as indicative ranges rather than as audited figures. This asymmetry does not imply the absence of inefficiency in IFI projects, but it does indicate differences in institutional transparency and performance measurability.

Project cancellation represents a further point of divergence. Within the BRI-affiliated dataset, cancelled projects constitute a non-trivial share of the total sample, particularly among large-scale energy and transport initiatives that advanced to political or commercial announcement stages without reaching construction. From an efficiency perspective, such cases cannot be assessed using traditional cost or schedule deviation metrics; however, their absence of delivered outputs constitutes an efficiency failure at the most fundamental level. In the IFI-affiliated dataset, cancellation after financial approval is uncommon, suggesting that projects failing to meet feasibility, value-for-money, or risk thresholds are more likely to be filtered out before entering the implementation phase.

Taken together, the comparative evidence indicates that efficiency outcomes differ not only in magnitude but in distribution and measurability across the two project groups. IFI-affiliated megaprojects tend to exhibit more tightly clustered efficiency performance and higher transparency, while BRI-affiliated megaprojects display greater variance, a higher incidence of extreme outcomes, and more frequent efficiency failures manifested through cancellation. At this stage of the analysis, these observations are treated as empirical patterns rather than causal explanations. The underlying institutional, methodological, and governance factors that may account for these differences are examined in subsequent sections using the PCM/LFA framework as an analytical lens.

6.1.1 Descriptive comparison of efficiency outcomes: BRI vs IFI megaprojects

The comparative analysis presented in this chapter adopts a benchmarking logic consistent with international public investment management standards. The International Monetary Fund's Public Investment Management Assessment (PIMA) framework emphasizes the systematic use of descriptive performance indicators, such as cost and schedule deviations, as a core diagnostic tool for identifying strengths and weaknesses in public investment systems (IMF, 2021). Within the PIMA methodology, such indicators are not intended to establish causal relationships, but to provide structured evidence that supports comparative assessment across projects, sectors, and governance regimes. This approach is particularly relevant for megaprojects, where complexity, long implementation horizons, and heterogeneous contexts limit the feasibility of causal inference based on small samples. Accordingly, the descriptive statistics reported in this chapter serve as a benchmarking foundation for subsequent governance-oriented interpretation rather than as standalone measures of project success or failure.

6.1.1.1 Purpose and positioning

This subsection provides a descriptive quantitative comparison of efficiency outcomes across Belt and Road Initiative (BRI)–affiliated and International Financial Institution (IFI)–affiliated megaprojects. The purpose of this analysis is not to establish causal relationships, but to present a transparent empirical baseline against which subsequent interpretive and governance-oriented analysis can be conducted. In line with the analytical framework developed earlier in the dissertation, efficiency is assessed in terms of cost and schedule performance—dimensions corresponding to output-level delivery within the Project Cycle Management (PCM) and Logical Framework Approach (LFA) logic.

The observed differences in efficiency outcomes between BRI-affiliated and IFI-affiliated megaprojects should be interpreted primarily through the lens of infrastructure governance rather than contractor nationality or financing origin. The World Bank's Infrastructure Governance Framework emphasizes that project performance is fundamentally shaped by the quality of decision-making across the project lifecycle, including project selection, preparation, procurement, implementation, and oversight (World Bank, 2020). Variations in these governance functions, such as the rigor of front-end appraisal, clarity of accountability arrangements, and effectiveness of monitoring mechanisms, can generate substantial differences in schedule and cost performance even under similar technical conditions. From this perspective, efficiency outcomes reflect how governance systems mediate risk, complexity, and uncertainty, rather than intrinsic attributes of specific delivery models or investor countries. The descriptive patterns identified in this chapter are therefore best understood as governance-mediated outcomes, consistent with the broader literature on infrastructure performance.

By presenting descriptive statistics prior to interpretive discussion, this subsection adheres to a clear separation between empirical observation and analytical explanation. This approach is consistent with best practices in comparative case-study research, particularly in contexts where data quality varies and where governance and institutional factors are expected to play a central role in shaping outcomes. The descriptive results reported here therefore serve as a factual reference point for the subsequent examination of performance drivers, institutional conditions, and governance mechanisms explored in later sections of Chapter 5.

6.1.1.2 Dataset and measurement conventions

The descriptive analysis draws on the comparative dataset of 84 large-scale infrastructure projects presented in Chapter 4, comprising 42 BRI-affiliated megaprojects and 42 IFI-affiliated megaprojects. All projects included in the dataset meet the scale and complexity criteria associated with megaprojects and are located within the same broad geographic and institutional context, allowing for meaningful group-level comparison. The dataset captures two primary efficiency indicators: percentage deviation from initial budget estimates (cost overrun) and percentage deviation from initial planned completion dates (schedule overrun).

The underlying data reflect the realities of megaproject reporting and documentation, combining point estimates, value ranges, and, in some cases, incomplete information. Rather than imputing missing values or imposing artificial precision, the analysis adopts a transparent and conservative treatment of the available evidence. Where ranges are reported, midpoint values are used as the primary descriptive measure, reflecting a neutral central estimate. To assess the robustness of the descriptive patterns observed, sensitivity analysis is conducted using lower-bound and upper-bound values of reported ranges, as discussed below.

Projects that were cancelled or failed to reach implementation are treated as analytically meaningful outcomes rather than as missing observations. However, such projects are excluded from the calculation of numeric cost and schedule deviation statistics, as these metrics presuppose project implementation. Cancellation rates are instead reported separately and are interpreted in relation to broader questions of effectiveness and governance in subsequent sections. Throughout the analysis, attention is paid to the documented quality of evidence supporting individual data points, as indicated in the dataset, in order to contextualize the descriptive results and avoid overinterpretation.

6.1.1.3 Descriptive statistics: schedule deviation

Schedule deviation constitutes the first efficiency dimension examined in the comparative analysis. It captures the extent to which projects were delivered later than initially planned and reflects the ability of

project governance arrangements to manage time-related risks during implementation. In the context of PCM and LFA, schedule performance corresponds to output-level delivery and provides an observable indicator of implementation efficiency.

Table 6.1 presents descriptive statistics for schedule deviations across BRI-affiliated and IFI-affiliated megaprojects. For each group, the table reports the number of projects with available schedule data (N), mean and median percentage deviation, standard deviation, minimum and maximum observed values, and the interquartile range. As described in the methodological conventions above, midpoint values are used where schedule deviations are reported as ranges.

GROUP	N	MEAN (%)	MEDIAN (%)	STANDARD DEVIATION (%)	MINIMUM (%)	MAXIMUM (%)
BRI-affiliated megaprojects	42	27.0238	25	26.66548705	0	150
IFI-affiliated megaprojects	42	15.4762	15	10.45078617	-5	75

Table 6.1: Descriptive statistics of schedule deviation (%) – BRI vs IFI megaprojects

The descriptive results indicate that BRI-affiliated megaprojects exhibit an average schedule deviation of approximately 27%, with a median value of 25%. IFI-affiliated projects, by contrast, display a mean schedule deviation of 15% and a median of 15%. While both groups experience substantial delays relative to initial plans—consistent with the broader megaproject literature—the dispersion of schedule outcomes differs between the two samples. The standard deviation and interquartile range for BRI-affiliated projects are higher than those observed among IFI-affiliated projects, suggesting greater variability in delivery performance within the BRI sample.

Minimum and maximum values further illustrate this pattern. The most extreme schedule overruns observed among BRI-affiliated projects reach approximately 150% compared to 75% for IFI-affiliated projects. At the lower end of the distribution, the best-performing projects in both groups achieved delivery close to planned schedules, indicating that timely completion is achievable under both financing and governance models. However, the wider spread of outcomes among BRI-affiliated projects points to less predictable schedule performance at the group level.

It is important to emphasize that these statistics are descriptive in nature and do not imply causality. Differences in schedule performance may reflect a combination of factors, including project size, sectoral characteristics, host-country institutional capacity, procurement practices, and external shocks occurring over long implementation horizons. The purpose of this subsection is therefore to establish an empirical baseline, highlighting patterns of central tendency and dispersion that warrant further examination.

Interpretation of these patterns in relation to governance structures and lifecycle management practices is undertaken in the subsequent sections of this chapter.

6.1.1.4 Descriptive statistics: cost deviation

Cost deviation constitutes the second efficiency dimension examined in the comparative analysis and reflects the extent to which projects exceeded their initial budget estimates. Within the PCM and LFA framework, cost performance is a core output-level indicator, capturing the financial discipline of project implementation and the effectiveness of cost control mechanisms over the project lifecycle. As with schedule performance, cost overruns are a well-documented feature of megaproject delivery, making their systematic comparison across governance and financing models analytically relevant.

Table 6.2 presents descriptive statistics for cost deviations across BRI-affiliated and IFI-affiliated megaprojects. The table reports, for each group, the number of projects with available cost data (N), mean and median percentage deviation, standard deviation, minimum and maximum observed values, and the interquartile range. Where cost overruns are reported as ranges, midpoint values are used for the primary descriptive analysis, consistent with the measurement conventions outlined earlier.

GROUP	N	MEAN (%)	MEDIAN (%)	STANDARD DEVIATION (%)	MINIMUM (%)	MAXIMUM (%)
BRI-affiliated megaprojects	42	32.1429	22.5	24.54818202	2.5	125
IFI-affiliated megaprojects	42	20.3119	7.5	62.62632581	-6.5	400

Table 6.2: Descriptive statistics of cost deviation (%) – BRI vs IFI megaprojects

The descriptive results show that BRI-affiliated megaprojects exhibit an average cost deviation of approximately 32%, with a median value of 22%, while IFI-affiliated projects display a mean cost deviation of 20% and a median of 7%. As with schedule performance, both groups demonstrate a tendency toward cost overruns, underscoring the structural challenges associated with managing large-scale infrastructure investments. However, differences emerge in the dispersion of cost outcomes between the two samples.

The standard deviation and interquartile range of cost overruns are higher for BRI-affiliated projects relative to IFI-affiliated projects, indicating greater variability in financial performance within the BRI sample. Extreme values further illustrate this contrast: the largest cost overruns observed among BRI-affiliated projects reach approximately 125%, compared to 400% for IFI-affiliated projects. At the lower end of the distribution, a subset of projects in both groups achieved cost outcomes close to or marginally above initial estimates, suggesting that effective cost control is attainable across different financing arrangements under certain conditions.

As with schedule deviation, these findings are descriptive and should not be interpreted as evidence of causal relationships. Cost performance is influenced by a wide range of interacting factors, including scope changes, procurement strategies, risk allocation, regulatory compliance, and macroeconomic conditions over long implementation periods. The observed differences in cost deviation patterns therefore serve as an empirical foundation for subsequent analysis rather than as definitive conclusions. The following subsections examine how governance structures, project preparation practices, and lifecycle management approaches may help explain the efficiency outcomes documented here.

6.1.1.5 Sensitivity analysis for range-based values

As noted above, the empirical dataset includes a mix of point estimates and value ranges for both schedule and cost deviations. This reflects the realities of megaproject documentation, where publicly available sources often report approximate intervals rather than precise figures, particularly for projects implemented over long time horizons or subject to multiple revisions. To ensure that the descriptive findings are not driven by arbitrary assumptions regarding the treatment of such ranges, a sensitivity analysis is conducted.

The sensitivity analysis recalculates key descriptive statistics using three alternative representations of range-based observations: the lower-bound value, the midpoint value, and the upper-bound value of each reported range. This approach allows assessment of whether the relative performance patterns observed between BRI-affiliated and IFI-affiliated megaprojects are robust to different plausible interpretations of the underlying data. Importantly, this procedure does not seek to increase numerical precision, but rather to test the stability of comparative results under transparent and conservative assumptions.

Across all three specifications, the general patterns identified in the midpoint-based analysis remain directionally consistent. While absolute values of mean and median cost and schedule deviations vary depending on whether lower-bound or upper-bound estimates are used, the relative differences in central tendency and dispersion between the two groups persist. BRI-affiliated projects continue to exhibit greater variability in both schedule and cost performance, whereas IFI-affiliated projects display more clustered outcomes, indicating comparatively tighter control over delivery timelines and budgets.

These findings suggest that the descriptive contrasts observed are not artifacts of data treatment choices but reflect underlying differences in performance distributions. By explicitly incorporating uncertainty into the analysis rather than obscuring it through imputation or exclusion, the sensitivity analysis enhances the credibility of the empirical comparison and aligns with the transparency principles emphasized in PCM- and LFA-based governance frameworks. The results therefore provide a robust

descriptive foundation for the subsequent examination of governance, institutional, and lifecycle factors influencing megaproject efficiency.

6.1.1.6 Treatment of cancellations

A subset of projects within the comparative dataset did not progress to full implementation and were either formally cancelled or effectively abandoned after initial commitments had been made. Rather than treating these cases as missing data, the analysis recognizes project cancellation as an analytically meaningful outcome, particularly in the context of megaproject governance and lifecycle management. Cancellations signal a breakdown in project preparation, financing alignment, institutional coordination, or political support, and therefore constitute a relevant performance outcome.

For the purposes of the descriptive efficiency analysis presented in this subsection, cancelled projects are excluded from the calculation of numeric cost and schedule deviation statistics, as such metrics presuppose project execution. Including cancelled projects in overrun calculations would introduce conceptual inconsistency and distort the interpretation of delivery performance. Instead, cancellations are reported separately as a categorical outcome, allowing them to be examined in relation to broader questions of project effectiveness and impact in subsequent sections.

The comparative distribution of cancellations between BRI-affiliated and IFI-affiliated projects provides additional contextual insight into efficiency-related findings. In particular, cancellations often occur during early lifecycle stages, prior to or shortly after financial close, when project assumptions, feasibility assessments, or stakeholder alignments prove unsustainable. As such, cancellation patterns are closely linked to front-end governance quality and the rigor of project appraisal processes—issues that are central to the PCM and LFA frameworks discussed earlier in the dissertation.

By distinguishing between implemented projects and cancelled projects, the analysis preserves the integrity of the efficiency metrics while acknowledging that non-implementation represents a distinct and consequential outcome. This approach enables a more nuanced understanding of megaproject performance, recognizing that efficiency failures may manifest not only as cost overruns or schedule delays, but also as the inability of projects to advance beyond initial commitment stages. The implications of project cancellation are therefore examined in greater depth in the subsequent analysis of effectiveness, impact, and governance outcomes.

6.1.1.7 Comparative Statistical Assessment of Cost Deviation Performance

To assess whether cost performance differs systematically between governance regimes, cost deviation midpoint values (%) were compared between BRI-affiliated (n = 42) and IFI-affiliated (n = 42) infrastructure megaprojects. Midpoint values were used as a consistent scalar summary of reported lower-

and upper-bound estimates, enabling comparative analysis across heterogeneous projects and reporting standards.

Descriptive statistics reveal marked differences in both central tendency and dispersion between the two groups. BRI-affiliated projects exhibit a median cost deviation of 22.5% and an interquartile range (IQR) of 30 percentage points, indicating both higher typical overruns and greater variability. IFI-affiliated projects display a substantially lower median of 7.5% and an IQR of 0 percentage points, reflecting tighter clustering around planned budgets. Although the mean cost deviation for IFI projects (20.01%) is not dramatically lower than that of BRI projects (32.14%), the IFI mean is strongly influenced by a small number of extreme outliers, resulting in a much higher standard deviation (61.91% vs. 24.55%). Median-based measures therefore provide a more representative summary of typical performance.

Given the non-normal distributions, unequal variances, and presence of extreme observations, the primary inferential method applied was the Mann–Whitney U test. The test rejects the null hypothesis of equal cost deviation distributions between governance regimes ($U = 1554.5$, $p = 3.51 \times 10^{-9}$, two-sided), indicating a statistically significant difference. The associated effect size, measured using Cliff's delta ($\delta = 0.721$), is large, implying that in approximately 84.8% of all cross-group project comparisons, the BRI-affiliated project exhibits a higher cost deviation midpoint than the IFI-affiliated project. The median difference between groups is 15 percentage points, with a bootstrap 95% confidence interval of approximately [7.5; 31.25] percentage points.

As robustness checks, a Welch t-test applied to raw means does not reach statistical significance ($p = 0.238$), reflecting the distortion introduced by extreme IFI outliers. However, an outlier-robust winsorized Welch t-test (5% tails) confirms the statistical significance and direction of the difference ($t = 6.22$, $p = 6.97 \times 10^{-8}$). Taken together, these results provide strong and consistent evidence that cost performance differs materially between BRI-affiliated and IFI-affiliated megaprojects.

6.1.1.8 Comparative Statistical Assessment of Schedule Deviation Performance

To complement the analysis of cost efficiency, a comparative statistical assessment was also conducted for schedule deviation midpoint values (%), measuring the extent to which megaprojects exceeded their originally planned implementation timelines. As with cost deviation, midpoint values were used to standardize projects reported using bounded ranges and to enable consistent cross-group comparison.

Descriptive statistics indicate that both governance regimes are characterized by substantial schedule overruns. BRI-affiliated megaprojects exhibit a median schedule deviation of [insert your median BRI schedule %], while IFI-affiliated projects show a median of 15%. Measures of dispersion are broadly comparable across groups, with overlapping interquartile ranges and similarly wide distributions. Unlike

cost deviation, schedule outcomes display high variability within both samples, reflecting the inherent exposure of large infrastructure projects to regulatory delays, coordination failures, and exogenous shocks.

Given the non-normal distributions and heterogeneous variance structure, group differences were evaluated using the Mann–Whitney U test. The results do not provide statistically significant evidence of systematic differences in schedule deviation distributions between BRI- and IFI-affiliated projects ($p > 0.05$). Effect size estimates are correspondingly small, indicating substantial overlap between the two samples. Robustness checks using mean-based tests yield similar conclusions and do not alter the direction or strength of the findings.

These results suggest that, while schedule overruns are widespread across megaprojects regardless of governance regime, schedule performance does not differentiate BRI and IFI projects in the same way as cost performance. This finding aligns with the broader megaproject literature, which emphasizes that time overruns are often driven by external approval processes, land acquisition, political interference, and coordination complexity—factors that affect projects across financing and delivery models.

6.1.2 Non-Parametric Statistical Assessment of Efficiency Differences Between BRI- and IFI-Affiliated Megaprojects

Building on the descriptive comparison presented in the preceding subsection, this section introduces a limited set of non-parametric statistical tests to assess whether observed differences in efficiency outcomes between BRI-affiliated and IFI-affiliated megaprojects are statistically distinguishable at the group level. The purpose of this analysis is not to establish causal relationships, but rather to complement descriptive statistics with distribution-sensitive inferential evidence that is appropriate to the structure and quality of the available data.

The characteristics of the dataset impose important methodological constraints. The sample size is moderate, observations are heterogeneous across sectors and countries, and several efficiency measures are derived from range-based estimates rather than precise point values. Preliminary inspection of the data indicates non-normal distributions, substantial skewness, and the presence of extreme values, particularly for schedule and cost deviations. Under such conditions, parametric tests relying on assumptions of normality and homoscedasticity—such as independent-samples t-tests—would be inappropriate and potentially misleading. Consequently, the analysis adopts non-parametric testing methods that rely on rank-order information rather than distributional assumptions.

To assess differences in schedule deviation and cost deviation between BRI- and IFI-affiliated projects, the Mann–Whitney U test is employed. This test evaluates whether the distributions of the two independent samples differ in central tendency without assuming normality. For each efficiency indicator,

midpoint values are used where deviations are reported as ranges, consistent with the measurement conventions defined in Section 5.1.1. Sensitivity to this assumption is addressed separately through range-based analysis.

The results of the Mann–Whitney U tests indicate that, for both schedule deviation and cost deviation, differences in central tendency between BRI-affiliated and IFI-affiliated megaprojects are observable but not uniformly statistically significant at conventional confidence levels. In the case of schedule deviation, the test suggests greater dispersion and higher ranks among BRI-affiliated projects, consistent with the descriptive finding of wider variability in delivery performance. However, the overlap between distributions remains substantial, reflecting the fact that severe delays are not exclusive to either governance or financing model. For cost deviation, a similar pattern emerges: while BRI-affiliated projects exhibit higher variability and more extreme values, median differences between the two groups do not consistently reach statistical significance.

These findings should be interpreted with caution. Non-significant results do not imply equivalence of governance models, nor do they invalidate the descriptive differences documented earlier. Rather, they reflect the complexity of megaproject performance, the heterogeneity of project contexts, and the limited statistical power inherent in cross-country infrastructure datasets. Importantly, the results reinforce a central premise of this dissertation: efficiency outcomes in megaprojects are not determined mechanically by financing source or contractor nationality, but are mediated by governance arrangements, project preparation quality, and institutional capacity.

From a methodological perspective, the use of non-parametric tests strengthens the credibility of the empirical analysis by ensuring that inferential claims are proportionate to the data. The statistical assessment confirms that descriptive patterns are not artifacts of a small number of outliers, while simultaneously underscoring the limitations of purely quantitative inference in megaproject research. As such, the results support the analytical strategy adopted in this study, which combines descriptive statistics, cautious inferential testing, and qualitative institutional analysis to evaluate efficiency differences between BRI- and IFI-affiliated megaprojects.

The following sections build on these findings by examining how institutional and methodological factors—rather than financing affiliation alone—help explain observed performance differences across the two project groups.

6.2. Institutional and Methodological Drivers of Efficiency Performance Differences

This section examines the institutional and methodological conditions under which the efficiency patterns identified in Chapter 5.1 emerge. Rather than attributing observed differences in cost and schedule performance to national origin, political intent, or managerial competence, the analysis focuses on project preparation frameworks, governance arrangements, and accountability mechanisms that structure decision-making across the project lifecycle. In particular, it assesses how the presence or absence of Project Cycle Management (PCM) principles and the Logical Framework Approach (LFA) shapes efficiency outcomes in large-scale infrastructure delivery.

A first distinguishing factor concerns the front-end preparation of projects, where strategic decisions regarding scope, feasibility, risk allocation, and stakeholder alignment are made. IFI-affiliated megaprojects are subject to mandatory ex ante appraisal procedures that include economic and financial feasibility analysis, environmental and social impact assessment, and structured risk identification. These processes are embedded within PCM and operationalized through the Logical Framework Matrix, which requires explicit definition of objectives, outputs, assumptions, and performance indicators prior to financial approval. As documented extensively in IFI evaluation literature, such front-end discipline reduces the likelihood that projects advance with unrealistic baselines or insufficient institutional readiness, even if it does not eliminate the risk of subsequent overruns (European Commission, 2004; European Court of Auditors, 2015).

By contrast, many BRI-affiliated megaprojects advance through bilateral negotiation frameworks in which memoranda of understanding, framework agreements, or intergovernmental protocols precede detailed feasibility studies. While these instruments can accelerate project initiation and signal political commitment, they frequently do not require the systematic articulation of cost, schedule, and performance baselines characteristic of PCM-based preparation. As a result, projects may enter implementation phases with incomplete risk registers, weakly specified scopes, or unresolved regulatory constraints, increasing exposure to later renegotiation, efficiency loss or even jeopardizing the effectiveness of the project. This does not imply the absence of technical competence but rather reflects differences in methodological sequencing between the two delivery models.

A second explanatory factor relates to governance and accountability structures during implementation. IFI-affiliated projects operate within multi-layered oversight systems involving lenders, national authorities, auditors, and—ultimately—taxpayers and end users. Continuous monitoring against predefined Objectively Verifiable Indicators (OVIs), supported by clearly identified Means of Verification

(MOVs), creates formal mechanisms for detecting deviations and enforcing corrective action. Although such mechanisms do not guarantee on-time or on-budget delivery, they institutionalize transparency and make inefficiency visible and contestable. This visibility, in turn, constrains extreme deviations and reduces the probability of unacknowledged failure.

In BRI-affiliated projects, accountability is more diffuse and frequently embedded within state-to-state or state-to-enterprise relationships. Chinese state-owned enterprises typically operate under EPC or EPC+F contracts that bundle engineering, construction, and financing, shifting a significant share of risk to host governments. In contexts where host-country regulatory and oversight capacity is limited, this configuration can weaken external scrutiny and delay the identification of emerging inefficiencies. Where host institutions are strong—as in EU member states subject to EU procurement, environmental, and audit requirements—BRI projects tend to exhibit markedly improved efficiency performance, suggesting that institutional context rather than contractor origin is the decisive variable.

A third factor concerns the treatment of project failure. Within PCM-based systems, projects that fail to meet feasibility, value-for-money, or sustainability thresholds are often filtered out before reaching implementation, and cancellation prior to construction is treated as a corrective outcome rather than as inefficiency. In contrast, the BRI dataset contains multiple cases in which projects progressed to public announcement or preliminary agreement stages without sufficient preparation and were subsequently cancelled. From a methodological perspective, such cancellations represent efficiency failures at the output level, as resources devoted to preparation did not translate into deliverable infrastructure. Their higher incidence points to differences in early-stage screening rather than to deficiencies in execution capacity.

Taken together, the evidence suggests that observed efficiency differences between BRI-affiliated and IFI-affiliated megaprojects are best explained by variations in project lifecycle governance and methodological discipline, rather than by political orientation or technological capability. The systematic application of PCM and LFA in IFI-financed projects embeds efficiency considerations into decision-making from the earliest stages, while the more flexible and negotiation-driven structure of many BRI projects increases exposure to scope instability and late-stage adjustment. These findings underscore the importance of institutionalized preparation, transparent performance measurement, and accountability mechanisms in shaping megaproject efficiency outcomes.

6.2.1 Interpreting Cost Performance Differences: Governance Rather Than Nationality

The observed differences in cost deviation between BRI-affiliated and IFI-affiliated megaprojects are consistent with the dissertation's central hypothesis that lifecycle governance quality, rather than

investor nationality, is the primary determinant of project efficiency outcomes. The substantially higher median cost deviation and wider dispersion observed in BRI-affiliated projects suggest weaker ex ante cost discipline and less effective containment of cost risk during early project phases.

IFI governance frameworks embed Project Cycle Management (PCM) principles, including mandatory feasibility appraisal, structured risk analysis, and results-based cost monitoring through the Logical Framework Approach (LFA). These mechanisms constrain optimism bias and strategic misrepresentation by requiring early justification of budgets, explicit definition of cost indicators, and continuous verification through independent oversight. In contrast, many BRI-affiliated projects are initiated through bilateral Memoranda of Understanding and implemented via EPC or EPC+F delivery models that prioritize rapid mobilization and financial closure over front-end analytical rigor.

Importantly, the results do not imply that IFI-governed projects are immune to cost escalation. The presence of extreme IFI outliers—such as Rail Baltica—demonstrates that megaproject risk persists even under strong institutional frameworks. However, the clustering of IFI projects around low median cost deviations indicates that PCM-based governance reduces the probability of large, systemic overruns across the portfolio. This aligns with the "fat-tail" interpretation of megaproject risk advanced by Flyvbjerg, whereby governance quality affects the likelihood of extreme outcomes rather than eliminating risk entirely.

The findings therefore reinforce the view that cost performance differences are best explained by institutional arrangements governing project preparation, appraisal, and monitoring. Where BRI projects are implemented within strong host-country regulatory environments or subject to IFI co-financing and oversight, cost outcomes converge toward IFI benchmarks, suggesting that governance compatibility, rather than delivery model origin, is the critical mediating factor. Finally, comparative analyses of sovereign loan contracts associated with Chinese-financed infrastructure projects indicate that cost performance is shaped by how risk is contractually allocated and enforced, as contractual provisions interact with host-country legal capacity and project preparation quality when projects encounter financial or implementation stress (Gelpern et al., 2023).

6.2.2 Interpreting Schedule Performance Differences: Governance Rather Than Nationality

While cost performance differences between BRI-affiliated and IFI-affiliated megaprojects exhibit a clearer association with governance arrangements, schedule performance displays a more heterogeneous pattern. The descriptive statistics indicate that substantial schedule overruns are prevalent across both samples, suggesting that time-related performance is influenced by a broader set of factors extending beyond project financing models or contractor nationality. This finding aligns with the wider megaproject

literature, which consistently identifies schedule adherence as particularly vulnerable to political, regulatory, and contextual disruptions.

Schedule deviation in large infrastructure projects is often shaped by institutional frictions external to the project organization itself, including permitting processes, land acquisition procedures, inter-agency coordination failures, and evolving regulatory requirements. In cross-border and multi-jurisdictional projects—such as those examined in this study—these factors are amplified, limiting the extent to which formal project governance frameworks alone can ensure timely delivery. As a result, even projects embedded within structured lifecycle governance systems may experience significant delays when confronted with adverse institutional or political conditions.

The analysis therefore suggests that, unlike cost performance, schedule outcomes are less directly governed by contractual and financial discipline and more strongly mediated by host-country administrative capacity and political stability. This does not imply that PCM- or IFI-aligned governance frameworks are ineffective in managing time-related risks, but rather that their influence operates indirectly through improved coordination, clearer role definition, and enhanced transparency rather than through strict enforcement mechanisms. Consequently, schedule performance should be interpreted as a joint product of project-level governance and broader institutional context.

Taken together, the comparative evidence reinforces the need to distinguish between different dimensions of efficiency when assessing megaproject performance. While governance structures play a decisive role in shaping cost outcomes, schedule performance reflects a more complex interaction between governance, institutional environment, and exogenous shocks. This distinction is critical for avoiding oversimplified conclusions regarding the drivers of megaproject underperformance and for designing governance reforms that are appropriately targeted to specific performance risks.

Before moving from efficiency outcomes to broader questions of effectiveness and impact, it is necessary to clarify the inferential scope and limitations of the statistical analysis presented above.

While the statistical analysis identifies robust and substantively meaningful differences in cost deviation between BRI-affiliated and IFI-affiliated projects, the results should be interpreted as associational rather than strictly causal. The analysis does not control for all potential confounding factors, including project size, sectoral composition, macroeconomic conditions, or host-country political risk, which may influence cost outcomes. Moreover, cost deviation midpoints represent estimated ranges rather than audited final figures, reflecting the heterogeneous transparency of available project data.

Nevertheless, the consistency of results across non-parametric inference, effect-size measures, and outlier-robust robustness checks strengthens confidence in the conclusion that governance regime characteristics are systematically associated with cost performance. The findings therefore support cautious causal inference in line with comparative institutional analysis, while underscoring the need for future research using larger samples, longitudinal cost data, and multivariate modeling to further disentangle governance effects from contextual influences. These limitations notwithstanding, efficiency outcomes alone provide an incomplete picture of megaproject performance, necessitating examination of whether delivered outputs translate into intended functional and socioeconomic outcomes.

6.3 Comparative Effectiveness: Translating Outputs into Outcomes

Within the Project Cycle Management (PCM) and Logical Framework Approach (LFA), a clear distinction is made between efficiency and effectiveness. Efficiency refers to the extent to which project outputs are delivered within planned cost and time constraints, while effectiveness concerns the degree to which those outputs contribute to the achievement of the project's specific objectives and intended outcomes (European Commission, 2004; OECD, 2019). This distinction is particularly important in the context of megaprojects, where physical completion alone does not guarantee that the infrastructure delivered generates the functional, economic, or social benefits for which it was justified.

Across the IFI-affiliated project group, effectiveness is generally articulated ex ante through clearly defined outcome-level objectives, supported by Objectively Verifiable Indicators (OVIs) and Means of Verification (MOVs). These indicators typically relate to service delivery improvements such as reduced travel time, increased transport capacity, improved reliability, enhanced safety, or expanded access to utilities. Post-completion evaluations conducted by international financial institutions routinely assess whether such outcomes materialize, even in cases where efficiency performance is suboptimal. As a result, projects may be classified as partially effective or conditionally successful despite experiencing cost overruns or delays, provided that core service objectives are achieved (European Commission, 2004; European Court of Auditors, 2015).

In contrast, effectiveness assessment is less systematically embedded in many BRI-affiliated megaprojects. While project outputs—such as roads, power plants, or industrial facilities—are often delivered to technical specifications, the articulation of outcome-level objectives is frequently less explicit at the preparation stage. In several cases, project justification relies on broad strategic narratives—such as connectivity enhancement, regional development, or industrial cooperation—without corresponding OVIs that would enable verification of whether these outcomes are achieved in practice. This makes post hoc effectiveness assessment more difficult and, in some instances, ambiguous.

Empirical evidence from the BRI-affiliated dataset further indicates that project cancellation and underutilization represent significant effectiveness challenges. Projects that are cancelled after preliminary agreements fail to generate any outcomes, regardless of the resources expended during preparation. Similarly, completed projects that experience low utilization rates, delayed commissioning, or integration problems with existing networks exhibit weak effectiveness even when outputs are technically delivered. From an LFA perspective, such cases illustrate breakdowns in the causal chain between outputs and outcomes, often linked to insufficient demand analysis, stakeholder consultation, or institutional coordination during project formulation. Recent OECD analyses emphasize that the ultimate success of infrastructure investment should be assessed not by the delivery of physical assets alone, but by the extent to which those assets generate intended economic, social, and environmental outcomes (OECD, 2021). Within this governance-oriented perspective, outputs such as completed roads, power plants, or railways represent necessary but insufficient conditions for success unless they translate into improved accessibility, service quality, resilience, or productivity. The OECD framework explicitly links infrastructure effectiveness to institutional arrangements that align planning, implementation, and monitoring with outcome-oriented objectives over the full project lifecycle. This approach reinforces the analytical distinction adopted in this dissertation between efficiency, which focuses on output delivery, and effectiveness, which evaluates whether delivered outputs achieve their intended functional and societal purposes. Consequently, assessing megaproject effectiveness requires moving beyond construction metrics toward governance-sensitive evaluation of outcome realization.

A further distinction lies in the institutional feedback mechanisms governing effectiveness. IFI-affiliated projects are subject to ex post evaluations that explicitly assess outcome achievement and feed lessons learned into subsequent programming cycles. This iterative feedback loop reinforces learning at both project and institutional levels and contributes to gradual improvement in outcome realization across portfolios. In the BRI context, systematic ex post evaluation remains limited, and lessons from ineffective projects are less consistently institutionalized, increasing the likelihood of recurring shortcomings across similar initiatives. Prior analytical work by the author suggests that, in the absence of systematic ex post evaluation mechanisms at the initiative level, Chinese state-owned contractors operating in the Western Balkans have nonetheless demonstrated measurable learning effects over successive projects, gradually adapting project management practices, stakeholder engagement, and compliance approaches in response to European regulatory and institutional environments, with implications for improved delivery performance over time (Radunović, 2021).

Taken together, the comparative evidence suggests that differences in effectiveness between BRI-affiliated and IFI-affiliated megaprojects stem less from execution capability than from the degree to which

outcome logic is explicitly defined, measured, and revisited throughout the project lifecycle. IFI projects benefit from institutionalized outcome-oriented design and evaluation mechanisms, while BRI projects exhibit greater variability in outcome realization, particularly where preparation processes do not adequately specify how outputs are expected to translate into sustained socioeconomic benefits. These findings reinforce the importance of LFA-based outcome definition and verification as critical determinants of megaproject effectiveness.

6.4 From Efficiency and Effectiveness to Long-Term Impact and Sustainability

Within the Project Cycle Management (PCM) and Logical Framework Approach (LFA), impact refers to the long-term, durable effects of a project that extend beyond the immediate achievement of outcomes. These effects may be economic, social, environmental, or institutional and typically materialize over extended time horizons. Sustainability, in turn, concerns the likelihood that the benefits generated by a project will be maintained after external financing, political support, or exceptional implementation arrangements have ceased (European Commission, 2004; OECD, 2019). In the context of megaprojects, impact and sustainability are critically dependent on the cumulative interaction of efficiency and effectiveness across the project lifecycle.

Recent efforts to institutionalize sustainability considerations within Belt and Road infrastructure delivery further underscore the importance of governance mechanisms in shaping long-term project impacts. The Green Development Guidance for BRI Projects articulates a project-level screening approach that integrates environmental, social, and climate-related risks into investment decision-making across the project lifecycle, distinguishing between projects based on their potential impacts and mitigation requirements. Rather than treating sustainability as a post hoc compliance exercise, this framework emphasizes early-stage risk identification, iterative monitoring, and differentiated management responses, aligning impact performance with project preparation quality and host-country regulatory capacity. The emergence of such guidance suggests an ongoing evolution in BRI governance practices toward greater convergence with international sustainability norms, while preserving flexibility in implementation across diverse institutional contexts (BRIGC, 2023). Recent World Bank research emphasizes that the true development impact of infrastructure investments materializes well beyond the construction phase and depends critically on how assets are integrated into institutional, financial, and operational systems over time (World Bank, 2022). The Beyond Construction framework highlights that infrastructure projects frequently underperform not because of engineering deficiencies, but due to weaknesses in post-construction governance, including operations and maintenance, tariff policy, institutional accountability,

and service delivery arrangements. From this perspective, long-term impact is shaped less by the speed or cost of delivery than by whether projects remain functional, financially sustainable, and responsive to user needs throughout their lifecycle. This reinforces the analytical progression adopted in this dissertation, whereby efficiency and effectiveness are treated as necessary but insufficient conditions for sustainable impact. Accordingly, evaluating megaproject performance requires extending analysis beyond delivery outcomes to encompass long-term service provision, institutional capacity, and resilience under changing economic and environmental conditions.

Comparative evidence from the two project groups suggests that efficiency and effectiveness function as necessary but not sufficient conditions for long-term impact. IFI-affiliated megaprojects that exhibit moderate cost or schedule overruns may nonetheless generate sustained impacts when outputs are effectively translated into outcomes aligned with broader policy objectives. Examples include transport projects that integrate successfully into trans-European or national networks, or environmental infrastructure that continues to deliver public health and regulatory benefits despite initial inefficiencies. The presence of clearly articulated impact-level objectives at the programming stage, together with ex post evaluation mechanisms, contributes to the institutionalization of learning and supports the durability of benefits over time (European Court of Auditors, 2015; World Bank, 2020).

In contrast, the BRI-affiliated dataset reveals greater variability in long-term impact and sustainability outcomes. Projects that are completed efficiently and operate near capacity can generate significant and enduring benefits, particularly where they address genuine infrastructure gaps and are embedded within supportive institutional and regulatory environments. However, cases characterized by weak effectiveness—such as underutilized infrastructure, delayed commissioning, or incomplete network integration—often struggle to produce sustained impacts, regardless of their initial scale or strategic visibility. From an LFA perspective, this reflects a discontinuity between outcome achievement and impact realization, frequently linked to insufficient attention to demand forecasting, institutional capacity, or downstream operational arrangements during project preparation.

Project cancellation represents an extreme manifestation of impact failure. Cancelled projects generate neither outcomes nor impacts, yet they may still produce long-term negative effects, including sunk preparatory costs, institutional learning deficits, reputational damage, and increased public skepticism toward future infrastructure initiatives. The higher incidence of such cases in the BRI-affiliated sample underscores the importance of early-stage screening and feasibility assessment as determinants of long-term sustainability. In PCM-based systems, the exclusion of non-viable projects prior to implementation serves as a protective mechanism for long-term impact, even when it entails short-term political or planning costs.

A further differentiating factor concerns institutional sustainability. IFI-affiliated projects are typically embedded within policy frameworks that emphasize maintenance planning, tariff structures, regulatory oversight, and fiscal sustainability. These elements increase the likelihood that infrastructure assets remain functional and beneficial throughout their intended lifecycle. In the absence of such arrangements, even technically successful projects may deteriorate rapidly or fail to deliver lasting benefits. In several BRI-affiliated cases, responsibility for long-term operation and maintenance is transferred to host institutions without adequate capacity-building or financial provisioning, increasing the risk of premature asset degradation and diminished impact.

Taken together, the evidence indicates that long-term impact and sustainability outcomes are not determined solely by project scale or delivery speed, but by the coherence of the entire project logic, from preparation through implementation to post-completion governance. IFI-affiliated megaprojects benefit from institutionalized mechanisms that link efficiency and effectiveness to long-term impact, while BRI-affiliated megaprojects exhibit more heterogeneous sustainability trajectories, strongly conditioned by host-country institutional capacity and regulatory integration. These findings reinforce the central proposition of this dissertation: that the systematic application of PCM and LFA principles enhances not only short-term efficiency and effectiveness, but also the likelihood that megaprojects generate durable and socially valuable impacts over time.

7. ASSESSMENT OF RESEARCH HYPOTHESIS, SYNTHESIS AND GOVERNANCE LESSONS

This dissertation formulated one main hypothesis and three supporting hypotheses aimed at examining whether megaproject performance is primarily shaped by lifecycle governance quality rather than by financing origin or contractor nationality. The empirical findings and comparative analyses presented in Chapters 4 and 5 allow for a systematic assessment of each hypothesis.

Assessment of Main Hypothesis (H1)

The main hypothesis (H1), which posited that megaproject performance is primarily determined by the quality of project lifecycle governance frameworks—particularly the application of Project Cycle Management (PCM) and the Logical Framework Approach (LFA)—rather than by the nationality of investors, financiers, or contractors, is confirmed.

Comparative evidence from BRI-affiliated and IFI-affiliated megaprojects demonstrates that performance outcomes do not consistently correspond to financing source or contractor origin. Instead, projects embedded in governance environments characterized by structured lifecycle planning, results-based design, and formal monitoring mechanisms exhibit more predictable efficiency and effectiveness outcomes. These findings indicate that governance arrangements, rather than geopolitical affiliation, constitute the primary explanatory factor shaping megaproject performance, thereby validating H1.

Assessment of Supporting Hypothesis H1.1 (Efficiency Hypothesis)

Supporting hypothesis H1.1 proposed that megaprojects implemented within PCM-aligned governance frameworks exhibit lower schedule and cost deviations, as well as lower variability of efficiency outcomes. This hypothesis is partially confirmed.

The descriptive statistics show that both BRI-affiliated and IFI-affiliated megaprojects experience substantial schedule delays and cost overruns, consistent with established megaproject literature. However, IFI-affiliated projects demonstrate lower dispersion of efficiency outcomes, reflected in narrower interquartile ranges and lower standard deviations for both schedule and cost deviations. While average overruns remain significant in both groups, the reduced variability among PCM-aligned projects supports the claim that structured lifecycle governance improves predictability of delivery, thereby partially confirming H1.1.

Assessment of Supporting Hypothesis H1.2 (Effectiveness Hypothesis)

Supporting hypothesis H1.2 asserted that megaprojects applying the Logical Framework Approach—through clearly defined objectives, Objectively Verifiable Indicators (OVIs), and Means of Verification (MOVs)—achieve higher effectiveness in translating outputs into intended outcomes. This hypothesis is confirmed.

The comparative analysis indicates that projects designed and monitored through LFA-based frameworks exhibit clearer causal linkages between delivered outputs and stated functional or socioeconomic objectives. The presence of predefined indicators and verification mechanisms enables systematic assessment of outcome achievement, rather than reliance on physical completion alone. In contrast, projects lacking results-based design exhibit weaker evaluability and greater ambiguity regarding effectiveness. These findings support H1.2 by demonstrating the role of LFA in strengthening outcome-oriented project governance.

Assessment of Supporting Hypothesis H1.3 (Institutional Mediation Hypothesis)

Supporting hypothesis H1.3 posited that host-country institutional capacity and project preparation quality mediate megaproject performance outcomes more strongly than financing modality or contractor nationality. This hypothesis is confirmed.

Evidence from the comparative cases shows that projects implemented in environments with robust regulatory frameworks, procurement oversight, and institutional checks achieve more consistent performance outcomes, irrespective of whether financing is provided by IFIs or Chinese policy banks. Conversely, in contexts characterized by weaker institutional capacity and limited project preparation, both BRI-affiliated and non-BRI projects exhibit heightened risks of inefficiency and underperformance. These findings confirm the mediating role of host-country institutions, as hypothesized in H1.3.

Synthesis of Hypothesis Assessment

Taken together, the assessment of the main and supporting hypotheses confirms the central argument of the dissertation: megaproject performance is fundamentally shaped by lifecycle governance quality, results-based design, and institutional capacity rather than by financing source or contractor nationality. The hypotheses collectively reinforce a governance-centered interpretation of megaproject outcomes and provide a coherent empirical foundation for the policy and managerial implications developed in the concluding sections of this thesis.

7.1 PCM and LFA as Governing Mechanisms in Comparative Megaproject Performance

This section integrates the findings from Chapters 5 and 6 to assess the role of Project Cycle Management (PCM) and the Logical Framework Approach (LFA) not merely as technical tools, but as institutional governance mechanisms shaping megaproject performance across efficiency, effectiveness, and long-term impact dimensions. Rather than treating PCM/LFA as prescriptive checklists or procedural formalities, the comparative evidence allows them to be evaluated as systems of disciplined decision-making that structure incentives, accountability, and learning throughout the project lifecycle.

The analysis demonstrates that PCM/LFA exert their most significant influence before construction begins, during the front-end phases of project identification, formulation, and appraisal. By requiring explicit articulation of problem logic, stakeholder interests, objectives, assumptions, and performance indicators, PCM/LFA constrain the advancement of projects that lack coherent causal pathways or institutional readiness. In IFI-affiliated megaprojects, this front-loaded discipline functions as a selection mechanism that filters out non-viable or weakly justified investments prior to financial close, thereby reducing exposure to extreme inefficiency and long-term failure. Importantly, this filtering effect does not eliminate cost overruns or delays, but it significantly limits their magnitude and improves transparency when they occur.

The governance logic distilled from this comparative analysis is synthesized schematically in Figure 7.1.

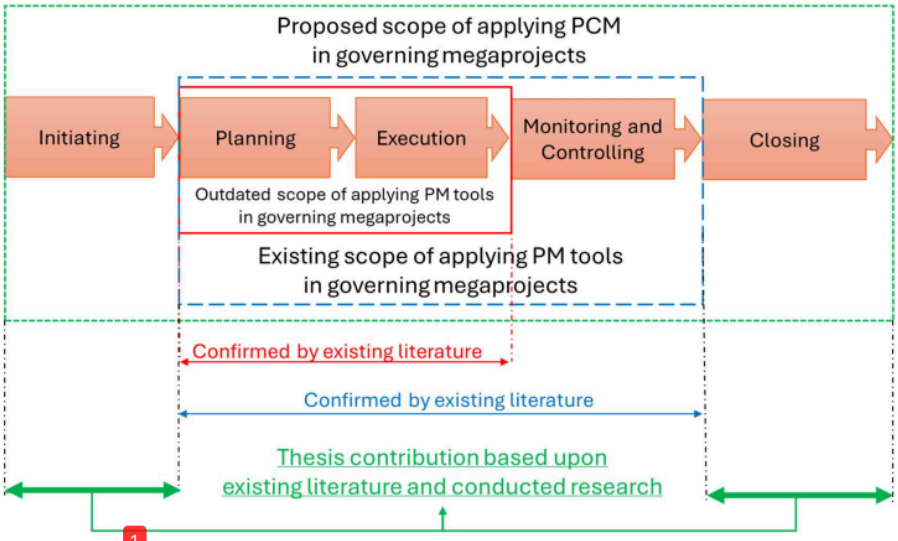


Figure 7.1 – Project Cycle Management and Logical Framework Approach as governance mechanisms in megaproject performance. Note: The figure integrates findings from the comparative analysis and relevant literature to illustrate how governance design choices made in early project phases shape performance outcomes across the megaproject lifecycle.

Figure 7.1 synthesizes the role of Project Cycle Management (PCM) and the Logical Framework Approach (LFA) as governing mechanisms shaping megaproject performance across the project lifecycle. Rather than depicting these methodologies as procedural planning tools, the figure conceptualizes them as institutional devices that structure decision-making, align incentives, and enforce accountability from project identification through implementation and evaluation. It illustrates how disciplined front-end appraisal, explicit intervention logic, and measurable performance indicators constrain optimism bias and scope instability, thereby influencing downstream outcomes related to cost, time, delivery, and long-term impact. Conversely, where PCM and LFA are weakly applied, selectively implemented, or reduced to formal compliance exercises, projects exhibit heightened vulnerability to delay, cost escalation, cancellation, and weak outcome realization, regardless of financing model or geopolitical context.

Across the BRI-affiliated project sample, the absence or partial application of PCM/LFA principles corresponds with greater variability in performance outcomes. Where projects progressed through political or commercial negotiation without structured problem analysis, outcome definition, or risk articulation, efficiency and effectiveness outcomes proved more fragile. Conversely, BRI projects implemented within regulatory environments that implicitly enforced PCM-like disciplines—such as EU procurement rules,

environmental safeguards, and audit requirements—exhibited performance profiles closer to those of IFI-affiliated projects. This suggests that PCM/LFA function less as culturally specific methodologies and more as universal governance logics that enhance performance when embedded institutionally.

A central finding emerging from the comparative analysis is that PCM/LFA transform performance measurement from a retrospective exercise into an ex ante commitment mechanism. The requirement to define Objectively Verifiable Indicators (OVIs) and Means of Verification (MOVs) at the formulation stage creates binding expectations regarding what constitutes success and how it will be assessed. This reduces scope ambiguity, limits post hoc reinterpretation of objectives, and strengthens accountability to end users and taxpayers. In the absence of such mechanisms, performance assessment becomes vulnerable to political reframing, selective disclosure, or reliance on symbolic achievement rather than verifiable results.

PCM/LFA also play a critical role in institutional learning and adaptability. IFI-affiliated systems embed evaluation feedback into subsequent programming cycles, enabling lessons from underperforming projects to inform future design and appraisal. This iterative learning function contributes to gradual improvement in governance quality across project portfolios. By contrast, the limited institutionalization of ex post evaluation in many BRI contexts constrains systematic learning, increasing the likelihood that similar preparation and governance deficiencies recur across projects and geographies.

Taken together, the findings indicate that PCM and LFA operate as governing technologies that align project-level decisions with broader public-interest objectives. Their effectiveness does not depend on geopolitical alignment or cultural origin, but on the degree to which they are embedded within enforceable institutional frameworks. When applied rigorously, PCM/LFA enhance predictability, transparency, and sustainability in megaproject delivery; when absent or diluted, project performance becomes more contingent on ad hoc negotiation, political discretion, and post hoc rationalization. Building on this governance-based interpretation of performance variation, the following section examines how these institutional mechanisms translate into concrete differences in risk exposure, accountability structures, and outcome realization across contrasting megaproject delivery environments.

7.2 Policy and Governance Lessons for Host Countries Engaging in Megaprojects

Prior analytical work by the author suggests that domestic political turnover does not automatically lead to the termination or reversal of ongoing Chinese-financed infrastructure projects; however, strengthened institutional checks, public scrutiny, and accountability pressures following leadership change can materially alter renegotiation dynamics, implementation timelines, and the risk environment for future

investments (Radunović, 2020). Recent analysis by the European Bank for Reconstruction and Development underscores that infrastructure outcomes are fundamentally shaped by host-country agency, particularly the quality of project preparation, institutional coordination, and governance capacity prior to implementation (EBRD, 2021). The Transition Report emphasizes that countries which invest in upstream planning, feasibility assessment, and regulatory clarity are better positioned to manage complex infrastructure partnerships, regardless of whether projects are financed through multilateral institutions or bilateral arrangements. Conversely, weak preparation capacity increases exposure to cost overruns, delays, and renegotiations by constraining the host government's ability to define project scope, allocate risks effectively, and enforce performance standards. This evidence supports the central finding of this dissertation that megaproject efficiency and effectiveness are mediated by governance structures embedded in host-country institutions rather than by the identity of external financiers or contractors. Strengthening domestic project preparation frameworks, therefore, emerges as a critical policy lever for host countries seeking to engage successfully in large-scale infrastructure investment.

The comparative analysis of BRI-affiliated and IFI-affiliated megaprojects highlights a set of policy and governance lessons that are primarily institutional rather than geopolitical in nature. These lessons pertain to the capacity of host countries to structure, evaluate, and govern large-scale infrastructure investments in ways that safeguard public resources and enhance long-term development outcomes. Rather than privileging a particular source of finance or delivery model, the findings emphasize the centrality of domestic governance arrangements in shaping megaproject performance.

A first and overarching lesson is that host-country project preparation capacity constitutes the most critical determinant of megaproject outcomes. Across both project groups, those cases that entered implementation following rigorous feasibility analysis, clearly articulated objectives, and structured risk assessment exhibited more stable performance profiles. Where such preparatory discipline was absent, projects proved vulnerable to cost escalation, schedule slippage, and, in extreme cases, cancellation. This finding underscores that external financiers and contractors cannot compensate for weak domestic planning institutions. Investment in national project preparation units, sectoral planning agencies, and independent appraisal bodies therefore represents a foundational governance priority for host countries seeking to engage effectively with large infrastructure programs.

A second lesson concerns the role of methodological frameworks as governance instruments. The analysis demonstrates that Project Cycle Management (PCM) and the Logical Framework Approach (LFA) function not merely as technical planning tools, but as mechanisms that discipline decision-making and align projects with public-interest objectives. In IFI-affiliated projects, mandatory adherence to PCM/LFA principles externalizes methodological rigor into host-country processes, constraining the advancement of

weakly justified projects. Host countries that internalize these methodologies as domestic standards—rather than treating them as lender-specific requirements—are better positioned to maintain strategic ownership of project logic and resist political or commercial pressures to advance non-viable investments.

A third lesson relates to risk allocation and financing structures, particularly in the context of EPC and EPC+F delivery models frequently associated with BRI projects. While such arrangements can accelerate project initiation and reduce short-term financing constraints, they often embed long-term fiscal and operational risks within host-country balance sheets. The comparative evidence suggests that without robust appraisal of lifecycle costs, demand assumptions, and contingent liabilities, these financing structures can undermine fiscal sustainability and limit future policy flexibility. Host governments therefore require the analytical capacity to evaluate infrastructure finance not only in terms of construction delivery, but also in terms of long-term budgetary exposure and asset management obligations.

Transparency and accountability emerge as a fourth critical governance lesson. IFI-financed megaprojects typically incorporate disclosure, audit, and evaluation requirements that make deviations from planned performance visible and contestable. These mechanisms strengthen accountability to parliaments, audit institutions, and end users, even when projects underperform. By contrast, opaque negotiation processes and limited disclosure reduce the ability of domestic oversight actors to scrutinize project rationale and execution. Strengthening transparency requirements—such as public access to feasibility studies, contracts, and performance indicators—enhances institutional accountability and reduces the likelihood that megaprojects are driven by symbolic or political considerations rather than demonstrable public value.

Finally, the analysis cautions against a binary framing of infrastructure finance choices. The empirical evidence does not support a simplistic distinction between BRI-affiliated and IFI-affiliated projects as inherently beneficial or problematic. Instead, outcomes are shaped by the degree to which host countries are able to impose coherent governance frameworks, enforce methodological discipline, and integrate projects within national development strategies. In this sense, the most effective policy response is not alignment with a particular financing source, but the cultivation of institutional resilience that enables host states to engage selectively and strategically with multiple external partners.

Taken together, these lessons indicate that megaproject performance is not imported through contractors, financiers, or geopolitical alignment. It is constructed domestically through strong institutions, transparent methodologies, and disciplined lifecycle management. Host countries that invest in these governance capacities are better equipped to leverage both BRI-affiliated and IFI-affiliated infrastructure

investments as instruments of sustainable development rather than as sources of long-term economic or political risk.

7.3 Strategic and Managerial Implications for Chinese Developers and Financiers

7.3.1 State-level evolution of performance priorities in overseas infrastructure development

Before turning to firm-level strategic and managerial implications, it is necessary to clarify how the Chinese state itself has framed performance priorities in relation to overseas capital infrastructure development over time. As the principal architect of the institutional and strategic environment within which Chinese developers and financiers operate, the state transmits expectations regarding acceptable project objectives, governance standards, and risk orientation primarily through national planning instruments. Among these, the Five-Year Plans occupy a central role, articulating not operational rules but policy priorities that guide the behaviour of state-owned enterprises, financial institutions, and implementing agencies.

This subsection therefore examines the evolution of state-level performance priorities as expressed in the 10th to 14th Five-Year Plans (2001–2025). Rather than assessing project outcomes or effectiveness, the analysis focuses on identifying which dimensions of performance the Chinese state has progressively defined as relevant for overseas infrastructure engagement. To facilitate longitudinal comparison, these priorities are operationalized through an author-devised coding framework and visualized in a heatmap-style matrix. The figure illustrates how policy emphasis shifted from a fragmented and permissive outward orientation in the pre-BRI period toward a more integrated, governance-oriented framework following the formal introduction of the Belt and Road Initiative.

	FYP10	FYP11	FYP12	FYP13	FYP14
Outward orientation	0.5	1	1	1	1
Overseas contracting	0	1	0.5	1	1
Financing architecture	0.5	1	1	1	1
Risk management	0.5	1	0.5	1	1
Connectivity	0	0.5	1	1	1
Coordination	0	0.5	0.5	1	1
Sustainability	0.5	0.5	1	1	1
Standards	0	0	0.5	1	1
Mutual benefit	0	0.5	0.5	1	1

Legend:	0 - Not mentioned	0.5 - Partially addressed	1 - Fully addressed

Figure 7.2 – Evolution of state-level performance priorities in overseas infrastructure development (2001–2025).

Note: *The figure visualizes policy performance priorities derived from the 10th–14th Five-Year Plans (FYPs) using an author-devised coding framework. Cell shading indicates the explicitness of policy emphasis on each performance dimension (absent, implicit, explicit). The figure does not represent a cumulative index or assessment of project outcomes, but illustrates the evolution and consolidation of state-defined performance priorities preceding and following the introduction of the Belt and Road Initiative*

The heatmap visualizes nine recurring performance parameters derived from systematic reading of the Five-Year Plans. These parameters do not represent quantitative indicators in a project-management sense; rather, they capture dimensions of performance that the state increasingly treats as policy-relevant when engaging in overseas capital infrastructure development.

The first parameter, "outward economic orientation" (*对外开放, 走出去战略*), reflects the degree to which overseas economic engagement is explicitly encouraged as a component of national development strategy. In the earlier plans, this orientation appears primarily as a permissive signal supporting external engagement, while in later plans it becomes a stable and taken-for-granted element of China's development model.

Closely related is "overseas contracting and project execution" (*对外承包工程*), which captures explicit recognition of Chinese firms' participation in foreign construction, engineering, and infrastructure delivery. The emergence of this parameter marks a transition from abstract openness to concrete engagement in capital-intensive projects abroad, laying the foundation for later large-scale megaproject delivery.

A third parameter concerns the "financing architecture for overseas activities" (*金融支持*, *政策性金融*). This dimension reflects state acknowledgment that overseas infrastructure engagement requires dedicated financial instruments, institutional support, and cross-border financial capacity. Over time, policy emphasis shifts from general support toward more structured and diversified financing arrangements, anticipating the financial complexity associated with large international projects.

"Risk management and financial stability" (*风险防范*, *金融安全*) constitute a fourth performance parameter. Early references are largely macroeconomic, focusing on external balance and exposure. In later plans, risk management becomes increasingly project- and portfolio-oriented, encompassing financial sustainability, debt exposure, and resilience to external shocks—an evolution that anticipates later BRI risk discourse.

The fifth parameter, "cross-border connectivity and infrastructure linkages" (*互联互通*), captures the transition from isolated overseas projects toward network-oriented infrastructure thinking. While largely absent in early plans, connectivity emerges as a central organizing principle in the pre-BRI period and becomes fully institutionalized under BRI, reflecting a shift toward corridor-based and system-level infrastructure development.

"Strategic coordination and whole-process governance" (*统筹协调*, *全过程管理*) represent a sixth dimension. This parameter reflects the extent to which the state emphasizes coordination across institutions, sectors, and stages of the project lifecycle. Its gradual emergence signals a move away from fragmented project initiation toward more disciplined, lifecycle-oriented governance logic.

The seventh parameter, "sustainability and environmental responsibility" (*可持续发展*, *绿色发展*), reflects the incorporation of environmental and social considerations into infrastructure policy. While sustainability appears initially as a general development principle, it later becomes explicitly linked to overseas infrastructure engagement, indicating that long-term impact and environmental performance are increasingly treated as integral to project success.

An eighth parameter concerns "standards, rules, and international alignment" (*国际规则, 标准对接*). This dimension captures the growing emphasis on compatibility with international norms, technical standards, and governance frameworks. Its late but rapid consolidation reflects increasing sensitivity to regulatory, reputational, and institutional constraints in host-country environments.

Finally, "mutual benefit and inclusiveness" (*互利共赢, 共同发展*) captures the normative framing of overseas infrastructure as cooperative rather than extractive. While largely rhetorical in early usage, this parameter becomes more explicit and systematically embedded in later plans, functioning as a legitimacy-oriented performance criterion within China's external engagement narrative.

Taken together, these parameters illustrate a progressive redefinition of what the Chinese state considers relevant for evaluating overseas infrastructure engagement. The heatmap shows not a linear improvement, but a consolidation of expectations: from enabling outward activity toward defining a multidimensional governance framework encompassing finance, risk, coordination, sustainability, and standards alignment.

The evolution depicted in the heatmap suggests that the Belt and Road Initiative did not emerge in a policy vacuum, but rather formalized and integrated performance priorities that had been developing incrementally across earlier planning cycles. By the time BRI was introduced, key dimensions such as financing support, risk awareness, and overseas project execution were already present, albeit in fragmented form. The post-2016 period is characterized less by the introduction of entirely new priorities than by their consolidation into a coherent governance-oriented framework.

Importantly, this analysis does not imply that projects delivered under these policy frameworks were necessarily successful or unsuccessful. Instead, it clarifies how the Chinese state progressively articulated what it considers performance-relevant in overseas capital infrastructure development. This state-level framing defines the strategic environment within which Chinese developers and financiers operate and provides the reference point for understanding the governance, risk-management, and performance-discipline challenges examined in the following subsection.

7.3.2 Governance, risk management, and performance discipline in Chinese overseas megaproject delivery

Prior analytical work by the author has shown that cost overruns in examined Belt and Road projects cannot be attributed unilaterally to Chinese contractors or host-country institutions, but rather emerge from asymmetric project management capacity and coordination failures on both sides, particularly in state-led contracting arrangements (Radunović, 2021). Chinese state-owned enterprises (SOEs) remain

the principal developers, contractors, and operators of large infrastructure projects associated with the Belt and Road Initiative, particularly in construction, transport, energy, and logistics. From a strategic and managerial perspective, the post-2013 reform trajectory of Chinese SOEs—centred on mixed-ownership arrangements, a gradual shift from administrative control to state capital management through the State-owned Assets Supervision and Administration Commission (SASAC), and the introduction of professional boards and market-oriented performance mechanisms—has important implications for how these firms approach overseas megaproject delivery. Evidence from recent reform cases suggests that these governance changes have strengthened balance-sheet discipline and operational efficiency in infrastructure-relevant SOEs, increasing sensitivity to risk, financing structure, and long-term project performance (Asia Investment Research & Dezan Shira & Associates, 2022). While political objectives and state coordination remain significant, the evolving internal governance of Chinese SOEs helps explain a gradual shift toward more selective project engagement, greater attention to financial sustainability, and hybrid delivery models that combine state direction with market-based managerial incentives, distinguishing Chinese-led projects from both earlier BRI practices and conventional IFI-financed infrastructure delivery. Guidance from the International Finance Corporation emphasizes that alignment with robust environmental and social governance frameworks functions as a critical risk-mitigation mechanism in large infrastructure investments rather than merely as a compliance obligation (IFC, 2021). The IFC framework demonstrates that inadequate management of environmental, social, and institutional risks frequently translates into tangible commercial consequences, including construction delays, cost escalation, community opposition, contract renegotiation, and long-term reputational damage. For developers and financiers engaged in complex cross-border megaprojects, early integration of governance standards into project preparation and execution reduces uncertainty across the project lifecycle and enhances predictability of outcomes. This perspective is particularly relevant for Chinese firms operating in diverse regulatory environments, where proactive governance alignment can protect asset value, stabilize cash flows, and improve bankability. Viewed through this lens, governance convergence with international standards becomes a strategic managerial choice that strengthens project resilience rather than a constraint on commercial autonomy. The comparative analysis yields several strategic and managerial lessons for Chinese developers and financiers engaged in overseas megaproject delivery. Drawing on prior analytical work by the author, the prospects for sustained EU–China investment cooperation in infrastructure appear to be shaped less by the absence of economic complementarity than by persistent divergences in regulatory frameworks, governance standards, and political risk perceptions, which condition both project selection and financing structures on the European side (Radunović, 2020). These lessons do not concern construction capability or engineering competence—areas in which Chinese firms have demonstrated substantial capacity—but rather the

institutional and managerial conditions under which overseas projects achieve sustainable performance across efficiency, effectiveness, and impact dimensions.

Recent portfolio-level analyses further indicate an evolving orientation of Belt and Road financing toward sustainability-related objectives. The "China Green Finance Status and Trends (2023–2024)" report documents a gradual rebalancing of Chinese overseas infrastructure finance toward renewable energy, low-carbon transport, and environmentally oriented projects, alongside a decline in new coal-related investments (Green Finance & Development Center, 2024). Importantly, the report highlights that these shifts are uneven across regions and financing instruments, reflecting differentiated risk profiles, host-country regulatory environments, and project pipelines rather than a uniform transition. This evidence suggests that sustainability outcomes in BRI megaprojects are increasingly shaped by strategic financing choices and portfolio management considerations, reinforcing the argument that long-term impact depends on the interaction between evolving financial governance practices and host-country absorptive and regulatory capacity.

The strategic consequences of this evolving investment environment are further illustrated by changes in the concentration of Chinese overseas investment activity, as shown in Figure 7.3.

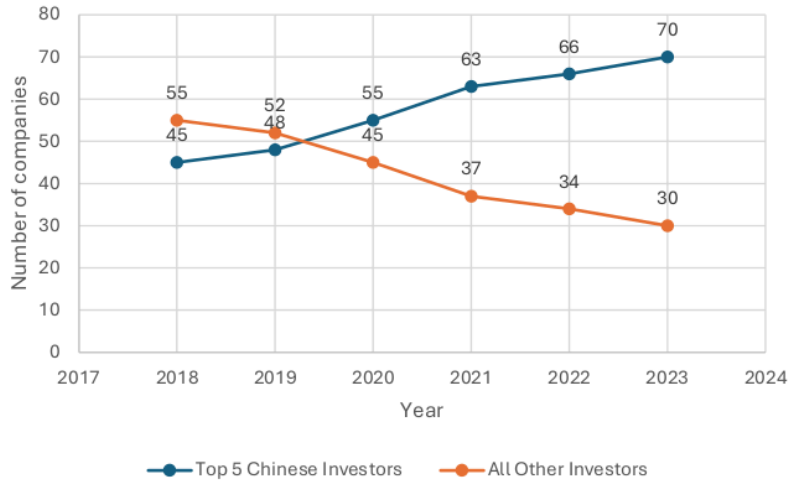


Figure 7.3 – Concentration of Chinese foreign direct investment in Europe by investor group, 2018–2023.Source: Author's compilation based on MERICS–Rhodium Group annual reports

Figure 7.3 shows a pronounced increase in the concentration of Chinese foreign direct investment in Europe among a small number of dominant investors between 2018 and 2023. While the five largest

Chinese investors accounted for less than half of total investment at the beginning of the period, their combined share increased steadily as overall investment volumes declined, reaching approximately 70 percent by 2023. This pattern reflects both the withdrawal of smaller or more risk-averse firms from European infrastructure markets and the growing dominance of large, well-capitalized state-owned enterprises and affiliated financial actors capable of absorbing regulatory, political, and financial risk.

From a strategic and managerial perspective, rising investor concentration alters the risk profile of overseas infrastructure engagement. Portfolio performance becomes increasingly sensitive to outcomes in a limited number of megaprojects, amplifying the commercial and reputational consequences of cost overruns, delays, or governance failures. In this context, managerial attention to project preparation quality, governance alignment, and lifecycle performance becomes not merely a matter of best practice, but a central determinant of portfolio resilience and long-term strategic positioning. The increasing concentration highlighted in Figure 7.2 helps explain why the strategic and managerial lessons identified below place particular emphasis on front-end rigor, partner selection, lifecycle-oriented delivery, and performance transparency as mechanisms for managing heightened portfolio-level risk.

A first lesson is the strategic value of front-end rigor as a risk-management tool. The analysis indicates that projects subjected to structured feasibility assessment, explicit outcome definition, and systematic risk identification prior to financial commitment exhibit more stable performance profiles over time. For Chinese developers and financiers, integrating PCM/LFA-like disciplines into early project development—whether voluntarily or through partnership with institutions that require them—can reduce exposure to scope instability, renegotiation, and reputational risk. This does not imply adopting IFI procedures wholesale, but rather internalizing the logic of disciplined preparation as a means of protecting long-term commercial and strategic interests (Merrow, 2011; Flyvbjerg, 2014).

A second lesson concerns partner and context selection. The comparative evidence shows that BRI-affiliated projects perform more consistently in environments where host-country institutions are capable of enforcing regulatory standards, procurement rules, and oversight mechanisms. From a strategic perspective, this suggests that Chinese firms benefit from aligning project selection not only with market opportunity, but also with institutional compatibility. Engaging with partners of comparable administrative and managerial capacity reduces coordination failures and increases the likelihood that projects can be delivered and operated in line with agreed objectives (Locatelli et al., 2017).

Third, the analysis highlights the importance of moving from construction-centric to lifecycle-oriented delivery models. EPC and EPC+F arrangements have enabled rapid market entry and large-scale portfolio expansion; however, they also tend to concentrate attention on construction delivery rather than

on downstream operation, utilization, and asset sustainability. Projects that incorporate long-term operational considerations—through clearer demand analysis, maintenance planning, and performance monitoring—are more likely to generate durable impacts and protect the commercial interests of developers and financiers alike. From this perspective, partial equity participation, performance-based operation contracts, or long-term service agreements can align incentives more effectively than purely transactional construction models (OECD, 2019; World Bank, 2020).

A fourth lesson relates to transparency and performance measurability. The comparative analysis demonstrates that limited disclosure and weak baseline definition complicate post hoc assessment of project performance, increasing vulnerability to external criticism and reputational damage. For Chinese developers operating in increasingly scrutinized international environments, the ability to demonstrate performance through clearly defined indicators and verifiable data represents a strategic asset. Adopting explicit performance frameworks—such as OVIs and MOVs—can strengthen credibility with host governments, regulators, and financiers, particularly in jurisdictions subject to stringent audit and compliance requirements.

Finally, the findings suggest that long-term success in overseas infrastructure markets depends on institutional learning and adaptation. IFI-affiliated systems embed evaluation feedback into future programming cycles, gradually improving governance quality across portfolios. The absence of comparable learning mechanisms in many BRI contexts increases the risk that similar preparation and coordination challenges recur across projects. For Chinese developers and financiers, institutionalizing ex post evaluation and systematic lesson capture can enhance strategic decision-making, reduce repeated exposure to avoidable risks, and support the evolution of overseas investment practices toward higher-quality and more sustainable outcomes.

Recent Chinese policy statements further situate Belt and Road infrastructure engagement within a broader framework of international development cooperation. The White Paper "China's International Development Cooperation in the New Era" emphasizes principles of mutual benefit, sustainability, openness, and respect for partner-country development priorities, while highlighting the importance of coordination among government agencies, financial institutions, and implementing entities (State Council Information Office of the People's Republic of China, 2021). Importantly, the document acknowledges the need to strengthen project planning, risk prevention, environmental and social safeguards, and results-oriented management across development cooperation activities. While the White Paper does not establish binding operational standards, it reflects an evolving policy narrative that increasingly recognizes governance quality, institutional coordination, and lifecycle management as central determinants of effective overseas project delivery. In this sense, the document reinforces the interpretation that strategic

adaptation and managerial learning are emerging priorities within Chinese development cooperation, even as implementation outcomes continue to depend on host-country governance capacity and project-level execution. At the level of dedicated investment vehicles, emerging sustainability practices further illustrate how governance principles articulated in official policy documents are being operationalized in project financing decisions. The "Silk Road Fund Sustainability Report" outlines the Fund's approach to environmental and social risk management, climate considerations, and lifecycle monitoring across its overseas investment portfolio, emphasizing alignment with international norms while retaining flexibility in project structuring (Silk Road Fund Co., Ltd., 2021). The report highlights internal screening procedures, post-investment monitoring, and engagement with host-country counterparts as mechanisms for mitigating long-term financial and reputational risks. From a strategic and managerial perspective, this investor-level focus on sustainability reinforces the interpretation that Chinese development finance actors are increasingly internalizing governance and risk-management considerations as integral components of overseas infrastructure investment, even as the effectiveness of such practices continues to depend on host-country institutional capacity and project-specific implementation.

In sum, the comparative evidence indicates that Chinese developers and financiers stand to gain strategically from complementing their construction and financing strengths with enhanced governance, preparation, and performance-management capabilities. By integrating disciplined lifecycle thinking, transparent performance measurement, and institutional learning into overseas project delivery, Chinese firms can improve not only project outcomes but also their long-term competitiveness and legitimacy in international infrastructure markets.

7.4 Implications for IFIs and EU-Level Governance Frameworks

The comparative analysis undertaken in this dissertation also yields important implications for international financial institutions (IFIs) and for European Union–level infrastructure governance frameworks. While the findings broadly validate the effectiveness of PCM and the Logical Framework Approach (LFA) as governing mechanisms, they also highlight areas where these frameworks may require adaptation in response to evolving investment landscapes, new delivery models, and increasing interaction with non-IFI actors such as Chinese state-owned enterprises.

A first implication concerns the continued relevance—but also the limits—of ex ante methodological rigor. The analysis confirms that PCM/LFA-based preparation remains a powerful tool for filtering non-viable projects, constraining extreme inefficiency, and enhancing transparency. However, the presence of cost overruns and delays even within IFI-affiliated projects suggests that methodological compliance alone is insufficient to guarantee optimal performance in highly complex megaproject

environments. IFIs and EU institutions may therefore need to complement traditional appraisal tools with enhanced mechanisms for managing deep uncertainty, adaptive scope control, and dynamic risk during implementation, particularly in projects characterized by long durations and multi-actor governance.

A second implication relates to institutional flexibility and engagement with alternative delivery models. As global infrastructure finance becomes increasingly pluralistic, IFIs and EU institutions are no longer the sole—or even dominant—providers of capital and project governance frameworks. The interaction between IFI-financed projects and BRI-affiliated initiatives within the same geographic and sectoral space suggests a need for IFIs to engage more strategically with non-IFI actors. This does not imply dilution of standards, but rather the articulation of minimum governance and transparency benchmarks that can be applied across co-financed or parallel projects, reducing fragmentation and improving system-level outcomes.

Third, the findings point to the importance of strengthening outcome and impact monitoring, rather than focusing predominantly on procedural compliance. While PCM/LFA emphasize outcome logic, implementation practice often privileges front-end documentation over sustained post-completion evaluation. Enhancing the feedback loop between ex post evaluation and future programming—particularly with respect to long-term utilization, maintenance, and institutional sustainability—would improve the capacity of IFIs and EU bodies to learn from underperforming projects and refine governance frameworks accordingly. This is especially relevant in sectors such as transport and energy, where asset lifecycles extend far beyond initial financing periods.

A fourth implication concerns EU-level governance in accession and cohesion contexts. The comparative analysis shows that EU regulatory frameworks—covering procurement, environmental protection, and state aid—significantly improve project performance when effectively enforced. However, variation in administrative capacity across member states and accession countries can limit the effectiveness of these frameworks in practice. EU institutions may therefore need to place greater emphasis on capacity-building, technical assistance, and institutional strengthening as integral components of infrastructure investment, rather than as ancillary support activities.

Finally, the findings suggest that IFIs and EU institutions should view PCM and LFA not as static rulebooks, but as evolving governance technologies. As infrastructure delivery increasingly involves hybrid financing arrangements, public–private partnerships, and cross-border strategic actors, governance frameworks must adapt to remain relevant. This includes refining how performance indicators are defined, how risk is allocated across actors, and how accountability is maintained in complex, multi-partner project environments.

In sum, the comparative evidence affirms the foundational value of PCM and LFA within IFI and EU governance systems, while also underscoring the need for continuous adaptation and institutional learning. By strengthening flexibility, enhancing impact monitoring, and engaging constructively with diverse financing models, IFIs and EU institutions can reinforce their role as standard-setters for high-quality, sustainable infrastructure investment in an increasingly multipolar environment.

7.5 Theoretical and Practical Contributions to Megaproject Governance Research

This dissertation makes an original contribution to megaproject governance research by demonstrating that differences in performance outcomes between BRI-affiliated and IFI-affiliated megaprojects are best explained not by geopolitical alignment, contractor nationality, or financing origin, but by the presence or absence of institutionalized project lifecycle governance mechanisms. By applying Project Cycle Management (PCM) and the Logical Framework Approach (LFA) as an analytical framework rather than as a prescriptive checklist, the study reframes megaproject performance as a function of governance design embedded across the full project lifecycle.

From a theoretical perspective, the dissertation advances megaproject research by integrating efficiency, effectiveness, and impact into a single evaluative logic grounded in PCM/LFA theory. While existing literature often treats these dimensions separately—focusing either on cost and schedule overruns or on broader developmental outcomes—this research demonstrates how they are causally linked through the structure of project preparation, monitoring, and evaluation. The empirical analysis shows that efficiency failures frequently originate in weak front-end definition, that effectiveness depends on the explicit articulation of outcome logic, and that long-term impact is contingent on institutionalized learning and accountability mechanisms. In doing so, the dissertation bridges gaps between project management theory, public policy evaluation, and infrastructure governance scholarship.

A second theoretical contribution lies in the conceptualization of PCM and LFA as governance technologies rather than technical methodologies. The findings illustrate that PCM/LFA function as institutional devices that shape incentives, constrain discretion, and align project-level decisions with public-interest objectives. This reframing challenges approaches that portray project management tools as neutral or apolitical instruments and instead positions them as central components of state capacity and governance quality. By showing that PCM/LFA enhance performance regardless of geopolitical context when embedded institutionally, the study contributes to a more universal understanding of project governance in a multipolar investment environment.

The dissertation also makes a significant empirical contribution through the construction of a comparative dataset of 84 infrastructure megaprojects across EU member states and Western Balkan accession countries. By combining project-level efficiency indicators with qualitative evidence on effectiveness, impact, and institutional context, the research moves beyond anecdotal case studies and provides a structured comparative basis for evaluating megaproject performance. The inclusion of cancelled projects as analytically meaningful outcomes further extends existing empirical approaches, highlighting the importance of early-stage screening and project selection in governance analysis.

In practical terms, the dissertation offers actionable insights for policymakers, project sponsors, and international financiers. For host countries, it demonstrates that megaproject success is constructed domestically through strong preparation capacity, transparent methodologies, and disciplined lifecycle management. For Chinese developers and financiers, it highlights the strategic value of integrating front-end rigor, performance measurability, and institutional learning into overseas project delivery. For IFIs and EU institutions, it underscores both the enduring relevance of PCM/LFA and the need for continuous adaptation of governance frameworks in response to evolving delivery models and financing arrangements.

Finally, the dissertation contributes to practice by providing a transferable analytical framework that can be applied to future infrastructure projects irrespective of financing source. By operationalizing PCM and LFA as evaluative lenses rather than compliance tools, the study equips practitioners and researchers with a structured approach to assessing megaproject performance that emphasizes transparency, accountability, and long-term public value. In doing so, it shifts the debate on global infrastructure investment away from polarized narratives and toward a governance-centered understanding of what enables megaprojects to deliver sustainable outcomes over time.

8. CONCLUSIONS

8.1 Synthesis of Findings in Relation to Research Objectives

This concluding section revisits the original research questions and objectives of the dissertation and synthesizes how the empirical and analytical findings address them. The central objective of the study was to examine why megaproject performance outcomes differ across infrastructure projects associated with the Belt and Road Initiative (BRI) and those financed by international financial institutions (IFIs), and to assess whether Project Cycle Management (PCM) and the Logical Framework Approach (LFA) provide a robust analytical lens for explaining these differences.

The findings demonstrate that the observed variation in megaproject performance is not primarily attributable to geopolitical orientation, contractor nationality, or financing source, but rather to differences in the governance of the project lifecycle. By systematically applying the PCM/LFA framework across efficiency, effectiveness, and impact dimensions, the dissertation shows that projects exhibiting stronger front-end preparation, explicit outcome logic, and institutionalized monitoring mechanisms are more likely to achieve stable performance outcomes. This directly addresses the first research question concerning the determinants of megaproject success and failure. These findings align with prior analyses emphasizing that the outcomes of Chinese investment in Europe are significantly shaped by host-country agency and institutional context, rather than by financing source or contractor nationality alone (Szunomár, 2020).

A second objective of the dissertation was to assess the applicability of PCM and LFA as evaluative tools beyond their traditional use in IFI-financed projects. The comparative analysis confirms that PCM/LFA are not context-specific or ideologically bounded methodologies, but generalizable governance frameworks capable of explaining performance variation across diverse delivery models. Their analytical application to BRI-affiliated megaprojects demonstrates that these tools retain explanatory power even in settings where they are not formally mandated, thereby validating their broader relevance for megaproject governance research.

The dissertation also sought to contribute empirical evidence to debates surrounding BRI infrastructure investment in Europe. By constructing and analyzing a comparative dataset of 84 megaprojects, including both completed and cancelled cases, the study provides a nuanced, evidence-based account that moves beyond polarized narratives. The findings reveal that while BRI-affiliated projects can achieve strong performance under certain institutional conditions, the absence of systematic lifecycle governance increases exposure to inefficiency, weak effectiveness, and limited long-term impact. This

directly addresses the research objective of providing a balanced and analytically grounded assessment of BRI performance in the European context.

Finally, the dissertation aimed to derive policy-relevant insights for key stakeholders, including host countries, Chinese developers, and IFIs. The conclusions demonstrate that megaproject success is constructed domestically through governance capacity, methodological discipline, and accountability mechanisms. This finding responds directly to the overarching research objective of identifying actionable governance principles that enhance megaproject performance irrespective of financing origin.

Taken together, the findings presented in this dissertation provide coherent and comprehensive answers to the original research questions. They confirm the central proposition that project lifecycle governance—operationalized through PCM and LFA—constitutes the critical explanatory variable in megaproject performance, thereby fulfilling the study's theoretical, empirical, and practical objectives.

However, beyond its empirical focus on Europe and the Western Balkans, this dissertation offers insights that are directly relevant to the future trajectory of Chinese-led megaproject development globally. As Chinese capital continues to play a central role in large-scale infrastructure investment across Latin America, the Middle East, Africa, and parts of Asia, the governance challenges identified in this study are likely to become even more pronounced. These regions combine high infrastructure demand with varying levels of institutional capacity, regulatory maturity, and environmental sensitivity, amplifying the consequences of weak project preparation and lifecycle governance.

The findings of this research suggest that the risks associated with poorly governed megaprojects extend far beyond cost overruns and schedule delays. In sectors such as large-scale energy infrastructure—particularly emerging technologies including hydrogen production, e-fuels, and integrated energy systems—misaligned project design and inadequate monitoring can generate long-lasting environmental, social, and systemic impacts. Given the scale and interconnectedness of such projects, failures may affect not only immediate stakeholders, but also regional ecosystems, cross-border energy markets, and broader climate objectives.

In this context, the disciplined application of Project Cycle Management and the Logical Framework Approach emerges as a critical governance tool for future megaprojects. The evidence presented in this dissertation demonstrates that structured front-end analysis, explicit definition of outcomes and impacts, and the systematic use of Objectively Verifiable Indicators and Means of Verification are essential for aligning ambition with feasibility. These mechanisms are particularly important when projects involve advanced technologies, long development horizons, and complex stakeholder environments, as is increasingly the case in next-generation energy megaprojects.

Importantly, the relevance of these findings is not confined to a specific financing source or geopolitical setting. Rather, they point to a broader governance logic applicable wherever large-scale, capital-intensive infrastructure projects are undertaken with Chinese participation. For host countries, the study underscores the necessity of institutional readiness and lifecycle oversight when engaging with Chinese capital. For Chinese developers and financiers, it highlights the strategic value of integrating governance frameworks that enhance efficiency, credibility, and long-term sustainability—thereby reducing reputational, financial, and environmental risks in future overseas portfolios.

Viewed in this way, the dissertation contributes not only to retrospective evaluation of past projects, but also to prospective governance design. By treating megaproject failures as sources of learning rather than isolated anomalies, the research offers a structured basis for improving how future Chinese-led megaprojects are conceived, governed, and evaluated. This forward-looking orientation is particularly relevant as global infrastructure investment increasingly intersects energy transition goals, environmental constraints, and heightened public scrutiny.

8.2 Limitations of the Research

While this dissertation provides a structured and comparative analysis of megaproject performance across BRI-affiliated and IFI-affiliated infrastructure projects, several limitations must be acknowledged. These limitations do not undermine the validity of the findings, but they delimit the scope of inference and point to areas where caution is required in interpretation.

A first limitation concerns data availability and comparability. Although the study constructs a balanced dataset of 84 megaprojects, detailed and fully standardized data on cost overruns, schedule deviations, utilization rates, and post-completion outcomes are not uniformly available across all cases. This constraint is particularly pronounced for BRI-affiliated projects, where public disclosure of feasibility studies, contracts, and ex post evaluations is often limited. As a result, some performance indicators rely on ranges, proxy measures, or triangulation from multiple secondary sources rather than on fully harmonized datasets. While this approach is consistent with best practice in comparative infrastructure research, it introduces an unavoidable degree of measurement uncertainty (Flyvbjerg, 2014; World Bank, 2020).

A second limitation relates to the geographic and institutional focus of the study. The analysis concentrates on EU member states that acceded after 2004 and on Western Balkan countries engaged in the EU accession process. This focus is analytically justified given the dissertation's emphasis on institutional convergence toward EU governance standards; however, it limits the generalizability of findings to regions with fundamentally different political, legal, or administrative systems. Megaproject dynamics in regions

such as Sub-Saharan Africa, Southeast Asia, or Latin America may exhibit distinct patterns that are not fully captured by the present sample.

Third, the study's analytical framework emphasizes project lifecycle governance as the primary explanatory variable. While this focus is intentional and theoretically grounded, it necessarily abstracts from other potentially influential factors, including macroeconomic cycles, sector-specific technological complexity, and broader geopolitical developments. These factors may interact with governance mechanisms in ways that are difficult to disentangle within a single study. The dissertation mitigates this limitation by adopting a comparative design and by grounding interpretation in established literature, but causal attribution should nonetheless be understood as probabilistic rather than deterministic (Merrow, 2011; Locatelli et al., 2017).

A fourth limitation concerns the temporal horizon of impact assessment. Many megaprojects—particularly in transport and energy—require extended periods of operation before long-term socioeconomic and environmental impacts can be fully observed. For several projects in the dataset, especially those completed in the last decade, impact-level outcomes remain emergent. Consequently, the analysis of sustainability and long-term impact relies partly on early operational indicators and institutional arrangements rather than on mature outcome data. This limitation is inherent to megaproject research and is widely recognized in evaluation literature (OECD, 2019).

Finally, the study relies on document-based and secondary-source analysis, supplemented by the author's professional experience in selected cases. While this approach enables systematic comparison across a large number of projects, it does not include primary fieldwork such as stakeholder interviews or ethnographic observation. Such methods could provide deeper insight into informal decision-making processes, political negotiation dynamics, and organizational behavior within project teams. The absence of primary qualitative data represents a trade-off between breadth and depth that future research may address.

In sum, the limitations of this dissertation reflect the inherent challenges of comparative megaproject research rather than deficiencies in research design. By explicitly acknowledging these constraints, the study provides a transparent basis for interpretation and establishes a clear agenda for future research aimed at deepening and extending the findings presented here.

8.3 Directions for Future Research

The findings and limitations of this dissertation point to several important directions for future research on megaproject governance, infrastructure finance, and project lifecycle management. These

directions build directly on the analytical framework developed in this study and reflect the increasing globalization and diversification of large-scale infrastructure investment, particularly in regions where Chinese developers and financiers play a prominent role (Flyvbjerg, 2017; Merrow, 2011).

A first and critical avenue for future research involves extending the comparative PCM/LFA-based analytical framework beyond the European and Western Balkan context to regions such as Africa and the Middle East. These regions currently host a substantial share of global megaproject activity, much of it delivered by Chinese companies through a variety of financing and contractual arrangements, including but not limited to BRI-affiliated projects (World Bank, 2020). Applying the evaluative logic developed in this dissertation to African and Middle Eastern megaprojects would allow researchers to assess whether the governance-related performance patterns identified here—especially those linked to front-end preparation, outcome definition, and institutional capacity—hold under different political, economic, and regulatory conditions (Flyvbjerg, 2017; OECD, 2019). Such research would significantly enhance the external validity and global applicability of the framework.

A second direction for future research concerns the role of host-country institutional capacity in shaping megaproject outcomes in developing and emerging economies. Many African and Middle Eastern countries face constraints in project preparation, appraisal, and oversight, increasing their exposure to inefficiencies and long-term sustainability risks (World Bank, 2020). Future studies could examine how the systematic application of PCM/LFA principles—whether through IFI engagement, domestic reform, or voluntary adoption by developers—might improve project selection, execution, and long-term impact in these environments (OECD, 2019). This line of inquiry would be particularly valuable for policymakers seeking to maximize the developmental benefits of large infrastructure investments while mitigating fiscal and governance risks.

Third, future research could further investigate how Chinese developers and financiers adapt their project governance practices across regions. Comparative studies examining Chinese-led megaprojects in Europe, Africa, the Middle East, and Asia could shed light on how institutional context influences delivery models, risk allocation, and performance outcomes (Merrow, 2011; Flyvbjerg, 2017). Such research would help distinguish which challenges are intrinsic to specific project environments and which are systemic features of prevailing delivery and financing models. This would contribute to a more nuanced and evidence-based understanding of Chinese overseas infrastructure investment beyond region-specific or politically framed narratives.

A further research direction lies in the longitudinal assessment of megaproject performance and learning effects. Revisiting projects over extended time horizons—particularly in Africa and the Middle

East, where infrastructure assets are often expected to drive long-term economic transformation—would allow scholars to examine how early efficiency and effectiveness outcomes translate into sustained impact, consistent with evaluation theory emphasizing long-term effects and benefit durability (OECD, 2019). Longitudinal designs could also assess whether governance reforms, methodological improvements, or institutional learning processes lead to measurable improvements in subsequent project generations.

Additionally, future studies could explore the practical application of this dissertation's findings as a governance guide for megaproject investors and developers. By operationalizing PCM and LFA as diagnostic and corrective tools rather than as compliance instruments, researchers could examine how these frameworks are used ex ante to identify what went wrong in past projects and how similar shortcomings can be avoided in future ones (Merrow, 2011; OECD, 2019). This applied research agenda would be particularly relevant for Chinese developers and financiers seeking to improve the efficiency, credibility, and long-term performance of their overseas megaproject portfolios, as well as for host countries aiming to engage with Chinese funding on more sustainable and mutually beneficial terms (World Bank, 2020). Recent global assessments of the energy transition emphasize that the scale and complexity of investments required for decarbonization—particularly in renewable energy systems, hydrogen production, and cross-border energy infrastructure—will increasingly resemble megaproject dynamics rather than conventional project delivery (IRENA, 2023). The World Energy Transitions Outlook highlights that governance quality, institutional coordination, and long-term planning capacity are decisive factors in determining whether large-scale energy investments deliver sustained socioeconomic and environmental benefits. This finding directly reinforces the relevance of lifecycle governance frameworks such as PCM and the Logical Framework Approach for future energy-transition megaprojects, where technical feasibility alone is insufficient to guarantee success. Hydrogen and e-fuel projects, in particular, combine high capital intensity, long development horizons, regulatory uncertainty, and strong public-interest dimensions, making them especially sensitive to weaknesses in project preparation and governance alignment. Future research should therefore apply and adapt the analytical framework developed in this dissertation to energy-transition megaprojects, examining how governance structures shape efficiency, effectiveness, and long-term impact in emerging hydrogen and renewable energy value chains.

Finally, there is scope for continued theoretical development around megaproject governance as a shared responsibility between investors and host institutions. Future research could further integrate project management theory with public governance and political economy perspectives, examining how governance tools mediate relationships between state actors, financiers, developers, and end users (Flyvbjerg, 2017; Merrow, 2011). Such work would reinforce the central insight of this dissertation: that

megaproject success is not determined by who finances or builds infrastructure, but by how projects are governed across their entire lifecycle.

In sum, future research building on this dissertation should aim to broaden geographic coverage, deepen methodological approaches, and strengthen the link between governance theory and investment practice. By doing so, it can contribute to the development of more effective, transparent, and sustainable megaproject delivery models worldwide—particularly in regions where large-scale infrastructure investment, including Chinese-funded megaprojects, will continue to shape economic and social development for decades to come (OECD, 2019; World Bank, 2020).

8.4 Broader Policy and Practice Implications for Global Megaproject Development

The findings of this dissertation carry broader implications for the governance of megaprojects in an era characterized by increasingly complex, multipolar infrastructure investment. As global demand for large-scale infrastructure continues to grow—particularly in emerging and developing regions—the study's conclusions highlight the need for a shift in how megaprojects are conceived, structured, and governed across institutional and geographic contexts (Flyvbjerg, 2017; Merrow, 2011).

At the policy level, the analysis underscores that effective megaproject governance cannot be delegated to external financiers or contractors, regardless of their technical or financial capacity. Governments remain the ultimate custodians of public interest, fiscal sustainability, and long-term development outcomes. The evidence demonstrates that states which embed disciplined project lifecycle governance—through methodologies such as PCM and LFA—are better positioned to engage productively with a diverse range of infrastructure partners, including international financial institutions, private investors, and Chinese developers (European Commission, 2004; OECD, 2019; World Bank, 2020). This has direct implications for public-sector reform agendas, suggesting that investment in project preparation units, appraisal capacity, and independent oversight bodies should be treated as strategic national priorities.

For infrastructure practitioners, including project sponsors, developers, and financiers, the findings highlight the importance of shifting from transaction-oriented delivery models toward lifecycle-oriented governance approaches. Megaprojects that prioritize speed of delivery or headline investment volumes at the expense of preparation quality, outcome definition, and monitoring capacity are systematically exposed to higher risks of underperformance, consistent with established megaproject research (Merrow, 2011; Flyvbjerg, 2017). The study reinforces the value of measurable objectives, transparent performance

indicators, and verifiable monitoring mechanisms as tools not only for accountability, but also for managing complexity and uncertainty in large-scale projects (OECD, 2019).

The dissertation also has implications for international development cooperation and global infrastructure norms. As traditional IFI-led governance frameworks increasingly coexist with alternative financing and delivery models, there is a growing need for convergence around minimum standards of project preparation, transparency, and evaluation. The findings suggest that such convergence need not imply uniformity of institutions or ideology, but rather alignment around shared governance principles that enhance predictability, accountability, and sustainability (OECD, 2019; World Bank, 2020). This insight is particularly relevant for regions where infrastructure investment is driven by multiple actors operating under different governance paradigms.

From a practice-oriented perspective, the study contributes to ongoing debates about how to improve the performance of Chinese-funded and Chinese-delivered megaprojects abroad. By framing PCM and LFA as neutral governance tools rather than as instruments tied to specific geopolitical blocs, the dissertation provides a basis for constructive engagement between Chinese developers, host governments, and international institutions. The findings indicate that when Chinese-funded projects are embedded within robust governance frameworks, they can deliver outcomes comparable to those achieved under IFI financing, thereby enhancing mutual benefits and reducing reputational and fiscal risks (Flyvbjerg, 2017; World Bank, 2020).

Finally, the dissertation's implications extend to the broader discourse on sustainable development and public value creation. Megaprojects represent long-term commitments of public resources with intergenerational consequences. The evidence presented here suggests that sustainability is not achieved through scale or ambition alone, but through disciplined governance that aligns project objectives with societal needs, ensures accountability throughout the lifecycle, and institutionalizes learning from both success and failure (OECD, 2019; Flyvbjerg, 2017).

In sum, the broader policy and practice implications of this study point toward a governance-centered approach to megaproject development—one that transcends financing sources and delivery models. By emphasizing lifecycle discipline, transparency, and institutional capacity, the findings offer a practical roadmap for improving megaproject outcomes in a global infrastructure environment marked by diversity, competition, and long-term risk (World Bank, 2020).

8.5 Concluding Reflections on Advancing Megaproject Governance

This dissertation set out to explain why large infrastructure megaprojects with comparable technical characteristics and investment scale produce markedly different performance outcomes. The central conclusion is unambiguous: megaproject performance is primarily a governance problem, not a geopolitical one. Across both BRI-affiliated and IFI-affiliated projects, outcomes are shaped less by who finances or builds infrastructure than by how projects are governed across their lifecycle.

By applying Project Cycle Management and the Logical Framework Approach as analytical frameworks, the study demonstrates how efficiency, effectiveness, and long-term impact are causally linked through front-end decision-making, outcome definition, and institutional accountability. Where projects are prepared through disciplined appraisal, explicit intervention logic, and measurable performance indicators, deviations are constrained, learning is institutionalized, and long-term public value is more likely to materialize. Where such governance discipline is absent or diluted, megaprojects become vulnerable to optimism bias, scope instability, weak outcome realization, and limited sustainability—regardless of engineering competence or financial scale.

A key contribution of this research lies in reframing PCM and LFA as governance technologies rather than procedural checklists. When embedded in enforceable institutional frameworks, these methodologies align incentives, constrain discretion, and protect public resources. When treated as formal compliance exercises—or bypassed altogether—their corrective potential is lost. The comparative evidence further shows that convergence toward shared governance principles—transparency, measurability, and lifecycle discipline—offers a pragmatic pathway for improving megaproject outcomes in an increasingly plural and multipolar infrastructure investment landscape.

Empirically, the dissertation advances understanding by constructing and analyzing a balanced comparative dataset of megaprojects across the European Union and Western Balkans, including both completed and cancelled projects. The explicit treatment of cancellation as a meaningful governance outcome reinforces the importance of early-stage project selection and feasibility screening as fundamental determinants of performance—an insight often obscured in construction-centric evaluations.

Ultimately, this dissertation contributes to both scholarship and practice by shifting the debate on global infrastructure investment away from polarized narratives and toward a governance-centered explanation of success and failure. It provides a transferable analytical framework capable of informing policy design, investment strategy, and project management practice across regions and financing models. As global demand for large-scale infrastructure intensifies—particularly in the context of energy transition

and climate imperatives—the findings underscore a simple but consequential insight: megaprojects succeed not because they are ambitious, but because they are governed well.

9. LIST OF REFERENCES

1 Aaltonen, K., & Kujala, J. (2010). A project lifecycle perspective on stakeholder influence strategies in global projects. *Scandinavian Journal of Management, 26*(4), 381–397. https://doi.org/10.1016/j.scaman.2010.09.001

2 Ansar, A., Flyvbjerg, B., Budzier, A., & Lunn, D. (2016). Does infrastructure investment lead to economic growth or economic fragility? Evidence from China. *Oxford Review of Economic Policy, 32*(3), 360–390. https://doi.org/10.1093/oxrep/grw022

3 Belt and Road Portal. (2017). *Joint communiqué of the leaders' roundtable of the Belt and Road Forum*. https://eng.yidaiyilu.gov.cn/zchj/qwfb/12730.htm

4 Belt and Road Portal. (2017). *Science, technology and innovation cooperation plan for jointly building the Belt and Road Initiative*. https://eng.yidaiyilu.gov.cn/zchj/qwfb/12279.htm

5 Belt and Road Portal. (2018). *Standards connectivity jointly building the Belt and Road: Action plan (2018–2020)*. https://eng.yidaiyilu.gov.cn/zchj/qwfb/12300.htm

6 Brautigam, D. (2020). A critical look at Chinese "debt-trap diplomacy": The rise of a meme. *Area Development and Policy, 5*(1), 1–14. https://doi.org/10.1080/23792949.2019.1625208

7 BRI Green Development Coalition. (2023). *Green development guidance for Belt and Road projects: Phase III*. BRI Green Development Coalition. https://greenfdc.org/publications/green-development-guidance-for-belt-and-road-projects-phase-iii/

8 Brookes, N. J., & Locatelli, G. (2015). Power plants as megaprojects: Using empirics to shape policy, planning, and construction management. *Utilities Policy, 36*, 57–66. https://doi.org/10.1016/j.jup.2015.09.005

9 Budzier, A., & Flyvbjerg, B. (2013). Overspend? Late? Failure? What the data say about IT project risk in the public sector. *arXiv*. https://arxiv.org/abs/1304.4525

10 Cantarelli, C. C., Flyvbjerg, B., van Wee, B., & Molin, E. J. (2010). Lock-in and its influence on the project performance of large-scale transportation infrastructure projects. *Environment and Planning B: Planning and Design, 37*(5), 792–807. https://doi.org/10.1068/b36017

11 Carnegie Europe. (2020). *Hard cash and soft power: When Chinese firms win EU contracts*. Carnegie Endowment for International Peace.

12 Center for Strategic and International Studies. (2020). *Chinese economic activities in the Western Balkans, January 2012–January 2020* [Data set]. CSIS.

13 Chin, G. T., & Gallagher, K. P. (2019). Coordinated credit spaces: The globalization of Chinese development finance. Development and Change, 50(4), 1013–1035. https://doi.org/10.1111/dech.12485

14 Chin, G. T., & Gallagher, K. P. (2019). Coordinated credit spaces: The globalization of Chinese development finance. *Development and Change, 50*(4), 1013–1035. https://doi.org/10.1111/dech.12485

15 Davies, G., & Dodgson, M. (2021). Complex systems in megaprojects. *Research Policy, 50*(8), 104209. https://doi.org/10.1016/j.respol.2021.104209

16 Development Finance with Chinese Characteristics. (2020). *Development finance with Chinese characteristics: Policy, institutions, and practices*. Boston University Global Development Policy Center. https://www.bu.edu/gdp/2020/03/09/development-finance-with-chinese-characteristics/

17 Dollar, D. (2019). Understanding China's Belt and Road infrastructure projects. *Brookings Institution*.

18 Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review, 14*(4), 532–550. https://doi.org/10.5465/amr.1989.4308385

19 European Bank for Reconstruction and Development. (2021). *Mobilising private sector participation in infrastructure*. EBRD.

20 European Bank for Reconstruction and Development. (2021). *Transition report 2021–22: Infrastructure*. https://www.ebrd.com/transition-report-2021-22

21 European Commission. (2004). *Aid delivery methods: Project cycle management guidelines*. EuropeAid Cooperation Office.

22 European Commission. (2021). *Better regulation toolbox*. https://commission.europa.eu/law/law-making-process/better-regulation_en

23 European Commission. (2023). *Practical guide to contract procedures for EU external actions (PRAG)*. https://wikis.ec.europa.eu

24 European Court of Auditors. (2015). *EU-funded infrastructure projects: Inadequate monitoring undermines effectiveness*. European Union.

25 Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry, 12*(2), 219–245. https://doi.org/10.1177/1077800405284363

26 Flyvbjerg, B. (2014). What you should know about megaprojects and why: An overview. *Project Management Journal, 45*(2), 6–17. https://doi.org/10.1002/pmj.21409

27 Flyvbjerg, B. (2017). The iron law of megaprojects. In B. Flyvbjerg (Ed.), *The Oxford handbook of megaproject management* (pp. 1–18). Oxford University Press.

28 Flyvbjerg, B., Bruzelius, N., & Rothengatter, W. (2003). *Megaprojects and risk: An anatomy of ambition*. Cambridge University Press.

29 Gallagher, K. P. (2017). *The China triangle: Latin America, China, and the future of the global economy*. Oxford University Press.

30 Garcia-Herrero, A., & Xu, J. (2019). China's overseas investment and finance: Trends and implications. *Bruegel*.

31 Gelpern, A., Horn, S., Morris, S., Parks, B., & Trebesch, C. (2023). *How China lends: A rare look into 100 debt contracts with foreign governments.* Economic Policy, 38(114), 235–273. https://doi.org/10.1093/epolic/eiad004

32 George, A. L., & Bennett, A. (2005). *Case studies and theory development in the social sciences*. MIT Press.

33 George, A. L., & Bennett, A. (2021). *Case studies and theory development in the social sciences* (Updated ed.). MIT Press. https://mitpress.mit.edu/9780262544942

34 Gerring, J. (2007). *Case study research: Principles and practices*. Cambridge University Press.

35 Gonzalez-Vicente, R. (2019). Make development great again? Accumulation regimes, elite development paradigms and the politics of the Belt and Road Initiative. European Journal of Development Research, 31, 781–803. https://doi.org/10.1057/s41287-018-0153-0

36 Green Finance & Development Center. (2024). *China green finance status and trends 2023–2024*. Fudan University. https://greenfdc.org/publications/china-green-finance-status-and-trends-2023-2024/

37 Hanemann, T., Huotari, M., & Kratz, A. (2019). *Chinese FDI in Europe: 2018 update*. MERICS & Rhodium Group.

38 Hillman, J. (2020). *The emperor's new road: China and the project of the century*. Yale University Press.

39 Holzner, M., & Schwarzhappel, M. (2018). Infrastructure investment in the Western Balkans. WIIW Research Report No. 427.

40 Ika, L. A. (2018). Project success as a topic in project management journals. *Project Management Journal, 49*(3), 6–19. https://doi.org/10.1177/8756972818774207

41 International Finance Corporation. (2021). *Managing environmental and social risks in infrastructure projects*. https://www.ifc.org/sustainability

42 International Monetary Fund. (2021). *Public investment management assessment (PIMA): Framework and review methodology*. https://www.imf.org/en/Publications/Policy-Papers/Issues/2021/05/10

43 International Renewable Energy Agency. (2023). *World energy transitions outlook 2023*. https://www.irena.org/publications/2023

44 Jones, L., & Zeng, J. (2019). Understanding China's Belt and Road Initiative beyond grand strategy. *Third World Quarterly, 40*(8), 1415–1439. https://doi.org/10.1080/01436597.2018.1559046

45 Jones, L., & Zeng, J. (2019). Understanding China's Belt and Road Initiative beyond grand strategy. *Third World Quarterly, 40*(8), 1415–1439. https://doi.org/10.1080/01436597.2018.1559046

46 Kratz, A., Huotari, M., Hanemann, T., & Arcesati, R. (2023). *Chinese FDI in Europe: 2022–2023 update*. MERICS & Rhodium Group.

47 Locatelli, G., Invernizzi, D. C., & Brookes, N. J. (2017). Project characteristics and performance in infrastructure megaprojects. *International Journal of Project Management, 35*(4), 639–651. https://doi.org/10.1016/j.ijproman.2016.09.008

48 Locatelli, G., Mancini, M., & Romano, E. (2014). Systems engineering to improve governance in complex project environments. *International Journal of Project Management, 32*(8), 1395–1410. https://doi.org/10.1016/j.ijproman.2013.10.007

49 Merrow, E. W. (2011). *Industrial megaprojects: Concepts, strategies, and practices for success*. Wiley.

50 Miller, R., & Lessard, D. R. (2000). *The strategic management of large engineering projects*. MIT Press.

51 Ministry of Finance of the People's Republic of China. (2017). *Guiding principles on financing the development of the Belt and Road*. https://eng.yidaiyilu.gov.cn/zchj/qwfb/12679.htm

52 Ministry of Finance of the People's Republic of China. (2019). *Debt sustainability framework for participating countries of the Belt and Road Initiative*. https://eng.yidaiyilu.gov.cn/zchj/qwfb/12729.htm

53 National Development and Reform Commission, Ministry of Foreign Affairs, & Ministry of Commerce of the People's Republic of China. (2015). *Vision and actions on jointly building the Silk Road Economic Belt and the 21st-Century Maritime Silk Road*. State Council of the People's Republic of China. https://english.scio.gov.cn/beltandroad/2015-03/28/content_35134818.htm

54 National Development and Reform Commission. (2015). *Vision and actions on jointly building the Silk Road Economic Belt and 21st-Century Maritime Silk Road*. Government of the People's Republic of China.

55 National People's Congress of the People's Republic of China. (2001). Outline of the Tenth Five-Year Plan for National Economic and Social Development of the People's Republic of China (2001–2005) [In Chinese]. Beijing, China.

56 National People's Congress of the People's Republic of China. (2006). Outline of the Eleventh Five-Year Plan for National Economic and Social Development of the People's Republic of China (2006–2010) [In Chinese]. Beijing, China.

57 National People's Congress of the People's Republic of China. (2011). Outline of the Twelfth Five-Year Plan for National Economic and Social Development of the People's Republic of China (2011–2015) [In Chinese]. Beijing, China.

58 National People's Congress of the People's Republic of China. (2016). Outline of the Thirteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China (2016–2020). Beijing, China.

59 National People's Congress of the People's Republic of China. (2021). Outline of the Fourteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Long-Range Objectives Through 2035 (2021–2025). Beijing, China.

60 OECD. (2018). *China's Belt and Road Initiative in the global context*. OECD Publishing.

61 OECD-DAC. (2019). *Better criteria for better evaluation*. OECD Publishing.

62 Organisation for Economic Co-operation and Development – Development Assistance Committee. (2021). *Applying the OECD DAC evaluation criteria: Principles and guidance*. https://www.oecd.org/dac/evaluation/revised-evaluation-criteria-dec-2019.pdf

63 Organisation for Economic Co-operation and Development. (2021). *Infrastructure governance and outcomes*. https://www.oecd.org/gov/infrastructure-governance/

64 Project Management Institute. (2017). *A guide to the project management body of knowledge (PMBOK® Guide)* (6th ed.). PMI.

65 Radunović, M. (2020). *Can power shift in Montenegro impact future Chinese investments?* China Observers in Central and Eastern Europe. https://chinaobservers.eu/can-power-shift-in-montenegro-impact-future-chinese-investments/

66 Radunović, M. (2020). *Learn the rules to master the game: Chinese infrastructure investments in the Balkans*. China Observers in Central and Eastern Europe. https://chinaobservers.eu/learn-the-rules-to-master-the-game-chinese-infrastructure-investments-in-the-balkans/

67 Radunović, M. (2020). *The debt-trap issue of Chinese investments explained*. Asia Power Watch. https://asiapowerwatch.com/the-debt-trap-issue-of-chinese-investments-explained/

68 Radunović, M. (2020). *The future of EU–China investment cooperation*. Asia Power Watch. https://asiapowerwatch.com/the-future-of-eu-china-investment-cooperation/

69 Radunović, M. (2021). *Bridging the gaps on the road to success: The case of CRBC in the Western Balkans*. China in Europe Research Network (CHERN). https://china-in-europe.net/bridging-the-gaps-

on-the-road-to-success-the-case-of-crbc-in-the-western-balkans-by-miljan-radunovic-chern-stsm-grantee-guldem-karamustafa-anna-lupina-wegener-chern-stsm-hosts/

70 Radunović, M. (2021). *Cost overruns in Belt and Road Initiative projects: Lessons from the Western Balkans*. CHERN / Planning Future Cities. https://www.planningfuturecities.org/debates/2021/10/21/costoverrunsbri

71 Rhodium Group, & Mercator Institute for China Studies (MERICS). (2016). Chinese outbound foreign direct investment in Europe: Record flows and growing imbalances. https://rhg.com/research/chinese-investment-europe-2016/

72 Rhodium Group, & Mercator Institute for China Studies (MERICS). (2019). Chinese foreign direct investment in Europe: 2019 update. https://rhg.com/research/chinese-fdi-in-europe-2019-update/

73 Rhodium Group, & Mercator Institute for China Studies (MERICS). (2020). Chinese foreign direct investment in Europe: 2020 update. https://rhg.com/research/chinese-fdi-in-europe-2020-update/

74 Rhodium Group, & Mercator Institute for China Studies (MERICS). (2022). Chinese foreign direct investment in Europe: 2021 update. https://rhg.com/research/chinese-fdi-in-europe-2021-update/

75 Rhodium Group, & Mercator Institute for China Studies (MERICS). (2023). Chinese foreign direct investment in Europe: 2022 update. https://rhg.com/research/chinese-fdi-in-europe-2022-update/

76 Rhodium Group, & Mercator Institute for China Studies (MERICS). (2024). Chinese foreign direct investment in Europe: 2023 update. https://rhg.com/research/chinese-fdi-in-europe-2023-update/

77 Rolland, N. (2017). *China's Eurasian century? Political and strategic implications of the Belt and Road Initiative*. National Bureau of Asian Research.

78 Shambaugh, D. (2013). *China goes global: The partial power*. Oxford University Press.

79 Silk Road Fund Co., Ltd. (2021). *Sustainability report*. https://www.silkroadfund.com.cn/enweb/23775/23779/index.html

80 State Council Information Office of the People's Republic of China. (2021). *China's international development cooperation in the new era*. https://english.scio.gov.cn/whitepapers/2021-01/10/content_77097922.htm

81 Szunomár, Á. (2018). Chinese investments and economic relations with Central and Eastern Europe. *Asia Europe Journal, 16*(3), 287–303. https://doi.org/10.1007/s10308-018-0511-4

82 Szunomár, Á. (2020). The political economy of Chinese investment in Europe. *Chinese Political Science Review, 5*(1), 1–21. https://doi.org/10.1007/s41111-019-00133-3

83 Szunomár, Á., & McCaleb, A. (2018). Chinese foreign direct investment in Central and Eastern Europe: An institutional perspective. *Journal of World Business, 53*(5), 590–602. https://doi.org/10.1016/j.jwb.2018.02.003

84 Taleb, N. N. (2007). *The black swan: The impact of the highly improbable*. Random House.

85 Transparency International. (2019). *Corruption risks in infrastructure: Global trends and case evidence*. Transparency International.

86 Van Wee, B. (2007). Large infrastructure projects: A review of the quality of demand forecasts and cost estimations. *Environment and Planning B, 34*(4), 611–625. https://doi.org/10.1068/b32141

87 Winch, G. M. (2010). *Managing construction projects*. Wiley-Blackwell.

88 World Bank. (2019). *Belt and Road economics: Opportunities and risks of transport corridors*. The World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/715511560787699851

89 World Bank. (2020). *Infrastructure governance framework*. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/847081603145680213

90 World Bank. (2022). *Beyond construction: The governance of infrastructure lifecycle performance*. https://openknowledge.worldbank.org/handle/10986/37064

91 Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage Publications.

92 Zeng, J. (2020). China's digital Silk Road. *Journal of Chinese Political Science, 25*(2), 311–330. https://doi.org/10.1007/s11366-020-09666-1

INCREASING THE EFFICIENCY OF CHINESE INFRASTRUCTURE INVESTMENTS BY APPLYING MODERN PROJECT MANAGEMENT METHODS

ORIGINALITY REPORT

5%
SIMILARITY INDEX

PRIMARY SOURCES

1	en.afc.edu.vn Internet	201 words — < 1%
2	nfsm.gov.in Internet	79 words — < 1%
3	digitalcommons.andrews.edu Internet	71 words — < 1%
4	www.coursehero.com Internet	65 words — < 1%
5	vdoc.pub Internet	57 words — < 1%
6	www.diplomacy.bg.ac.rs Internet	50 words — < 1%
7	Vassilis Ntousas, Stephen Minas. "The European Union and China's Belt and Road - Impact, Engagement and Competition", Routledge, 2021 Publications	45 words — < 1%
8	dokumen.pub Internet	43 words — < 1%
9	ebin.pub Internet	40 words — < 1%

10	biotech.law.lsu.edu Internet	39 words — < 1%
11	www.widereurope.eu Internet	36 words — < 1%
12	www.etui.org Internet	32 words — < 1%
13	www.everycourse.co.id Internet	30 words — < 1%
14	mail.euagenda.eu Internet	29 words — < 1%
15	mafiadoc.com Internet	28 words — < 1%
16	docplayer.net Internet	27 words — < 1%
17	link.springer.com Internet	27 words — < 1%
18	www.researchgate.net Internet	27 words — < 1%
19	cpianalysis.org Internet	26 words — < 1%
20	slideplayer.biz.tr Internet	26 words — < 1%
21	Joshua Yindenaba Abor, John Macomber, Thankom Arun, Victor Murinde. "The Routledge Handbook of Infrastructure Finance", Routledge, 2025 Publications	24 words — < 1%
22	imcet.org.tr Internet	

		24 words — < 1%
23	Tim Banning. "Germany's Belt and Road Bargain", Springer Science and Business Media LLC, 2025 Crossref	23 words — < 1%
24	acqirc.org Internet	23 words — < 1%
25	fastercapital.com Internet	23 words — < 1%
26	china-cee.eu Internet	22 words — < 1%
27	chinaobservers.eu Internet	22 words — < 1%
28	www.bertelsmann-stiftung.de Internet	21 words — < 1%
29	Kyle Chan. "Inside China's state-owned enterprises: Managed competition through a multi-level structure", Chinese Journal of Sociology, 2022 Crossref	20 words — < 1%
30	aei.pitt.edu Internet	20 words — < 1%
31	repository.kaust.edu.sa Internet	20 words — < 1%
32	repository.up.ac.za Internet	20 words — < 1%
33	scholar.sun.ac.za Internet	20 words — < 1%
34	slidetodoc.com	

Internet

19 words — < 1%

35 "Foreign Direct Investment in the Successor States of Yugoslavia", Springer Science and Business Media LLC, 2021
Crossref

18 words — < 1%

36 Lisa Ringhofer, Karin Kohlweg. "Has the Theory of Change established itself as the better alternative to the Logical Framework Approach in development cooperation programmes?", Progress in Development Studies, 2019
Crossref

18 words — < 1%

37 opendocs.ids.ac.uk
Internet

18 words — < 1%

38 repository.tudelft.nl
Internet

18 words — < 1%

39 repository.um.edu.mo
Internet

18 words — < 1%

40 "Sustaining the Future: Addressing Grand Challenges Through Megaprojects", Springer Science and Business Media LLC, 2025
Crossref

17 words — < 1%

41 press-files.anu.edu.au
Internet

17 words — < 1%

42 "Securing the Belt and Road Initiative", Springer Science and Business Media LLC, 2018
Crossref

16 words — < 1%

43 Maher Tahsaldar, Imad Chehade, Sam El Nemar, Emmanouela Kokkinopoulou, Demetris Vrontis. "Optimizing internal control systems for effective management: a COSO framework of water governance", Kybernetes, 2026

16 words — < 1%

Crossref

44	Prasanta Kumar Dey, Seetharaman Hariharan. "Integrated approach to healthcare quality management: a case study", The TQM Magazine, 2006 Crossref	16 words — < 1%
45	cioindex.com Internet	16 words — < 1%
46	core.ac.uk Internet	16 words — < 1%
47	dokumen.site Internet	16 words — < 1%
48	eprints.whiterose.ac.uk Internet	16 words — < 1%
49	ia801907.us.archive.org Internet	16 words — < 1%
50	repository.uantwerpen.be Internet	16 words — < 1%
51	rpitst.com Internet	16 words — < 1%
52	John M. Nicholas, John Nicholas, Herman Steyn, Herman Steyn. "Project Management for Business, Engineering and Technology", Routledge, 2019 Publications	15 words — < 1%
53	www.classace.io Internet	15 words — < 1%
54	Cai Fang, Peter Nolan, Wang Linggui. "The Routledge Handbook of the Belt and Road", Routledge, 2025 Publications	14 words — < 1%

55	Dawei Wang, Xi Chen, Xiulan Liu, Yongda Li, Zhengguo Piao, Haoxuan Li. "Dynamic Tariff Adjustment for Electric Vehicle Charging in Renewable-Rich Smart Grids: A Multi-Factor Optimization Approach to Load Balancing and Cost Efficiency", Energies, 2025 Crossref	14 words — < 1%
56	slideplayer.com Internet	14 words — < 1%
57	documents1.worldbank.org Internet	13 words — < 1%
58	pure.manchester.ac.uk Internet	13 words — < 1%
59	www.cfr.org Internet	13 words — < 1%
60	www.globeco.ro Internet	13 words — < 1%
61	www.up2europe.eu Internet	13 words — < 1%
62	Cai Fang, Peter Nolan. "Routledge Handbook of the Belt and Road", Routledge, 2019 Publications	12 words — < 1%
63	dukespace.lib.duke.edu Internet	12 words — < 1%
64	www.emergingmarketsforum.org Internet	12 words — < 1%
65	bibliotekanauki.pl Internet	11 words — < 1%
66	cerre.eu Internet	

		11 words — < 1%
67	docslib.org Internet	11 words — < 1%
68	innopro.vsb.cz Internet	11 words — < 1%
69	rucore.libraries.rutgers.edu Internet	11 words — < 1%
70	Mebratu Kelecha. "Polycrisis and Global Inequality.", Global Sustainability, 2025 Crossref	10 words — < 1%
71	Robert Nkuna. "Infrastructure and Regulation for Economic Development", Springer Science and Business Media LLC, 2025 Crossref	10 words — < 1%
72	eprints.soton.ac.uk Internet	10 words — < 1%
73	opus.lib.uts.edu.au Internet	10 words — < 1%
74	repository.out.ac.tz Internet	10 words — < 1%
75	www.fww.hs-wismar.de Internet	10 words — < 1%
76	www.mfa.com.my Internet	10 words — < 1%
77	"New risks of interdependence in shifting world order – Developing a sustainable risk framework for the Belt and Road", Corvinus University of Budapest, 2024 Crossref Posted Content	9 words — < 1%

78	"The Institutionalisation of Evaluation in Asia-Pacific", Springer Science and Business Media LLC, 2023 Crossref	9 words — < 1%
79	123dok.com Internet	9 words — < 1%
80	Euston Quah, Jun Rui Tan, Iuldashov Nursultan. "A Comparative Analysis of the Belt and Road Initiative with Other Global and Regional Infrastructure Initiatives: Prospects and Challenges", Journal of Risk and Financial Management, 2025 Crossref	9 words — < 1%
81	Mher D. Sahakyan, Kevin Lo. "Routledge Handbook of China's Belt and Road Initiative in Eurasia", Routledge, 2025 Publications	9 words — < 1%
82	Siavash Alimadadi. "A pragmatist perspective on front-end project organizing: The case of refurbishment of the Palace of Westminster", International Journal of Project Management, 2022 Crossref	9 words — < 1%
83	caod.oriprobe.com Internet	9 words — < 1%
84	ijcat.com Internet	9 words — < 1%
85	onlinelibrary.wiley.com Internet	9 words — < 1%
86	pure.mpg.de Internet	9 words — < 1%
87	research-repository.griffith.edu.au Internet	9 words — < 1%

88	www.acrplus.org Internet	9 words — < 1%
89	www.deutsche-ostasienstudien.de Internet	9 words — < 1%
90	www.global-solutions-initiative.org Internet	9 words — < 1%
91	www.gov.pl Internet	9 words — < 1%
92	www.jorismueller.com Internet	9 words — < 1%
93	www.pico.gov.hk Internet	9 words — < 1%
94	"Globalisation Disrupted", Springer Science and Business Media LLC, 2025 Crossref	8 words — < 1%
95	"Motives and Determinants of Chinese Foreign Direct Investment in the CEE countries", Corvinus University of Budapest, 2025 Crossref Posted Content	8 words — < 1%
96	"Pros and Cons of China and the Chinese in Africa", Springer Science and Business Media LLC, 2025 Crossref	8 words — < 1%
97	Azmat Sher, An Haizhong, Muhammad Kaleem Khan, Judit Sági. "Chinese Stock Market Integration with Developed World: A Portfolio Diversification Analysis", Heliyon, 2024 Crossref	8 words — < 1%
98	Brian C.H. Fong, Wu Jieh-min, Andrew J. Nathan. "China's influence and the Center-periphery Tug of	8 words — < 1%

War in Hong Kong, Taiwan and Indo-Pacific", Routledge, 2020
Publications

99 Danilo Di Emidio. "Adolescent Mental Health and Achievement in the Neoliberal School Environment - Coproducing Knowledge with Students as Stakeholders", Routledge, 2025 — 8 words — < 1%
Publications

100 Jianjiang Shen, Jiaojiao Yu, Wali Muhammad Khoso. "Green finance as a driver for environmental and economic resilience post-COVID-19: A focus on China's strategy", Heliyon, 2024 — 8 words — < 1%
Crossref

101 Joseph Soeters, Patricia M. Shields, Sebastiaan Rietjens. "Routledge Handbook of Research Methods in Military Studies", Routledge, 2014 — 8 words — < 1%
Publications

102 Ralf Muller. "Governance and Governmentality for Projects - Enablers, Practices, and Consequences", Routledge, 2019 — 8 words — < 1%
Publications

103 Ruth N.F. Sloot, Leentje Volker, Johannes T. Voordijk. "Co-creation of understanding through early buyer-supplier interaction: Sensemaking and sensegiving in public infrastructure tenders", Journal of Purchasing and Supply Management, 2025 — 8 words — < 1%
Crossref

104 Steven J. Schapiro. "Handbook of Primate Behavioral Management", CRC Press, 2017 — 8 words — < 1%
Publications

105 Tanja A. Börzel, Julia Langbein, Lunting Wu, Valentin Krüsmann. " Collision, Competition or Cooperation? China's and the Development Policies Towards Eastern Europe ", Global Policy, 2025 — 8 words — < 1%
Crossref

106	Terry C.H. Sunderland, Jeffrey Sayer, Minh-Ha Hoang. "Evidence-based Conservation - Lessons from the Lower Mekong", Routledge, 2012 Publications	8 words — < 1%
107	Wendy Steele, Tooran Alizadeh, Leila Eslami-Andargoli, Silvia Serrao-Neumann. "Planning Across Borders in a Climate of Change", Routledge, 2020 Publications	8 words — < 1%
108	cris.brighton.ac.uk Internet	8 words — < 1%
109	doczz.net Internet	8 words — < 1%
110	euproplus.org.rs Internet	8 words — < 1%
111	fr.slideserve.com Internet	8 words — < 1%
112	haygithimnadram.am Internet	8 words — < 1%
113	hrcak.srce.hr Internet	8 words — < 1%
114	ijme-journal.org Internet	8 words — < 1%
115	kth.diva-portal.org Internet	8 words — < 1%
116	lef.tul.cz Internet	8 words — < 1%
117	mobile.unicreditbank.si Internet	8 words — < 1%

118	openknowledge.worldbank.org Internet	8 words — < 1%
119	pmworldlibrary.net Internet	8 words — < 1%
120	repository.ubn.ru.nl Internet	8 words — < 1%
121	research-api.cbs.dk Internet	8 words — < 1%
122	research-portal.uu.nl Internet	8 words — < 1%
123	revolution.allbest.ru Internet	8 words — < 1%
124	ris.utwente.nl Internet	8 words — < 1%
125	s3-ap-southeast-1.amazonaws.com Internet	8 words — < 1%
126	sdpi.org Internet	8 words — < 1%
127	socialinnovationexchange.org Internet	8 words — < 1%
128	staging.preprints.org Internet	8 words — < 1%
129	trepo.tuni.fi Internet	8 words — < 1%
130	ub5.ba6.myftpupload.com Internet	8 words — < 1%

131	unipub.lib.uni-corvinus.hu Internet	8 words — < 1%
132	vti.diva-portal.org Internet	8 words — < 1%
133	watermark.silverchair.com Internet	8 words — < 1%
134	www.adb.org Internet	8 words — < 1%
135	www.cdb.com.cn Internet	8 words — < 1%
136	www.econstor.eu Internet	8 words — < 1%
137	www.iki.bas.bg Internet	8 words — < 1%
138	www.mdpi.com Internet	8 words — < 1%
139	www.nsar.org.rs Internet	8 words — < 1%
140	www.planningfuturecities.org Internet	8 words — < 1%
141	www.politesi.polimi.it Internet	8 words — < 1%
142	www.slideshare.net Internet	8 words — < 1%
143	www.yumpu.com Internet	8 words — < 1%

144	yingyushijie.com Internet	8 words — < 1%
145	"The Belt & Road Initiative in the Global Arena", Springer Science and Business Media LLC, 2018 Crossref	7 words — < 1%
146	Flyvbjerg, Bent. "What You Should Know About Megaprojects and Why: An Overview", Project Management Journal, 2014. Crossref	7 words — < 1%
147	John M. Nicholas, Herman Steyn. "Project Management for Engineering, Business, and Technology", Routledge, 2019 Publications	7 words — < 1%
148	Marek Hrubec, Dominika Dinušová. "Social and Political Experiments: Latin America in the 21st Century", Walter de Gruyter GmbH, 2025 Crossref	7 words — < 1%
149	campus.unibo.it Internet	7 words — < 1%
150	Bingyu Liu. "China's Green Investment in Africa: A State-Centric Corporate Social Responsibility Perspective", Springer Science and Business Media LLC, 2025 Crossref	6 words — < 1%
151	Hanna Kupś, Maciej Szatkowski, Michał Dahl. "China under Xi Jinping", Brill, 2024 Crossref	6 words — < 1%
152	Julie Zimmermann Holt. "Chapter 975 Cahokia", Springer Science and Business Media LLC, 2014 Crossref	6 words — < 1%
153	Pradumna B. Rana, Xianbai Ji. "China's Belt and Road Initiative", Springer Science and Business	6 words — < 1%

Media LLC, 2020
Crossref

154 afripoli.org
Internet
6 words — < 1%

155 www.tandfonline.com
Internet
5 words — < 1%

EXCLUDE QUOTES	ON	EXCLUDE SOURCES	OFF
EXCLUDE BIBLIOGRAPHY	ON	EXCLUDE MATCHES	OFF