

**A Human-Centred Infrastructure Design and Implementation Framework: A Case
of Kenyan Infrastructure Projects**

By

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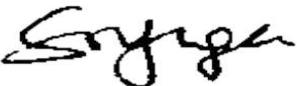
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Abstract

A growing concern in academia and industry is the lack of human-centred variables in conceptualising the relationship between the rising sovereign risk and sub-optimal infrastructure development in Sub-Saharan Africa. Emerging evidence reveals that national culture influences infrastructure development disparities. Still, this influence has not been mapped onto the rising sovereign risk in lower-middle-income nations to offer human-centred interventions to the cause-effect relationship between these interconnected variables. This research addresses this gap by integrating activity theory, affordances and cultural psychology theory as mid-range theoretical filters to elicit national culture as an antecedent of managerial herding motives. It conceptualises managerial herding motives as defensive socio-cognitive learning mediating the relationship between sovereign risk and infrastructure development and proposes a human-centred framework with five factors for mapping defensive socio-cognitive learning dimensions of managers in the infrastructure design and implementation activity on sovereign risk: (i) identifying the socio-cognitive constructs for designing a functional human-centred learning framework, (ii) assessing the behavioural pooling effect of perceived affordances in the infrastructure development context and cultural constraints by managers, (iii) identifying how the behavioural pooling effects unify micro-meso-macro-level project and sovereign risk determinants (iv) propose interventions for negative behavioural effects and (v) Key Performance Indicators (KPIs) for monitoring, evaluating and reporting managerial performance to identify behavioural improvement areas.

A sequential explanatory mixed method was adopted where the first phase was quantitative and the second qualitative. The quantitative method comprised a semi-structured survey of 597 managerial perceptions of sovereign risk, infrastructure debt-side governance, project management, macroeconomic risk, and national culture in large-scale Kenyan renewable energy and transportation projects. This primary data was analysed through factor analysis, correlation, ordinary least square regression, and logit regression. Secondary data, including 6468 project risk premium observations, was analysed through pooled panel data regression. Afterwards, the qualitative method entailed a case study and thematic analysis of thirty-one semi-structured interviews with key informants and policymakers in large-scale Kenyan renewable energy and transport projects. The integrated quantitative and qualitative research findings yielded 31 dimensions of defensive socio-cognitive learning among managers and 16 KPIs of human-centred infrastructure development risks. The study advances a practice-based theory of how collaborative learning among managers in infrastructure projects can improve the governance and performance of infrastructure systems. It recommends focusing on the determinants of socio-cognitive development among managers to mitigate their negative influence on infrastructure design and implementation as a heightening source of sovereign risk in developing nations.

Keywords: Kenyan infrastructure projects, Cultural-historical activity, Herding behaviour, Information cascading, Defensive socio-cognitive learning motives, Sovereign risk,

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List of Abbreviations

SPV	Special purpose vehicle
SDG	Sustainable Development Goals
USD	United States dollar
EPC	Engineering procurement and construction
SRP	Sovereign risk premium
SBS	Sovereign bond spreads
PRP	Project risk premium
AT	Ambiguity tolerance
PDI	Power distance
IDV	Individualism vs collectivism
MAS	Masculinity vs femininity
UAI	Uncertainty avoidance
LTO	Long-term vs short-term orientation
IVR	Indulgence vs restraint

List of Statutes

Constitution of Kenya 2010
Debt and Borrowing Policy 2020 (Kenya)
Energy Act 2019 (Kenya)
Feed in Tariff Policy 202 (Kenya)
Integrated National Transport Policy 2009 (Kenya)
Least Cost Power Development Plan 2010–2030 (LCPDP, 2009)
Local Content Act, 2023 (Kenya)
Petroleum Act 2019 (Kenya)
Public-Private Partnerships Framework 2014 (Kenya)
Renewable Energy Feed in Tariff Policy 2012 (Kenya)
Renewable Energy Auctions Policy 2021 (Kenya)
Vision 2030 (Kenya)

Definition of Terms

Sovereign risk	Probability of the national government defaulting on loans by failing to honour principal and interest payments (Cantor & Packer, 1996) due to infrastructure development failures.
Sovereign risk premium	Difference between the interest rate on the Kenyan sovereign bond and the interest rate on a risk-free U.S. Treasury bond of comparable maturity (Morsy & Moustafa, 2020)
Debt-side governance	Lending as rule-based risk management to guide infrastructure project stakeholders' actions (Dorobantu & Müllner, 2019).
Projects	Temporary infrastructure development endeavors to create unique results (Project Management Body of Knowledge, 2021)
Project management	Application of processes, methods, skills, knowledge and experience to achieve infrastructure development objectives within certain constraints (Association of Project Management Body of Knowledge, 2019).
Project risk premium	Additional return investors demand to compensate them for the higher risk of investing in overseas infrastructure development projects (Klein, 1997).
Macroeconomic risk	Project risk premium changes from persistent shocks to the real economy, such as political and social events (Shapiro, 1978)
National culture	The collective programming of the mind that distinguishes members of a given infrastructure project development group from others (Hofstede, 2013).
Herding behaviour	A form of convergent social behaviour broadly illustrating the alignment of the thoughts or behaviours of individuals within an infrastructure project group (herd) through local interaction and without centralised coordination (Raafat et al., 2009).
Defensive socio-cognitive learning	The motivation to observe and imitate the behaviour of other members within the project group (Bandura & Walters, 1977) is a protective response to uncertainty or perceived ignorance.
Human-centered design and implementation	Focusing on socio-cognitive learning motives among managers as a protective mechanism that mediates the negative influence of infrastructure development failure on sovereign risk to create frameworks that cater to individual managers, communities and lenders as distinct stakeholder groups (Norman, 1999).

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Dedication

This thesis is dedicated to my parents

Mr Joseph Oyuga Okirwa

and

Mrs Taphroza Sumba Oyuga

Chapter One: Introduction

1.1. Introduction

This chapter appraises how human-centred decision-making in infrastructure design and implementation mitigates information loss and bolsters innovation, ultimately augmenting infrastructure development as a tool for sovereign risk diversification. It discusses the research background, problem, and the study novelty.

1.2. Research background

In the 2020 joint World Bank–International Monetary Fund (IMF) debt sustainability analysis, Kenya was cautioned on its high risk of external long-term sovereign debt distress due to past deficits, suboptimal governance and benefits realisation from its large-scale infrastructure development projects (International Development Association (IDA) & International Monetary Fund (IMF), 2022). Regarding past deficits, Kenya’s gross public debt rose from 50.2% of its GDP in 2015 to 69% in 2021 against a GDP to debt ceiling of 70%, with about 50% owed to external creditors (Public Debt and Borrowing Policy, 2021). This rising external debt reveals Kenya’s success in attracting global capital to its flagship Vision 2030 infrastructure development projects. The governance perspective of the risen external sovereign debt sustainability risk calls for evaluating how collaborative decision-making in designing and implementing novel large-scale infrastructure projects in Kenya contributed to elevated risk. The study adopts a political theory definition of sovereignty from *The Arantzazu Mendi* (1938) case in international law development, that sovereignty constitutes “a government that exercises de facto administrative control over a country and is not subordinate to any other government within or outside that country”. This hierarchical structure within the sovereign is vital in determining the ultimate authority of the decision-makers within the infrastructure development system whose practices contribute to Kenya’s rising risks. Samuels (2013, pp. 33–42) states that decision-making entails designated individuals, groups, structures, systems, and subsystems acting on behalf of the people within the sovereign governance framework constituting the environment where their actions occur. Consequently, the managerial practices within the Kenyan large-scale infrastructure design and implementation system partly explain the heightening external sovereign risk.

The sovereign is the highest level of government, called the national government. The division of labour concerning infrastructure design and implementation in Kenya is two-fold. First, the national government borrows through the Central Bank of Kenya, then on-lends to its infrastructure development organisations. Second, the national government guarantees all sub-national debt for infrastructure development projects (Densford *et al.*, 2018). This separation of power and decentralised decision-making authority, according to the Constitution of Kenya 2010, aims to pool national risk and context-specific managerial expertise into infrastructure design and implementation. Thus, sovereign risk is the probability of the national government defaulting on its loans by failing to honour principal and interest payments (Cantor & Packer, 1996), partly

due to suboptimal infrastructure governance and performance. According to the sovereign ceiling policy, the sovereign risk premium reflects the national government's borrowing rate, meaning no infrastructure project loan can be rated higher than the Kenya government's sovereign bond (Borensztein *et al.*, 2013). The rule results from transfer risk, implying that the Kenyan government may impose taxes and currency control on its infrastructure sector if its repayment capacity declines (Borensztein *et al.*, 2013). Legal and regulatory changes redefine the infrastructure design and implementation activity, including the subjects involved, rules or policy guidelines, institutional instruments, tools and artefacts and the division of labour (Engeström, 2001) between the stakeholders involved. As a result, the sovereign ceiling policy institutes a dialectical relationship between the rising sovereign risk and infrastructure design and implementation as a practice-based infrastructure project management theory (Florice *et al.*, 2014).

The sovereign ceiling policy validates the national government's borrowing rate as a widely acknowledged risk-free benchmark. Its unique attributes include the central government's capacity to manage national expenditure, lacking higher authority to enforce debt service, and a high survival probability post-default (Fitch Ratings, 2023). Therefore, Brautigam (2022) observes that sovereign default risk emerges from the infrastructure development activity due to moral hazards perpetuated by decision-makers. Klein (1997) argued that their motivation for taking more risks may be attributed to the fact that they do not bear the full consequences of those risks because the public offers an open-ended risk-taking guarantee through taxation. Andreasen (2015) illustrates the signalling effect of the government's repayment decision to lenders and the risk transfer effect from the sovereign to other sectors through taxation. Gande and Parsley (2005) reveal an asymmetric spillover effect, such that a negative sovereign credit rating change in one country increases the sovereign credit spread of other countries, controlling for cultural variables of institutional integration (Guiso *et al.*, 2016) such as common language, international trade agreement, and legal system. Studies reveal the rising sovereign risk as a macro-level outcome of poorly understood meso and micro-level links. The behavioural evidence gap is severe from the standpoint of non-investment-grade countries within the Sub-Saharan African regions, such as Kenya (Fitch Ratings, 2023), because infrastructure loans from these countries are mostly unrated (Fitch Ratings, 2022b), exacerbating their perceived sovereign risk exposures.

Even though sovereign risk is widely acknowledged as a risk-free benchmark, recent empirical research by Morsy & Moustafa (2020) revealed that investor herding exacerbates a sovereign risk mispricing exposure. The study revealed that sovereign bond spreads are larger by 2.9% for emerging markets in Sub-Saharan Africa than other emerging regions, reflecting geographical discrimination. Herding behaviour, or herd mentality, is a socio-cognitive learning motive where people are intensely influenced by the decisions and behaviours of others in the same group without central coordination (Raafat *et al.*, 2009). An information cascade is a form of herding in which group members make decisions or adopt beliefs based primarily on

the actions and choices of those who came before them rather than relying on their private information or independent judgment (Bikhchandani *et al.*, 1992). Morsy & Moustafa's (2020) longitudinal data analysis suggests that both phenomena co-exist. Some empirical studies have demonstrated that national culture is the unobservable antecedent of herding behaviour through discriminatory socio-cognitive learning motives (Chang & Lin, 2015). This evidence supports the hypothesis that a nation's prevalent values and practices can exert a significant behavioural pooling effect on managerial behaviours, attitudes, and organisational outcomes (Hofstede *et al.*, 2010b). For instance, herding in international markets involves many investors collectively making investment decisions or trades based on the actions of others from their country of origin or analyst forecast rather than conducting independent analyses or following their judgment. It results in a rush of market participants buying or selling assets in a way that can exaggerate risk movements or information loss (Scharfstein & Stein, 1990). Morsy & Moustafa (2020) found the tendency of investors in the international public debt market to overlook country-specific political stability, institutional quality, and macroeconomic fundamentals. The fundamental problem in these studies is the critical information loss that occurs when decision-makers conform to the majority view because it leads to ignoring, undervaluing, or overlooking fundamental data. Limited research has looked into managerial herding in the borrowing nations' infrastructure development organisations despite managers being designated decision-makers who filter underlying information in the relationship between markets and the sovereign's governance structure.

In cross-border transaction cost economics, the national culture hypothesis suggests that organisations or individuals select governance structures discriminating against transaction risks based on their specific attributes (Williamson, 2000). Dorobantu & Müllner (2019) corroborate this concept by revealing that the geography of international infrastructure project syndicates is determined by the ability to influence politics, opportunistic creditor behaviour, and the flexibility to reorganise the syndicate if circumstances demand. While investor herding behaviour in the international public debt market and the geographical distribution of international infrastructure project syndicates reflect behavioural pooling within and across countries, its antecedents and consequences from a managerial decision-making standpoint remain unknown. Moreover, Drago & Gallo (2017) revealed that sovereign credit ratings impact the value of principal financial instruments like sovereign bond spreads and their derivatives, including infrastructure project finance and risk guarantees from the Kenya government. Dang & Partington (2020) found that the cultural distance between the rating agency and the rated sovereign determines ratings. While Borensztein *et al.* (2013) show that the sovereign rating effect of the bonds spills to financial and non-financial decisions within the rated sovereign, Ho *et al.* (2023) reveal that national culture affects the spillover effect. Based on the sovereign ceiling policy and the emerging evidence of the geographical determinants of international infrastructure project finance syndicates, infrastructure development is a leading non-financial spillover context due to its institutional and cultural integration in the sovereign's decision-making system (Guiso *et al.*, 2016). These

recent studies reveal a practice-based theory that the cause-effect relationship between sovereign risk and infrastructure development may emerge from the behavioural pooling effect of formal governance practices and national culture as informal governance practices that could be positively related but distinct constructs.

Studies examining the determinants of infrastructure development disparities validated the behavioural pooling effect of national culture on managerial practice. Mayfield & Mayfield (2012) found that national culture influences infrastructure development disparities worldwide. Moreover, Liu *et al.* (2015) argue that national culture influenced international contractors' risk management behaviour in Singapore, Poland, and Chinese infrastructure projects. Besides, Meng *et al.* (2016) document that national culture determines infrastructure sustainability prioritisation using managerial evidence from projects in China, the United Arab Emirates, and Sri Lanka. While the conceptual perspective of the sovereign ceiling policy suggests that national culture could moderate the emerging sustainability relationship between infrastructure projects and sovereign risk, the findings remain fragmented. Still, the fragmented findings reveal that cultural values represent the social cognition unifying motives and actions that constitute the "soft" managerial capacity at the intersection of the global financial market and infrastructure development. Yet, cultural phenomena remains under-researched in lower-middle-income countries within Sub-Saharan Africa. The current study extends this literature by conceptualising national culture as socio-cognitive learning construct mediating the embeddedness of managerial herding within the infrastructure development context and sovereign risk. It utilises the traditional variables in modelling sovereign risk premium changes and interacts them with variables measuring national culture. Infrastructure development is a non-financial context that has been associated with moral hazards among decision-makers partly driving the rising sovereign debt crises in various developing Sub-Saharan African countries (Brautigam, 2022). The objective is to elucidate the human-centred relationship between infrastructure development and sovereign risk. National culture is a socio-cognitive construct inhibiting collaborative managerial learning at the intersection of sovereign risk and infrastructure development when managers utilise cultural constraints as a protective strategy to avoid being blamed for poor decision-making outcomes. According to Bandura & Walters (1977), socio-cognitive learning integrates social and cognitive variables to elucidate human-centred approaches to acquiring, assimilating, and applying knowledge, skills, behaviours, and attitudes. It recognises that learning occurs through the interaction between social and cognitive tools. While learning should involve expanding on the acquired insights, ideas, and best practices from peers, subordinates, superiors, institutions, and external networks, herding blocks expansive learning by constraining managerial learning motives to conformance.

Cultural constraints encourage managers to preserve conventional approaches (herding), potentially stifling innovation and creativity while amplifying risk exposures and new technological adoption constraints in infrastructure development organisations. Besides, the emerging sovereign risk mispricings due to investor

herding reveal that discriminatory institutional alignment emerges when culture-mediated interactive forces between lenders and borrowers yield opportunistic behaviour. However, the borrower's dimension remains under-researched. It means that culture may influence an unjust distribution of borrowing costs for nations, wherein riskier countries enjoy lower borrowing costs than they logically should. In contrast, less risky nations incur higher costs than justified. This notable discovery underscores the urgency of integrating human-centred variables into the sovereign risk assessment models. Within-country sovereign risk models should include qualitative elements such as national culture variables to track and evaluate human-centred variables in long-term economic growth determinants such as infrastructure development. Kenya's recently enacted Local Content Act 2023 is a step in the right direction. It is a legal framework for establishing a monitoring, evaluation and reporting system for implementing local workforce training. It aims to ensure infrastructure development bolsters human-centred national capacities and capabilities to share accruing benefits with external investors. However, it lacks the socio-cognitive determinants of managerial learning and Key Performance Indicators (KPIs) of how learning progressively enhances human capital development outcomes. External sovereign debt sustainability risks have been linked to suboptimal benefits realisation from novel large-scale infrastructure development (Onjala, 2018) projects and culture-mediated sustainability prioritisation pitfalls (Meng *et al.*, 2016). Despite the significant growth and complexity of large-scale infrastructure development projects in Kenya, scholars have assessed their performance without adequately considering how national culture may pool managerial behaviour in ways that elevate long-term sovereign risk despite highlighting persistent cost overruns, schedule delays, and quality shortfalls due to governance tensions (Pueyo, 2018). The theory of herding implies that managerial herding motives could curtail training effectiveness as a response to governance tensions that constrain the capacity of managers to complement government efforts by articulating what needs to be changed. Governance tensions disrupt the stability of infrastructure cash flows as a tool for risk diversification in sovereign portfolios.

This study addresses a significant research gap in elucidating the relationship between sovereign risk and infrastructure development by integrating behavioural science theory and human-centred design principles into a micro-foundational theoretical framework of human activity. Prior studies in behavioural economics exposed investor herding as a macro determinant of sovereign risk mispricing in Sub-Saharan Africa and the geography of infrastructure project finance syndicates. Still, they overlooked the information-filtering role of local managers in the borrowing nations. The current study bridges a conceptual gap in elucidating the relationship between sovereign risk and infrastructure development using sovereign bond spreads as the risk-free benchmark for project risk premiums. Based on a sequential theoretical integration approach, it integrates theoretical constructs from Engeström's (2001) expansive learning framework at the workplace with constructs from Hofstede *et al.*'s (2010) national culture dimensions framework into mixed-method research. This integration offers robust theoretical elucidation of cultural norms as learned conventions that

block expansive learning among managers in a collaborative infrastructure development activity when they uphold suboptimal conventions. Engeström (1978) extended the cultural-historical activity theory (CHAT) by defining expansive learning as transformative and developmental outcomes in collaborative, complex, and dynamic workplaces. Based on this concept, the study conceptualises cultural values as antecedents of herding because they could prohibit some transformative activities and encourage others (Gibson, 1979).

The proposed conceptual framework integrates four theories: Cultural-historical activity theory provides the social network boundary for framing an infrastructure development activity as an expansive managerial learning context based on Engeström (1978). Gibson's (1979) affordance theory posits that perception and action are inseparable, emphasising that the ecological niche of an infrastructure development activity must be considered to improve human-centred design and implementation practices. In this study, the perception of sovereign risk, debt-side governance, project management, and macroeconomic risk among managers in Kenyan renewable energy and transportation infrastructure projects are called "perceived affordances" to mitigate project and sovereign risk. It emphasises the subjective aspect of affordances, focusing on how managers interpret the potential actions and outcomes enabled or constrained by these variables in their infrastructure development environment. It guides the study to identify what the Kenyan infrastructure development environment affords managers to succeed in design and implementation, thereby reducing project and sovereign risk. Affordances are the resources, tools, and conditions that support managers in overcoming challenges and achieving project goals. To complement Gibson's (1979) concept that culture is not an affordance but a constraint to managerial action, Hofstede's (2013) national culture psychology theory provides constructs describing the Kenyan infrastructure development context. Hofstede's (1980) and Hofstede's (2001) work on cultural dimensions and their consequences on international differences in work-related values provides a framework for understanding how cultural norms shape managerial and organisational behaviour. In line with the behavioural concept, Scharfstein & Stein's (1990) seminal work pioneered a theoretical model that herding behaviours among professional managers can be driven by career concerns and the desire to avoid blame. Chang & Lin (2015) used empirical evidence to demonstrate that national culture is an antecedent of herding behaviours. This behavioural science perspective of national culture as an antecedent of herding among professional organisational managers (Scharfstein & Stein, 1990) guides the study to isolating national culture's consequences into a specific behavioural problem within the large-scale infrastructure development activity and grounds its diagnostic approach in academic theory and scientific evidence to bridge the gap between practice, policy and theory. According to Keynes (1936), managers will be reluctant to act according to their private information, particularly when it exemplifies contrarian behaviour because worldly wisdom teaches humans that it is better for the reputation to fail conventionally than to succeed unconventionally. The central hypothesis is that managerial herding in the Kenyan infrastructure development context is a protective strategy driven by culture as an antecedent of

socio-cognitive learning motives whose actions are protecting one's reputation. Cultural is an antecedent of herding with two roles – it is a mechanism of transmitting thoughts or behaviour between managers as shared social norms, and a pattern-based model of connections between them in the Kenyan infrastructure development context because some managers believe others know more than them and follow the crowd.

The study contributes to advancing the UN's sustainable development goals (SDGs) as Global Goals to bolster development. It offers academic support for SDGs by conceptualising managerial herding motives as culture-mediated defensive socio-cognitive learning that constrains collaboration and innovativeness. The research insights lead to the proposal of a human-centred infrastructure design and implementation framework to bolster managerial support in implementing SDG 7 (to ensure access to affordable, reliable, sustainable, and modern energy for all) and SDG 9 (to build resilient infrastructure to promote inclusive and sustainable industrialisation and foster innovation). The research acknowledges that significant infrastructure development actions transcend individual actors and rest in the purview of interpersonal information transmission networks as systemic sovereign risk analytic tools. Thus, the evolving external sovereign risk is sequenced information asymmetry in Kenya's infrastructure development framework. This perspective empowers the research to elicit a culture-mediated social cognition among infrastructure development subsystems in Kenya, particularly renewable energy, rail, and road transportation. Besides, infrastructure development requires forward-looking risk simulation in the lifespan of each infrastructure system (McKinsey, 2013) as a sovereign risk diversification portfolio (Markowitz, 1952). Infrastructure lifecycles demand cost mitigation from inception – including international public and private borrowing costs, through planning, development, construction, monitoring, operations, maintenance, and termination (PricewaterhouseCoopers, 2014). However, theoretical propositions and empirical findings indicate that managers overestimate benefits and underestimate costs (Flyvbjerg, 2007), misaligning policy and practice. Empirical studies on herding show that such behaviour may emerge from managerial motives to mitigate the reputational risk of failing unconventionally motivated by the desire for social proof, career protection, and performance benchmarks (Hirshleifer & Teoh, 2009). While culture is an antecedent of herding, it is under-researched in eliciting the relationship between sovereign risk and infrastructure development as a collaborative high-risk decision-making context that can offer appropriate human-centred interventions.

1.2.1. Culture-mediated socio-cognitive learning within the infrastructure development context

The national culture hypothesis proposed by Geert Hofstede suggests that the cultural values and practices prevalent within a nation significantly influence the behaviour, attitudes, and decision-making processes of its individuals and organisational behaviour (Hofstede, 1980). National culture's behavioural manifestation can be traced to the socio-cognitive learning theory that Bandura & Walters (1977) pioneered. It posits that individuals learn through direct experiences and by observing others, imitating behaviours, and processing

information in social contexts, influenced by attention, retention, reproduction, and motivation. Attention requires the learner to focus on the behaviour, influenced by its attractiveness, competence, and similarity to the learner. Retention involves the learner's ability to remember the observed behaviour by encoding it into memory and retrieving it later. Reproduction necessitates that the learner has the physical and cognitive capability to replicate the behaviour. Motivation is crucial, as the learner must be driven to imitate the behaviour, influenced by expected outcomes and perceived rewards or punishments. Considering the concept of affordance from Gibson (1979), herding can be seen as a value-driven constraint in an ecological context of perceiving what peers afford a manager as a reciprocal to what the manager affords their peers.

Accordingly, national culture is widely acknowledged as a socio-cognitive antecedent influencing attention, retention, reproduction, and motivation to sustain herding behaviours. The socio-cognitive learning theory justifies the empirical adoption of national culture as a construct that explains the constraints motivating managers to reproduce the actions and decisions of those around them, particularly when they perceive them as knowledgeable. Empirical studies in various contexts have validated that cultural values and practices mediate the rapid spread of information or behaviour in a group, even if it is not based on accurate information or rational decision-making (Chang & Lin, 2015). Strategic managerial decision-making has been attributed to herding to mitigate reputational risk (Ashiya & Doi, 2001). This evidence implies that national culture may moderate the embeddedness of managerial herding motives in the relationship between infrastructure development and sovereign risk if managers preserve common practices to avoid reputational risk instead of challenging inefficient practices. The concept of values and norms justifies utilising national culture as one of the socio-cognitive learning constructs in empirical studies investigating individual-level behavioural motives and how they transcend organisational and national structures. Cultural values have been used as antecedents of herding motives because the slow-to-change nature of culture and its role in interpersonal information transmission can sustain discriminatory alignment within multicultural groups.

Guerin (2003) emphasises that people's economic behaviours are inherently intertwined with their social and cultural relations. It means that Kenya's elevated sovereign risk must be evaluated by considering the sociocultural context in which it is created. Based on Leontiev (1978), the study notes that infrastructure lifecycles are embedded in the cultural fabric of the society where they operate and elevate sovereign risk. Complex sociocultural dynamics shape how people from diverse cultural backgrounds navigate risk and uncertainty within the Kenyan infrastructure development context. As expounded by Hofstede (1980), shared social norms and values can determine Kenyan infrastructure design and implementation practices, particularly in the face of globalised market risk and uncertainty. Therefore, culture emerges as a persistent social construct that offers a lifecycle approach to unravelling how managers interact with the evolving formal and informal infrastructure governance tools and how their slow-to-change shared cultural values

and norms sustain herding, information cascading, and sovereign risk (Hofstede, 1980). Delmon (2021) corroborates the importance of risk ownership allocation, alternative knowledge, and risk management tools in project procurement decisions. Hofstede (2011) highlights the enduring nature of culture, suggesting that collaboration in a multicultural infrastructure development context can fail due to preserved cultural norms.

Accordingly, the research underscores the significance of mapping managerial practices within the infrastructure development context onto sovereign risk to elucidate the within-country behavioural pooling effect of cultural constraints as antecedents of managerial learning motives of herding while controlling for the behavioural pooling effect of formal governance tools. It emphasises sovereign debt-side management covenants, balancing project constraints and enablers in evolving political, economic, social, technological, environmental, legal and regulatory risks (Eberhard *et al.*, 2017). A cultural-historical analysis is vital in eliciting how the Kenyan infrastructure development environment influences sovereign risk, including the managerial perception of sovereign risk, debt-side governance, project management, and macroeconomic risk alongside slow-to-change human-centred variables such as the national culture. Perceived affordances refer to the interpretation or understanding among managers of the actions and outcomes that debt-side governance, project management, and macroeconomic risk mitigation tools enable or constrain within their infrastructure development environment. It emphasises the subjective aspect of their affordances as the key variables and focuses on how managers perceive the possibilities for action provided by these variables. The following sections discuss the affordances of the infrastructure development context used to mitigate risk, including debt-side governance, project management and macroeconomic risk factors.

1.2.2. Debt-side governance in the infrastructure lifecycle

The Kenyan central government borrows funds through external public and private debt (Onjala, 2018) and on-lends to its large-scale infrastructure development organisations. External debt-side governance tools should support Kenya in accessing long-term funding terms. How managers perceive the effectiveness of governance structures in managing project debt determines their confidence in sovereign oversight and risk management tools. Williamson (1988) introduced the concept of debt as a governance tool. It emphasises the significance of aligning the debt-to-equity, maturity, grace period, interest rate, financial covenants, collateral, and revenue generation capacity to mitigate default risk. Investors perceive higher risk in the project's initial phase due to substantial upfront debt with limited infrastructure lifecycle performance knowledge (Pueyo, 2018). Thus, governing by debt entails explicitly defining managerial decision-making boundaries via loan agreements to resolve the uncertainty in the infrastructure lifecycle management rules.

1.2.3. Infrastructure project lifecycle management

Managerial assessment of their capability affects their technical project planning and execution practices. According to the Association for Project Management (2019) Body of Knowledge, the ten practice-based

knowledge areas include planning, integrating project phases, managing the scope, scheduling work, budgeting and allocating resources, engaging stakeholders, communicating and managing risk, procuring the right materials and controlling quality to achieve the strategic objectives of the infrastructure project. Thus, Kenya's experience in delivering infrastructure projects offers valuable insights for other developing Sub-Saharan African nations. Shortfalls emerged (Githaiga, 2021), such as the limited capacity of managers and weak collaboration between the public and private sector (Wang, 2022). Technical project management challenges vary across project initiation, planning, construction, monitoring, operations, maintenance, and termination stages, with some persisting throughout the infrastructure project lifecycle due to misaligned policy design and implementation tools with project objectives (Flyvbjerg, 2007). Moreover, Kenya enacted the Local Content Act 2023 to measure the added economic value through systematic development of national capacity and capabilities and investment in developing local workforce in the extractive industry.

1.2.4. Macroeconomic risk in the infrastructure lifecycle

The perception of Kenya's economic stability and predictability influence managerial resource allocation, budgeting, and financial planning decisions. This can be traced to the recent evidence from surveys of managers within the Kenyan infrastructure development context requesting a conducive macroeconomic risk environment. Odhiambo *et al.* (2020) and Rambo & Lucas (2016) revealed that managers perceive that controlling inflation, end-user tariffs, economic crises, interest rates, political risk, regulation, market volatility, climate change and technological disruptions can improve infrastructure performance. Some studies found that macroeconomic risk exposures arise from internal organisational management practices (Henning & Wald, 2019), manifesting as cost overrun, schedule delay, poor quality, weak collaborative governance and decision-making, insufficient information, or lack of experience within the project team (Gregory & Sovacool, 2019). Managers overseeing infrastructure development navigate environments with significant macroeconomic risk exposures. Moreover, infrastructure projects often rely on external debt (Klagge & Nweke-Eze, 2020), exposing them to domestic and international macroeconomic risks. Factors like inflation, interest rates, and foreign exchange rate volatility (Rambo & Lucas, 2016) influence external debt repayment due to local and foreign currency mismatches. Additionally, changes in customer demand and tariff rates may lead to lower revenue, thus constraining debt repayment (Osiolo *et al.*, 2017).

1.2.5. A relationship between sovereign risk and large-scale infrastructure development

Large-scale infrastructure projects involve substantial financial investment by the central government. However, recent evidence suggests that Kenya struggles to mitigate sovereign risks due to the suboptimal economic growth contributions from its infrastructure development system (Onjala, 2018). Sovereign risk reflects the capacity and willingness to pay debt obligations (Eaton *et al.*, 1986). The significance of culture suggests that evaluating Kenya's vulnerability to economic and financial events based on the risk premium

investors demand to fund large-scale infrastructure development projects leads to omitted variables in most quantitative studies. It omits the role of socio-cognitive learning dimensions that influence this risk-taking. Several internal and external factors determine the risk premium due to Kenya's global interconnectedness through financial market linkages, external debt sources, exchange rate regimes, political stability, fiscal and monetary policy, credit ratings, global economic conditions, market sentiments, financial sector health, legal frameworks, and partial risk insurance instruments (Dang & Partington, 2020; Ho *et al.*, 2023). Recent evidence illustrates that national culture is a relevant socio-cognitive learning construct that increasingly influences sovereign risk (Ho *et al.*, 2023). Cross-country financial and economic comparative studies show that cultural factors influence sovereign credit rating changes and risk mispricing, discriminating against emerging markets due to investor herding (Morsy & Moustafa, 2020). Infrastructure project management studies show home-country culture influences managerial risk perception, communication styles, and decision-making (Liu *et al.*, 2015; Meng *et al.*, 2016). This role of national culture underscores the importance of culturally sensitive approaches in diversifying sovereign risk, particularly in multicultural teams involved in large Kenyan infrastructure project contexts. Understanding cultural nuances can lead to an accurate sovereign credit rating as a risk-free benchmark determinant when evaluating cross-border infrastructure risk premiums in emerging markets. It is important to account for the role of culture in these markets as one of the variables that influence limited information flow and transparency within nations.

Government creditworthiness influences infrastructure project creditworthiness because sovereign credit risk ratings influence infrastructure project-level risk ratings (Ho *et al.*, 2023). This effect may be severe in unrated infrastructure project risk evaluation due to high subjectivity. Despite improved macroeconomic fundamentals, empirical evidence by Morsy and Moustafa (2020) suggests a 2.9% upward sovereign risk mispricing for Sub-Saharan nations, including Kenya. Herding, characterised as behavioural convergence in a group (Shiller, 1995), blocks new information and innovative infrastructure lifecycle management in these countries, which heavily rely on counterparty ratings. The mispricing of sovereign risk can distort the benchmarks used to price infrastructure lifecycle risks, like sovereign bond yields or credit default swaps (Borensztein *et al.*, 2013; Ho *et al.*, 2023). When estimating political risk and interventions, there must be a distinction between sovereign risk and project-level management practices. A human-centred approach is proposed to track and evaluate the practice-based evolution of the relationship between sovereign risk and infrastructure development. It entails identifying, assessing, and quantifying sovereign risk exposures of infrastructure projects and stress-testing adverse scenarios using survey data, longitudinal secondary data and in-depth interview data to triangulate the research findings. The study focuses on four main variables: debt-side governance, project management, macroeconomic risk perceptions, and the slow-to-change cultural dimension of Kenya. For instance, Kenya's Mombasa–Nairobi Standard Gauge Railway (SGR) is a regional infrastructure project necessitating integrated lifecycle determinants, considering each East

African nation's capacity to manage such projects (CPCS Transcom International Limited, 2009). The current research emphasises the role of well-defined human-centred collaboration processes and procedures as key determinants of transparent and contract-enforced decision-making to prevent project progression without meeting key performance indicators and the targeted benefits (PricewaterhouseCoopers, 2014). It challenges the efficacy of standardised governance templates and legal frameworks in capturing contextual information loss through culture in identifying adaptive infrastructure lifecycle management frameworks.

Existing research underscores the influence of socially constructed private incentives in motivating cost underestimation, revenue overestimation, and misalignment of policy and infrastructure project goals (Flyvbjerg, 2007). Hence, the study emphasises forecasting realistic risk exposure using culture-mediated collaboration to mainstream human capital development objectives in the relationship between sovereign risk and infrastructure development. Sound monitoring, control, and reporting processes should integrate human-centred variables in decision-making models to show how the separation of power and decentralised national decision-making authority mitigate opportunistic managerial behaviour (Huang & Lesutis, 2023). While risk, uncertainty and ambiguity may be conflated along project lifecycles (Love et al., 2024), the thesis hinges on the findings of Gray & Ulbrich (2017), revealing that resolving relational risks, uncertainty or ambiguity through robust collaboration, information-seeking, and communication positively influences individual-level ambiguity intolerance, which can dislodge inefficient herding or information cascading.

1.3. Theoretical research gaps

The herding behavioural theory posits that people do what others do rather than use their private information (Raafat et al., 2009). This behaviour causes information loss in group-based decision-making because the insight from some managers does not join the public pool of knowledge. It means managerial incentives should foster information retrieval about the context in which an infrastructure development activity occurs to mitigate information loss. Chang & Lin (2015) validated this proposition by demonstrating that national culture determines herding motives. Morsy & Moustafa (2020) document problems of herd behaviour in the international public debt market where investors overlook political stability, institutional quality, and macroeconomic fundamentals, leading to a 2.9% sovereign risk mispricing for developing nations within Sub-Saharan Africa. Dorobantu & Müllner (2019) corroborate this finding, revealing that the geography of international infrastructure project finance syndicates is determined by the ability to influence politics, opportunistic creditor behaviour, and the flexibility to reorganise the syndicate if circumstances demand. These studies demonstrate that national culture constrains creditors' capacity to seek more information to understand borrowers. Infrastructure development managers may not efficiently utilise all the available sovereign and project information. Cultural constraints weaken collaboration, information-seeking, and communication, raising sovereign risk mispricing by up to 2.9% for Sub-Saharan African nations and

infrastructure implementation failures emerging from project risk management conflict (Liu *et al.*, 2015). However, the observed sovereign risk mispricing and suboptimal infrastructure development highlight unexplored within-country cultural tensions in Sub-Saharan Africa. This thesis addresses the underexplored area of sovereign risk diversification through large-scale infrastructure development in Sub-Saharan Africa at the managerial analysis level in a lower-middle-income nation, Kenya. It focuses on cultural values as a slow-to-change human-centred variable to elucidate how managers' psychological dependence on social groups redefines infrastructure development and sovereign risk outcomes. The goal of protecting one's reputational may be a defensive socio-cognitive learning motive influencing managers to reproduce the suboptimal practices that may have contributed to the elevated sovereign risk in Kenya. Existing studies have identified infrastructure lifecycle risks broadly categorised into external sovereign risk, debt-side governance, project management, and macroeconomic risk exposures (Onjala, 2018; Pueyo, 2018; Rambo & Lucas, 2016) but have not explained how the managerial capacity to address these risk exposures may also influence misunderstood sovereign risk nor have they proposed interventions. Quantitative research neglects the effect of the sociocultural variables in the Kenyan infrastructure context on sovereign risk (Wekesa *et al.*, 2016). The literature lacks empirical studies that applied an integrated social theory of expansive learning combining cultural-historical activity, herding behaviour, and affordance of formal governance to elicit how the Kenyan infrastructure development system might contribute to sovereign risks. This research aims to fill this gap and provide insights into how defensive culture-mediated managerial socio-cognitive learning in the infrastructure development system is herding that may fail to mitigate the elevated sovereign risk in developing Sub-Saharan African nations, offering human-centred interventions in the infrastructure design and implementation framework.

1.4. Research problem

The rising sovereign risk in developing Sub-Saharan African countries, partly due to poor infrastructure development outcomes, undermines human welfare (Brautigam, 2022). Hard infrastructure encompasses physical and visible assets providing essential services and enabling the movement of goods and people. In contrast, soft infrastructure comprises intangible systems and institutions shaping the economic and social environment (Ochieng *et al.*, 2020). Both types of infrastructure are vital for a well-functioning society and thriving economy, and they complement each other to achieve broader development goals. A mismatch between the rising external sovereign risk and infrastructure lifecycle performance has led to a debate on external sovereign debt sustainability as international investors adapt risk pricing strategies to contextual characteristics (Ho *et al.*, 2023). While some risk premium changes are attributed to factors like USD interest rate fluctuations, human-centred behavioural patterns have been identified as sources of overpricing infrastructure lifecycle development costs (Egli, 2020). Morsy & Moustafa (2020) showed that investor

herding has contributed to a 2.9% mispricing of sovereign risk premiums for developing Sub-Saharan African countries due to the loss of information signalling their political, economic, legal, regulatory and reforms. Dang and Partington (2020) used Hofstede's national culture framework to show that cultural and geographic distance affect sovereign risk ratings, revealing critical information loss is a persistent problem.

Moreover, Ho *et al.* (2023) used the same variables to show that culture-based subjective sovereign risk ratings spill over to financial and non-financial decision-making contexts. Mayfield & Mayfield (2012), Meng *et al.* (2016), and Liu *et al.* (2015) used similar variables in cross-country comparative studies to reveal that national culture influences infrastructure development outcomes, sustainability considerations, and contractor risk management behaviours. Sustainability is typically conceptualised as environmental, social, and governance (ESG) in determining sovereign risk ratings and counterparty risk in infrastructure risk ratings (Fitch Ratings, 2022b, 2023). However, context-specific forecasts do not elicit the sovereign risk emerging from the infrastructure development systems and mispriced sovereign risk premiums from a culture-mediated managerial socio-cognitive learning viewpoint, particularly in Kenya (Onjala, 2018). Extant studies highlighted cross-border infrastructure debt and project management challenges without explaining their vulnerability to contextual information loss underpinning sovereign risk premium changes (Kolstad & Wiig, 2011). Analytic methods are required to bridge these theoretical and empirical gaps and utilise sovereign risk premiums to forecast the long-term effect on infrastructure risk and how human capital development can be incorporated into the risk management framework to mitigate contextual information loss. While prior research has explored the relationship between infrastructure development and economic growth (Wekesa *et al.*, 2016), it has often overlooked the resulting sovereign risk premium and sociocultural information sharing behaviours yielding these outcomes. This research explains how infrastructure delivery influences sovereign risk, considering the cultural dimensions of appropriate debt-side governance, project management, and macroeconomic risk evaluation that can help policymakers and practitioners to dislodge defensive socio-cognitive learning motives. The study contributes to a comprehensive understanding of the mediating role of national culture in the embeddedness of managerial herding behaviour, and sovereign risk as dimensions of unsustainable human capital development in Sub-Saharan Africa, particularly in Kenya.

1.5. Research aim

The research aims to assess national culture as a moderator of the relationship between sovereign risk and infrastructure development as embedded outcomes of defensive socio-cognitive learning among managers. National culture is the proxy for herding. The research applies the national culture hypothesis to propose a human-centred infrastructure design and implementation framework with strategies to mitigate the negative effect of culture-mediated herding motives among managers on sovereign risk to improve the collaborative governance and performance of Kenyan renewable energy and transportation infrastructure projects.

1.5.1. Research objectives

The research objectives set to achieve this aim are:

1. To identify the key determinants of sovereign risk, debt-side governance, project management, macroeconomic risk, and culture in Kenyan renewable energy and transportation infrastructure projects
2. To examine the relationship between cultural and managerial demographics in Kenyan renewable energy and transportation infrastructure contexts
3. To assess how culture mediates and moderates the relationship between sovereign risk and the development of Kenyan renewable energy and transportation infrastructure projects.
4. Propose a human-centred infrastructure design and implementation framework.

1.5.2. Research questions

The key research questions presented are:

1. What determines sovereign risk, debt-side governance, project management, macroeconomic risk, and culture in Kenyan renewable energy and transportation infrastructure projects?
2. What is the relationship between culture and managerial demographics within Kenyan renewable energy and transportation infrastructure contexts?
3. How does culture mediate and moderate the relationship between sovereign risk and the development of Kenyan renewable energy and transportation infrastructure projects?
4. What is an optimal human-centred infrastructure design and implementation framework?

1.6. Scope of the study

The research covers public and private sector renewable energy and transportation (rail/road) projects with a total investment of \$100 million or more and at least 60% or more cross-border debt. The aim is to ascertain how infrastructure management influences sovereign risk moderated by national culture as an antecedent of managerial herding motives. It offers a cultural-historical activity theory of culture as the source of defensive socio-cognitive learning motives among managers to cope with debt-side governance, project management and macroeconomic risk evaluation constraints within and across these two sectors.

1.7. The novelty of the study

The novelty of the research study can be viewed from three perspectives:

- Theoretical contributions
- Practical contributions
- Policy contributions

1.7.1. Theoretical contributions

- **Theme 1: Implications for behavioural economics theory of sovereign risk mispricing:** This study employed Engeström's (2001) cultural-historical activity theoretical framework because it focuses on expansive learning at work. Hofstede's (2013) cultural framework and Gibson's (1979) affordances theory complement the framework by providing socio-cognitive constructs to measure herding motives. Hence, the study provides ecological evidence that culture influences sovereign risk diversification through infrastructure development by constraining managerial behaviour to reproduce old practices. Cultural constraints are antecedents of herding where managers perceive information asymmetry as constraints instead of opportunities to learn about the sovereign borrower. Hence, the study expands the scope of cognitive biases by revealing that culture is a socio-cognitive learning motives that amplifies anchoring, information framing, and overconfidence. It advocates recasting quantitative research findings into a human-centered activity analytic framework to enrich the contextual explanatory power of behavioural economics theory in designing and implementing culturally sensitive sovereign borrowing regulations and infrastructure investment evaluation tools.
- **Theme 2: Implications for infrastructure debt-side governance theory:** By integrating the four theories, the study enriches the debt-side governance theory by eliciting a borrower's behavioural perspective of governing managers in an infrastructure development activity through debt rules. It introduces national culture as an antecedent of herding into Engeström's (2001) activity system to demonstrate that the informativeness of managerial experiences about debt-side governance fails to yield transformative human capital and sovereign risk diversification improvements when some managers ignore their contrarian experiences for social inclusion. The findings inform collaborative managerial engagement to improve stakeholder engagement during infrastructure debt structuring and due diligence by leveraging cultural sensitivity as a socio-cognitive learning model to bolster thought diversity during decision-making. Sovereigns can benefit from considering how cultural values lead to accurate qualitative risk assessment and tailored debt management strategies.
- **Theme 3: Implications for infrastructure project management theory:** The study extends the theory by integrating four social theories to validate the practice-based project management theory integrating behavioural science and human-centred design principles. It reveals that herd behaviour undermines the benefits of learning from past project failures, innovation and people-centred risks. It identifies thirty-one culture-mediated socio-cognitive learning dimensions and interventions that can bolster collaborative learning to improve the governance and performance of managers in large infrastructure development projects. The study advocates culturally sensitive leadership, feedback loops for conflict resolution, training, and personal risk mitigation to enhance individual and team learning outcomes about infrastructure project planning, execution, and stakeholder engagement.

- **Theme 4: Implications for the macroeconomic risk theory:** The theoretical integration advances macroeconomic theory by confirming that shared culture in the borrower's infrastructure context influences cross-border engagement through the capacity of managers to participate in generating contextual information. It integrates the behavioural economics herding theory with human-centred design principles to demonstrate that mainstreaming green development policies in infrastructure projects should consider cultural dimensions of tolerating ambiguity as determinants of managerial capacity to adopt a new policy or technology. Beyond the cross-country comparatives analysis, the study offers an in-country culture analysis to understand how socio-cognitive learning influences the perception of macroeconomic risk trends among managers in a lower-middle-income country.

1.7.2. Practical contributions

- **Human-centred risk management practices:** This study emphasises integrating cultural factors into sovereign risk assessment frameworks. Insights into cultural constraints as antecedents of managerial herding aid informed investment decisions, refine human capital management strategies and encourage cultural due diligence in evaluating evolving investment frameworks. The proposed multi-dimensional KPIs (qualitative and quantitative) corroborate a balanced scorecard for tracking and evaluating managerial performance across financial, operational, and developmental impact.
- **Human-centred infrastructure project management:** The study has proposed a framework to guide managers to integrate cultural sensitivity into infrastructure project management practices to mitigate information loss and innovation stagnation within teams when some managers engage in herding, improve stakeholder engagement, and resolve conflict while preserving differing values. Cultural sensitivity can help managers adapt communication, provide authentic leadership training, and preserve team dynamics through collaborative and adaptive project management practices. The proposed interventions encourage knowledge sharing within the project organisation, ensuring that the best managerial practices and lessons learned are disseminated across all levels.
- **Implications for human-centred infrastructure design and implementation:** The study has proposed a human-centred infrastructure design and implementation framework with describable and measurable KPIs for tracking managerial creativity, innovation and information loss channels. It advocates identifying cultural constraints to gender diversity and inclusive decision-making, information loss due to personal risk mitigation motives, transparent communication, due diligence, and stakeholder engagement. Boards can benefit from the 31 socio-cognitive learning dimensions to identify managerial behaviour under cultural constraints to design culturally sensitive incentive structures. They can evaluate managerial collaboration, adaptability, capacity building, regulatory compliance and best practice sharing using the 16 KPIs of human-centred development and project

risk. Organisations can use the proposed interventions to dislodge moral hazards from managers by aligning quantitative KPIs with qualitative KPIs of human-centred governance to support policy.

1.7.3. Policy contributions

The proposed human-centred infrastructure design and implementation framework guides policymakers in promoting people-centred learning incentives and innovation to mitigate information loss when some local managers engage in herding and improve the governance and performance of infrastructure projects. The 31 dimensions of socio-cognitive learning and 16 KPIs for evaluating human-centred development in the relationship between infrastructure development and sovereign risk provide rigorous academic theoretical support for Vision 2030, Local Content Act (2023) and SDGs, which uphold people-centred governance, gender diversity, inclusive decision-making and preserving culture. Integrating the behavioural science theoretical concept of herding with human-centred design principles in framework development grounds the recommendations in scientific theory and empirical evidence, leveraging four social theories and managerial experiences to offer culturally sensitive approaches to SDG 7 (universal access to affordable, reliable, sustainable energy) and SDG 9 (building resilient, inclusive, and sustainable infrastructure). It responds to the call to enhance the infrastructure development risk framework with human-centred variables (Gregory & Sovacool, 2019) to identify and measure “soft infrastructure development outcomes” (Kolstad & Wiig, 2011) in developing nations by leveraging collaborative research between academia and industry.

1.8. Research approach

This study employs the theoretical lens of cultural-historical activity to elucidate herding as a defensive culture-mediated socio-cognitive learning motive of managers in the infrastructure development context that influences sovereign risk outcomes. By embracing a pragmatic paradigm, the research used a sequential explanatory mixed-method approach, including quantitative (questionnaire survey and secondary data) and qualitative (in-depth interviews) methods. Participants from seven flagship Vision 2030 renewable energy, rail, and road transportation projects were involved. Quantitative data from the survey and archival sources offered a two-step analysis. Archival data, longitudinally analysed, reveals how the infrastructure lifecycle system influences sovereign risk premiums over time and in diverse economic contexts. The findings were integrated using Hofstede’s (2013) culture typology, illuminating the role of culture as an antecedent of herding and sovereign risk creation within Kenya’s infrastructure lifecycle development system.

1.9. Key findings of the research study

The socio-cognitive learning motives of managers drive group psychology, which weakens the relationship between sovereign risk and infrastructure development. As established in this research study, the cultural orientation of managers within Kenya and the cultural distance between Kenya and the country of origin of its lenders may moderate the relationship between sovereign risk and infrastructure development through

managerial herding behaviour. While the two effects are positively related, they are distinct constructs motivating defensive socio-cognitive learning among managers of herding. The thirty-one socio-cognitive learning dimensions that the study identified suggest that the zone of proximal development of managers depends on the weight that they place on the behavioural pooling effect of formal governance tools and cultural constraints. Culture may redefine subjects, rules, the community, and the division of labour through socio-cognitive learning motives. The results are robust for Kenya's multiple infrastructure debt governance, project management, and macroeconomic risk scenarios.

It was further found that high power distance, masculinity, and long-term orientation potentially lead to herd leaders who influence the strength and direction of herding towards international market consensus on sovereign risk. While this is rational for them because other decision-makers in the market may have some important information, overreliance on the market consensus is problematic because it is susceptible to ignoring fundamental information. Hence aligning risk perspectives with the market could be attributed to the high likelihood of managers with these cultural orientations embodying authoritative decision-making and embracing risk, ambiguity, or uncertainty in the infrastructure development context. These attributes can foster expansive learning by increasing the adoption of innovative infrastructure development practices. However, their overconfidence tendencies have implications for elevating herding and risk exposures.

Conversely, high ambiguity intolerance, collectivism (low individualism), uncertainty avoidance, and restraint (low indulgence) will likely lead to herd followers or early informed managers who influence the strength and direction of herding away from market consensus and towards in-group objectives within the infrastructure development context. It may be attributed to the high likelihood that managers with these cultural orientations will ignore global risk knowledge structures and embrace local risk, ambiguity, or uncertainty management strategies. These managerial characteristics may be adept at implementing agile, hybrid, or adaptive infrastructure development frameworks. The strong desire to embrace local risk, ambiguity, or uncertainty strengthens herding and information cascading away from the global context. It can boost expansive learning by reinforcing their ability to adopt innovative infrastructure management practices with implications for the dislodging of inefficient market-driven herding and sovereign risks.

1.10. Structure of the thesis

Chapter One

This chapter presents the research problem and an overview of how the question is answered via culturally responsive interventions to improve the link between sovereign risk and infrastructure development.

Chapter Two

This chapter reviews the empirical literature on sovereign risk determinants, debt-side governance, project management, and macroeconomic risk in large infrastructure projects, comparing findings from Kenya, Sub-Saharan Africa, BRICS, and global contexts.

Chapter Three

This chapter contextualises the study within the cultural-historical theory, exploring sociocultural factors mediating the relationship between sovereign risk and the large-scale infrastructure development system. It justifies integrating cultural activity and behavioural finance theories to address the research question.

Chapter Four

This chapter outlines philosophical assumptions and methodology, including surveys, secondary data, interviews, sampling, analysis, and ethical considerations.

Chapter Five

This chapter presents the quantitative research findings.

Chapter Six

This chapter presents the qualitative findings, explaining key themes from inductive interviews and observational data analysis.

Chapter Seven

This chapter integrates quantitative and qualitative findings to elicit how culture-mediated psychological dependence on social groups moderates the link between sovereign risk and infrastructure development.

Chapter Eight

The chapter proposes a human-centred infrastructure design and implementation framework.

Chapter Nine

This chapter discusses theoretical contributions and implications for academia, policymaking, and management practice, addresses limitations, and offers future research recommendations. Figure 1-1 illustrates the explanatory sequential mixed-method research design approach.

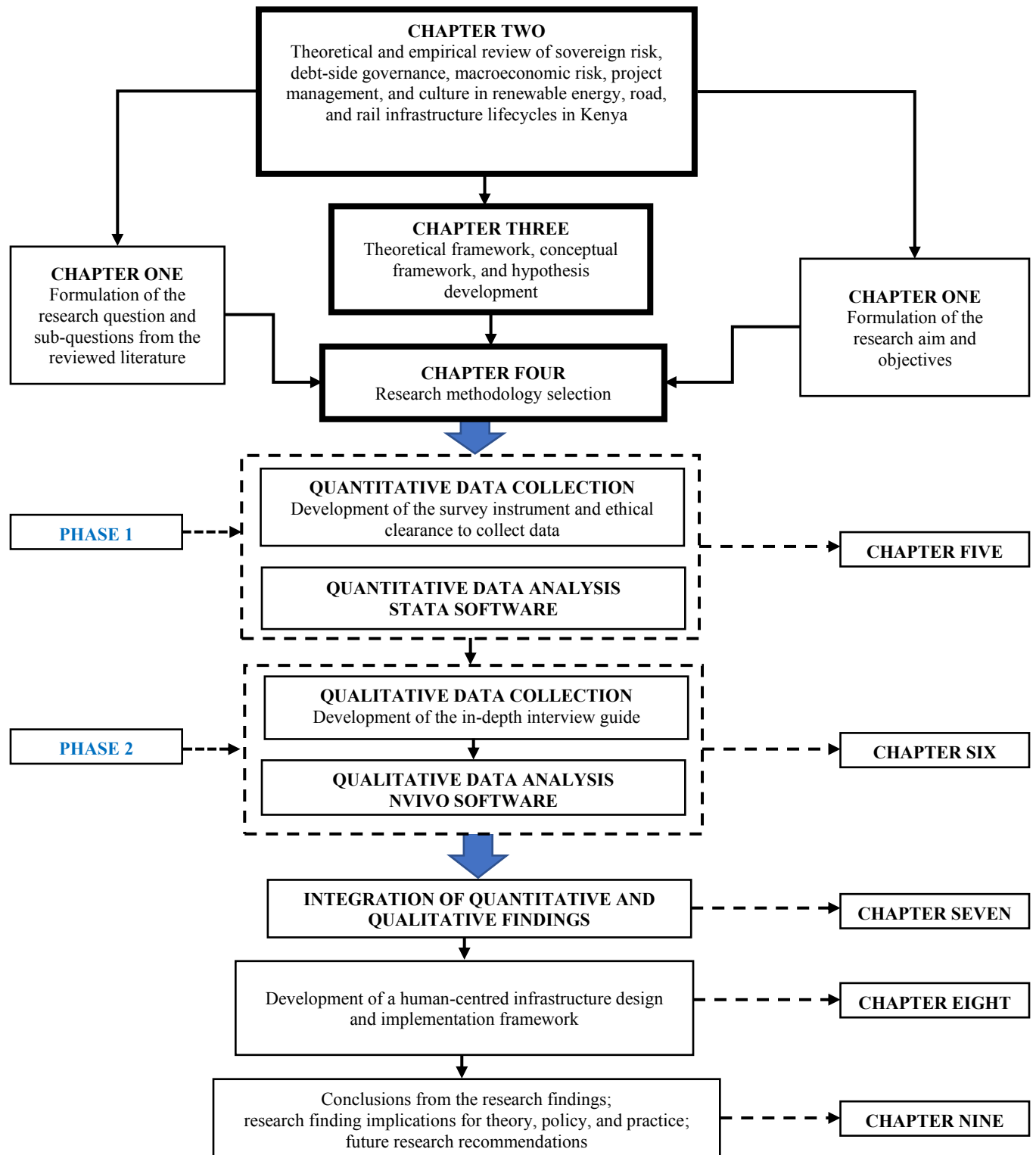


Figure 1-1: The explanatory sequential mixed-method research design

Source: Author (2023)

1.11. Chapter summary

This chapter established the research context, identified the problem and gaps in the literature, and outlined the study's objectives. It introduced the borrower's perspective into the debate on sovereign risk mispricing, highlighting the moderating influence of culture as defensive socio-cognitive learning motives when managers engage in herding that can elevate sovereign risk creation in the infrastructure design and implementation system. Based on this theoretical gap, the research aims to propose a human-centred infrastructure design and implementation framework that addresses psychological dependency on social groups, potentially mitigating the negative influence of managerial herding on sovereign risk. Chapter Two reviews relevant theoretical and empirical literature on sovereign risk, debt-side governance, project management, macroeconomic risk, and national culture, focusing on infrastructure lifecycle development.

Chapter Two: Review of the Relationship Between Sovereign Risk and Large-scale Infrastructure Development Activity

2.1. Introduction

The chapter reviews relevant literature to appraise national culture as a defensive socio-cognitive learning construct that mediates the relationship between sovereign risk and large-scale infrastructure lifecycle development through managerial herding and information cascading. It is divided into five sections:

- Part I: Overview of Kenya and the Vision 2030 infrastructure development blueprint
- Part II: A synopsis of infrastructure lifecycle management theory, focusing on the Energy Act 2019 and the Integrated Transport Policy
- Part III: A review of management studies across infrastructure lifecycles in Kenya
- Part IV: A review of management studies across infrastructure lifecycles in other regions:
 - Sub-Saharan African analysis level
 - Brazil, Russia, India, China, and South Africa (BRICS) analysis level
 - global analysis level
- Part V: Comparison of reviewed studies and categorisation of the research gap

2.2. Part I: Overview of Kenya and Vision 2030 infrastructure development blueprint

2.2.1. Vision 2030 infrastructure development blueprint

Kenya's Vision 2030, established in 2007, aimed to transform the country into a globally competitive and prosperous nation with a high quality of life by 2030 (Kenya Vision 2030, 2007). However, as of 2023, Kenya faces challenges in achieving this vision, primarily due to fiscal constraints and talent shortages slowing the development of world-class infrastructure systems (Onjala, 2018). One of the key objectives was to enhance infrastructure investment with private sector involvement (Hope, 2010). In this study, infrastructure investment encompasses debt and management commitments that have achieved financial closure and served the public, excluding movable assets and projects with budgets below \$100 million (Esty, 2004). Large infrastructure development covers construction, operation and management contracts with capital expenditures exceeding \$100 million, greenfield projects, and divestitures. Investment commitments comprise resources allocated to building new facilities or upgrading existing infrastructure. Data is reported based on the investment year and current exchange rates (the last day of the reporting period). Figure 2-2 illustrates some major Vision 2030 infrastructure development policy instruments.

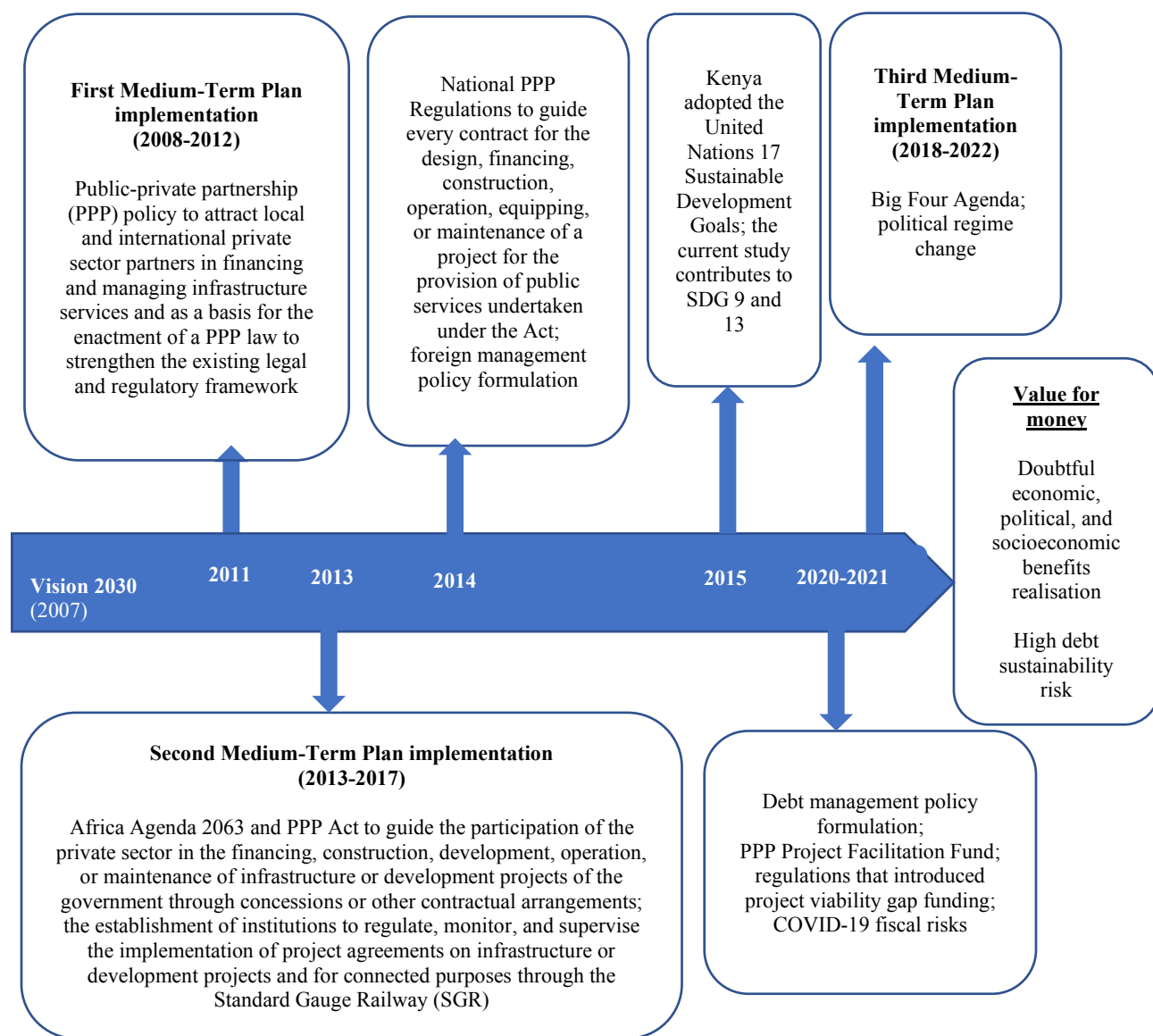


Figure 2-1: Major Vision 2030 infrastructure development policy guidelines

Source: Adapted from policy documents (2008-2021)

Vision 2030’s infrastructure policy design and implementation strategies encompass multiple dimensions, including sustainable energy resource management, land use reforms, human capital development, security enhancement, and fostering scientific innovation. The agenda is oriented towards lowering energy costs, improving efficiency through utilising geothermal, coal, and renewable energy sources, and establishing regional energy connections (Kenya Vision 2030, 2007). Land use law reforms and expedited land dispute resolution mechanisms are fundamental to infrastructure progress. Human capital development focuses on continual education and training to raise labour productivity in the infrastructure development context to international standards and foster industry-academic collaboration. Addressing internal security involves

adopting information communication technology to decrease infrastructure management costs caused by vandalism through crime prevention. Investing in science, technology, and innovation entails allocating research resources and enhancing workforce technical skills through science, technology, and mathematics (STEM) education quality across educational institutions, including polytechnics and universities (Kenya Vision 2030, 2007). These multifaceted human capital development strategies reflect the KPIs of soft infrastructure development that determine hard infrastructure development in advancing Vision 2030.

The Vision 2030 initiative prioritises economic growth through its economic pillar, which aims to achieve a 10% annual GDP growth by focusing on six key sectors: tourism, agriculture and livestock, wholesale and retail trade, manufacturing, financial services and business process offshoring, and ICT-enabled public service delivery (Kenya Vision 2030, 2007). Simultaneously, the social pillar aims to enhance the quality of life for individuals by addressing various human and social welfare infrastructure programmes across eight sectors: education and training, health, water and sanitation, environment, housing and urbanisation, gender, youth and sports, and culture. Notably, the social pillar also highlights the importance of inclusivity by catering to individuals with disabilities and historically marginalised communities in policy design and implementation.

Moreover, the political pillar envisions establishing a democratic political system that is people-centred, results-oriented, and accountable to the public (Kenya Vision 2030, 2007). This pillar seeks to create a state characterised by equality and diversity, regardless of race, ethnicity, religion, gender, or socioeconomic status. It underscores embracing and harnessing the population's diverse values, traditions, and aspirations for the collective benefit. To ensure the sustainability of the economic, social, and political gains made under Vision 2030 amidst potential political regime changes, the initiative's leaders commit to nine key governance principles (Kenya Vision 2030, 2007). These principles encompass constitutional reform, upholding the sovereignty of the people, promoting gender equality, adhering to national values, goals, and ideology, establishing a comprehensive bill of rights, fostering a viable political party system, encouraging public participation in governance, and promoting the separation of powers while decentralising national decision-making authority to foster inclusivity and stability in Kenya's future development. More recently, Kenya enacted the Local Content Act (2023) as a framework to guide establishing a monitoring, evaluation and reporting system in implementing human-centred capacities and capabilities.

Just over a decade after the inception of Vision 2030, estimates from the African Development Bank (2019) revealed an infrastructure financing gap of approximately \$2.1 billion annually in Kenya. The realisation of Vision 2030's ambitious goals necessitates the sustained yearly expenditure of nearly \$4 billion. However, relying solely on public resources to bridge this gap is inadequate, given the current public debt-

to-GDP ratio of 69% as of June 2022, closely approaching the sovereign debt-to-GDP policy limit of 70% (Public Debt and Borrowing Policy, 2020). This elevated sovereign risk might lead to a decline in Kenya's creditworthiness, in contrast with its position in 2011 when the public debt-to-GDP ratio was 53.4%. Considerable uncertainty surrounds the economic impact of new infrastructure projects. The escalated sovereign risk profile has the potential to amplify infrastructure risk premiums and hinder international market accessibility. While many studies have identified risks associated with infrastructure development, no conceptual model currently exists to enable managers to understand how their capacity to address risks collaboratively is an essential soft competency that can complement the government's efforts in identifying what to change and how to support them in mitigating emerging infrastructure risks. The current study addresses this research gap by proposing a human-centric infrastructure design and implementation framework to advance Vision 2030's people-centric and results-oriented governance.

2.2.2. Economic growth

According to the World Bank country income classification for 2022-2023, Kenya falls into the lower-middle income category, with gross national income (GNI) per capita ranging from \$1,086 to \$4,255 (World Bank, 2023). This income level has persisted for 8 years since Kenya achieved this status in 2014, indicating a consistent economic well-being within this range. Kenya's GDP growth has averaged 5%, falling short of the targeted 10%. As shown in Table 2-1, real gross domestic product witnessed a 2.6% growth in 2021, rebounding from a 2020 decline due to strong macroeconomic fundamentals, increased agricultural production and accelerated manufacturing, transportation, and vibrant service sector. Quality infrastructure projects' timely completion and budget adherence are crucial for achieving the desired 10% growth rate, given the country's diversified economy with significant agriculture, tourism, and mining contributions. Table 2-1 summarises the key economic growth indicators from 2011 to 2021.

Table 2-1: Economic growth risk (annual averages)

Economic growth	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
GNI per capita	1010	1060	1130	1260	1330	1500	1550	1730	1890	1900	2080
GNI per capita growth (annual %)	4.85%	1.02%	0.58%	3.07%	4.07%	11.51%	1.03%	3.94%	2.96%	-2.37%	5.69%
Real GDP growth rate per capita	3.33%	1.95%	3.37%	2.97%	3.42%	1.94%	1.58%	3.50%	2.92%	-2.30%	2.69%
GDP growth rate	5.12%	4.57%	3.80%	5.02%	4.97%	4.21%	3.84%	5.65%	5.11%	-0.25%	7.52%

Source: National Treasury (2023)

An earlier report by the World Bank Group (2019) on Kenya's economic outlook stated that the major development challenges include the macroeconomy's vulnerability to internal and external shocks, poverty, socioeconomic inequality, climate change and weak private sector investment.

2.2.3. Political administration structure

Adopting the Constitution of Kenya in August 2010 marked a key shift towards decentralising power and resource allocation to the 47 new counties (Constitution of Kenya, 2010). This transformation aimed to enhance governance and regional development by reducing centralisation in specific sectors. As defined by Kaufmann *et al.* (2009), governance encompasses the traditions and institutions through which a country exercises authority, including the selection, monitoring, and replacement of governments; policy formulation and implementation capacity; and respect for governing institutions by citizens and the state. According to the World Bank Group (2022) report, Kenya's economic progress and political gains have been sustained since the constitution's adoption. However, the decentralisation of governance, particularly in the energy and transportation sectors, has led to challenges such as bad governance practices, ambiguous resource allocation practices, and unclear lines of responsibility and accountability (Onjala, 2018; Otieno, 2023), negatively impacting Kenya's economic and developmental trajectory. Governance focuses on three significant dimensions: 1) the accountability of the executive to oversee institutions, 2) the accountability of public employees for their performance, and 3) civil society's access to information on public affairs. It explores the concept of state capture by narrow vested interests as a critical lens for assessing the impact of decentralisation on sustainable infrastructure governance, project management, and regional development.

2.2.4. Environment, social and governance

The Constitution of Kenya (2010) upholds infrastructure funding and development methods that mitigate environmental, social, and governance risks by requiring "social impact assessment". Social impact assessment analyses how a proposed activity, project, or plan influences the community and environment (Omenge *et al.*, 2022). It includes, without limitation, how people cope with life through their economy, social systems, and cultural values. People use the natural environment for subsistence, recreation, and spiritual and cultural activities. They use the built environment for shelter, livelihoods, industry, worship, recreation, and gathering. Social and cultural institutions and beliefs communities value as expressions of identity determine community organisation and hold people together. Strategic environmental assessment in infrastructure project finance and development means a formal and systematic process to analyse and address the environmental effect of policies, plans, programmes, and other strategic initiatives. The Constitution of Kenya (2010) recommends resilient infrastructure designs and technologies to counter climate change. Kenya must steadily measure the rising carbon emission per capita to align infrastructure development technologies with its emission reduction goals to sustain its low-carbon economic transition momentum through infrastructure projects to meet its Vision 2030 environmental goals.

2.2.5. Population and demographic overview

The United Nations Development Programme (2022) statistics on the Human Development Index (HDI) indicate that Kenya ranked at 0.58 points in 2020, placing the country 152nd out of 191, a decline from the 0.59 score in 2017. The sustainable development goals (SDGs) are life expectancy at birth (SDG 3), expected years of schooling (SDG 4), mean years of schooling (SDG 4), and gross national income (GNI) (SDG 8). Education reflects transcending socioeconomic status and demonstrating one's abilities (Hofstede *et al.*, 2010). Although Kenya has achieved gender parity in primary education enrolment, it ranks low to medium on HDI (United Nations Development Programme 2022). Primary education entails the evolving scientific, technological, and engineering world. Technical skills shortfalls make Kenya depend on cross-border talent for heavy engineering infrastructure projects (Ndiritu & Engola, 2020). It has "local content" policies to add value from infrastructure activities to the Kenyan economy by systematically developing national capacity and capabilities and investing in developing and procuring local workforces, services, and supplies. Advanced education comprises short-cycle tertiary education, a bachelor's degree or equivalent education level, a master's degree or equivalent education level, or a doctoral degree or equivalent education level. The rural population accounts for 73% of the population.

2.3. Part II: A synopsis of infrastructure lifecycle management theory

Infrastructure lifecycle management delineates decisions, timing, and resources linked in a process that leads to a certain result within a pre-set time. It has five phases: 1) initiation, 2) planning, 3) execution, 4) monitoring/control, and 5) closure (Association for Project Management, 2019). While this systematic process can efficiently transform Kenya's Vision 2030 into distinct, high-level infrastructure deployment to mitigate the emerging sovereign risk in large-scale novel infrastructure projects, the managerial ability to adapt lifecycle management frameworks to context has emerged as the complex. Different management approaches can be used to deploy infrastructure projects simultaneously depending on the targeted user benefits, technological uncertainty, and risk. The Association for Project Management (2019) proposes three primary lifecycle management frameworks suitable for managing the complexity of constructing new and upgrading existing infrastructure systems in Kenya, as shown in Table 2-2.

Moreover, two emerging approaches, incremental and evolutionary, seem relevant to infrastructure debt and lifecycle management. The incremental approach involves staging a series of smaller lifecycles to achieve the target state. The evolutionary one involves deploying several major transitions based on user feedback from the preceding phase. There is no universal best approach. Management professionals select the most suitable model for the infrastructure context, often combining features from the linear into a hybrid lifecycle. Stalled and failed projects evoke complexity in infrastructure lifecycle decision-making with sovereign risk implications, as discussed in Section 2.3.1.

Table 2-2: A synopsis of infrastructure lifecycle management theory

Lifecycle	Description
Linear (waterfall)	Lifecycles are sequenced into distinct phases, from developing the initial concept to deploying an outcome, output, or benefits. This approach aims to be highly structured, predictable, and stable.
Iterative (agile)	Lifecycles are composed of several iterations, which repeat one or more phases before proceeding to the next one. Iterative approaches can only proceed when user feedback is available for initiating new development, refinement, and improvement cycles.
Hybrid lifecycle	Lifecycles typically fuse elements to create a new model or approach. For example, iterative or agile methods can be used for early requirements gathering, where the uncertainty is greatest, and following up with incremental or sequential processes to formalise deployment.

Source: Association for Project Management (2019)

2.3.1. Herding, information cascade and the sovereign risk premium for infrastructure projects

The synopsis of infrastructure lifecycle management theory suggests that the managerial capacity to select an appropriate approach justifies understanding how soft competencies influence the relationship between sovereign risk and the infrastructure development system. Consequently, the herding hypothesis is widely acknowledged as a suitable lens to elicit the socio-cognitive learning motive of managers. It suggests that individuals in decision-making tend to follow a larger group's actions or the behaviour of those perceived as leaders rather than relying solely on their information or analysis, even if group choices are not rational or well-informed (Shiller, 1995). The difference between herding and information cascade is that, in a cascade, early decision-makers influence subsequent individuals to disregard their information if they assume the earlier actions were based on superior knowledge (Bikhchandani *et al.*, 1992). The motive for both behaviours is to mitigate reputation risk, which is the main focus of the current study. It is widely acknowledged within empirical studies that these motives emerge from shared cultural values and norms that individuals acquire early in life in the family and education system and the perception that others have superior knowledge (Chang & Lin, 2015). Hence, the term herding will be used for both concepts in the remainder of the chapters. The problem is that herding is defensive socio-cognitive learning that limits managerial capacity to challenge the infrastructure project management practices that have contributed to the elevated sovereign risk due to social norms or perceived ignorance.

A sovereign risk premium is the additional yield investors demand relative to a risk-free government bond benchmark for perceived risk in Kenya because it is a lower-middle-income country. A spillover effect refers to the impact of sovereign risk premium changes on financial and non-financial decision-making in other sectors. It is useful in evaluating the influence of Kenya's creditworthiness on the risk premium for pricing its infrastructure project management risk (Fitch Ratings, 2023). The influence of infrastructure

development on economic growth establishes the managerial capacity to select appropriate infrastructure lifecycle management approaches as a determinant of sovereign risk in Kenya, where the government's external debt is largely in US dollar-denominated instruments. Moreover, the sovereign risk mispricing emerging from investor herding (Morsy & Moustafa, 2020) reveals that socio-cognitive learning methods have traditionally influenced the decision-making outcomes of creditors and borrowers as distinct groups. Due to its slow-to-change nature, national culture (Hofstede, 1980) is a widely acknowledged empirical construct (Chang & Lin, 2015) for measuring herding as defensive socio-cognitive learning. Defensive socio-cognitive learning focuses on avoiding reputational risk by herding instead of challenging existing norms or adopting innovative management practices that could improve the infrastructure portfolio risk.

Markowitz (1952) introduced portfolio theory, which forms the basis for understanding how renewable energy and transportation sector managers decipher infrastructure investment risks. Kenyan authorities have issued bonds and bilateral and multilateral loans that mimic international market risk assessments and preferences while guaranteeing loans for critical infrastructure development projects in its Vision 2030 (Annual Public Debt Management Report, 2022). While the borrowing strategies indicate the government's commitment to supporting infrastructure projects to mitigate the negative consequences of default, no conceptual framework currently exists to elicit the reciprocal effect of managerial practices. However, the herding concept means that preserved cultural values may influence how Kenya's recently decentralised decision-making mediates the dialectic relationship between the perceived sovereign risk and infrastructure development if managers disregard their knowledge and follow group decisions in and outside Kenya. There is a contextual information loss risk if decisions are based on incomplete or inaccurate sovereign risk information (Morsy & Moustafa, 2020). A cascade of sovereign risk mispricing information may sustain a false belief that influences infrastructural loan negotiation and lifecycle risk management (Onjala, 2018).

Recent theoretical and empirical research attributes the international public debt market bubbles, speculative frenzies, and the amplification of sovereign risk rating (Dang & Partington, 2020), spillover effect (Ho *et al.*, 2023), and sovereign risk mispricing to investor herding (Morsy & Moustafa, 2020). However, there is limited evidence of managerial herding as a psychological dependence on social groups at the intersection of sovereign risk and infrastructure development. The herding hypothesis is relevant in evaluating the link between sovereign risk and the infrastructure development system. One can validate that shared cultural values influence managers to base their infrastructure development decisions on the choices of others rather than conducting thorough sovereign risk analyses as key government advisors. This behaviour may have impacted how cross-border infrastructure projects were funded, managed, and executed, potentially leading to observed poor outcomes. Understanding herding motives can help show

how in-country social network dynamics determine sovereign risk as collective decision-making motives within Kenyan multicultural infrastructure projects. Kenya has 43 ethnic communities that practise different cultures, making it a multicultural context.

Moreover, infrastructure investments are integral to achieving Kenya's targeted 10% economic growth. Solow's (1956) neoclassical growth theory, also known as the Solow-Swan model, emphasises the role of labour, capital, and technology in economic growth. According to the theory, economic output is produced using these three factors, and long-term economic growth can be sustained primarily through technological progress. The labour construct suggests that the workforce contributes to economic output. An increase in labour, whether through population growth or higher labour force participation, can lead to higher output. Investments in physical capital, such as infrastructure systems, enhance productive capacity because more capital allows for more or better production, contributing to growth. Technological advancements improve the efficiency of production processes and increase output without requiring proportional increases in labour or capital. Although Solow's model highlights the importance of labour, capital, and technology, achieving a 10% economic growth target through infrastructure development would depend on how effectively these factors are utilised and how they interact within the economy. Recent evidence suggests managers in Kenya perceive the macroeconomic environment as unfavourable due to an elevated sovereign risk, uncertainty and ambiguous policy. Gray & Ulbrich (2017) found ambiguity acceptance and translation skills as the most critical 'soft' managerial traits in achieving project success more than "technical skills", such as planning and scheduling. This evidence implies that Kenya should shift towards understanding how its human capacity drives selecting the right infrastructure projects and low-cost lifecycle development strategies, considering herding motives may preserve suboptimal practices.

Recent models demonstrate that Kenya's ESG framework explicitly considers climate change, culture and natural resource availability, which increasingly influence sovereign risk ratings (Fitch Ratings, 2022b). Environmental risks like climate change raise political and fiscal risks through hydrocarbon product demand shifts and prices (Gatti, 2013). ESG has been integrated into sovereign risk premium analysis to assess how governments address socioeconomic inequality and promote sustainable development goals (Moody's Investors Service, 2022). Social considerations encompass demographics, income distribution, education, housing, health, and access to basic services. These human-centred factors significantly affect sovereign creditworthiness, economic strength, and governance effectiveness (Hofstede *et al.*, 2010). Demographic trends, like rapid ageing, can impact fiscal policies and infrastructure spending. Social risks are closely tied to political risks and may affect government liquidity risk and increase infrastructure project costs due to public opposition (Fitch Ratings, 2022b). People-centric governance structures are pivotal in mitigating sovereign risk exposures by acknowledging the role of informal structures in preserving culture

(Stulz & Williamson, 2003). Strong governance enhances sovereign risk resilience, fosters economic growth, and improves fiscal strength, contributing to higher issuer profile scores (Cantor & Packer, 1996).

Kenya's efforts to stimulate infrastructure bond financing could impact its sovereign ratings, which have faced downward pressure recently (Fitch Ratings, 2022a). Kenya's reliance on foreign debt exposes it to currency transfer and convertibility (Longstaff *et al.*, 2011) risk. In certain cases, the infrastructure project risk rating may surpass the sovereign rating due to better governance and lifecycle management. Still, this information is not public (Fitch Ratings, 2022b), including offshore structuring or partial political risk guarantees. The literature suggests that portfolio theory, economic growth, and ESG considerations are pivotal in assessing and pricing the sovereign risk and infrastructure development landscape. Recognising how managers perceive these determinants is important for policymakers and investors to make informed decisions regarding infrastructure investments and implications for Kenya's creditworthiness. The current research offers insights into herding as defensive socio-cognitive learning by focusing on how managers perceive infrastructure debt-side governance, macroeconomic risk, and project management practices.

2.3.2. Debt-side governance in infrastructure lifecycles

Williamson (1979) introduced the transaction cost theory, which explains the governance of contractual relationships through debt. As a governance mechanism, debt offers advantages and potential risks. Debt can bolster government accountability and fiscal discipline (Triantis & Daniels, 1995). This increased accountability can lead to better governance practices, including transparent budgeting, efficient resource allocation, and improved collaboration in enhancing financial oversight (Onjala, 2018). Sovereign rating agencies assess the waterfall ranking, refinance risk, financial profile, covenants, counterparties, and liquidity of an infrastructure project to determine default protections (Fitch Ratings, 2023). Financial flexibility throughout the infrastructure project lifecycle influences liquidity profiles and overall leverage. Kenya employs diverse financing methods, including bank loans, private debt placement, and public institutional investor capital markets, to diversify risk in its infrastructure projects.

Mismanaged or excessive debt-to-equity ratio accumulation may elevate borrowing costs or limit access to affordable debt (Mpapalika & Malikane, 2019). While the private market expansion for infrastructure debt alleviates fiscal pressures on governments, each market type carries distinct risks that may not suit all projects, necessitating careful consideration of organisational, legal, and economic factors. Kenya has employed public guarantees and credit enhancements to improve the creditworthiness of infrastructure projects to attract more international investors (Fitch Ratings, 2023). Striking the right balance between risk guarantees and credit enhancements can enhance infrastructure and sovereign debt management. Despite sovereign risk being a transaction cost benchmark for infrastructure developers, a within-country sovereign

risk puzzle is less prevalent in most studies, considering Williamson's (2000) concept of culture as “institutions of embeddedness” in transaction cost economics. It argues that in many interactions, “transaction costs” arise because of the bounded rationality and opportunism of the transacting parties. Depending on the attributes of the particular transaction of interest, some sets of rules “governance structures” will govern transactions more efficiently than others, leading to the emergence of the most efficient institutional forms (those which minimise transaction costs) to achieve an optimal “match” with a particular transaction called the “discriminating alignment” hypothesis. Essentially, the hypothesis refers to organisations or individuals selecting debt-side governance structures that discriminate among sovereign infrastructural transactions based on their specific attributes. History suggests that infrastructure debt performs better during crises due to structured transaction protections and the availability of revenue streams (Moody's, 2019). There is a need for a human-centred conceptual framework and the specificity of variables positively influencing the relationship between infrastructure debt-side governance and sovereign risk perception as in-country discriminating alignment that can emerge from herding motives.

This study focuses on debt structures related to public-private partnerships (PPPs) and public projects. PPPs involve contracts between public and private firms, often without recourse to sponsors and shareholders (Yescombe, 2011). The limited recourse feature of PPP financing enhances resilience during economic downturns, as lenders' claims are restricted to project assets, guarantees, and bonds. Using debt as a governance tool is essential to boost sustainability and long-term economic stability. Ring-fencing cash flows reduces managerial discretion, resulting in higher debt-to-equity (Gatti, 2013). Non-guaranteed project loans help keep government liabilities off the balance sheet but may impact taxpayers and users as guarantors (Klein, 1997). The build-operate-transfer (BOT) model allows governments to maintain fiscal space for other investments while keeping infrastructure debt off-balance. Fiscal space represents available sovereign debt capacity influenced by public finance laws and international market constraints. However, using BOT to hide infrastructure debt off-balance sheet may obscure actual liabilities and diminish public debt monitoring effectiveness (Klein, 1997). Careful loan agreements must delineate stakeholder risk-return relationships to mitigate debt maturity and lifecycle management risks. While debt payment grace periods can incentivise better governance, excessively demanding conditions, policy constraints, or unsustainable debt burdens pose lifecycle debt servicing risks.

In summary, debt is a crucial governance tool in infrastructure projects, offering benefits such as increased accountability and fiscal discipline. However, balancing debt use with sustainability is vital, considering factors like market discipline, credit enhancements, debt-to-equity ratio, maturity, grace period, currency convertibility, and interest rate change determinants within and outside the country. Careful consideration of these factors can bolster responsible infrastructure project governance outcomes.

2.3.3. Macroeconomic risk in infrastructure lifecycles

Gatti (2013) states that macroeconomic risks are systematic events with far-reaching implications for infrastructure debt and the management of projects over their lifecycles. These risks include economic downturns, funding and capital market fluctuations, exchange rate volatility, inflation, interest rate fluctuations, political and regulatory shifts, revenue generation, and demand volatility. Inflationary pressures, discussed by Rambo and Lucas (2016), lead to increased construction and operational costs, potentially undermining project budgets and financial viability. Managing inflation risk, especially in projects involving public entities or public services, is a complex endeavour due to the need for administrative approval of user fee adjustments (Gatti, 2013). Infrastructure projects often rely on revenue streams, and unforeseen shifts in demand patterns significantly impact revenue generation and introduce financial challenges (Klein, 2017).

Managerial performance, material supply contracts, and political risks shape infrastructure project success (Fitch Ratings, 2022b). Political instability, often during regime changes, government policy changes, or regulatory framework shifts, can introduce risk and uncertainties to infrastructure project lifecycles. Alterations in taxation policies, contractual agreements, or environmental regulations can impact project feasibility, financial viability, and long-term sustainability. To effectively mitigate these risks, governments and project stakeholders prioritise comprehensive feasibility studies, embrace flexible financing structures, establish robust contingency plans, diversify revenue streams, enhance governance, and maintain strict monitoring of macroeconomic conditions (Gatti, 2013). Governments and stakeholders should:

- Conduct comprehensive feasibility studies and risk assessments before project initiation.
- Adopt flexible financing structures, exchange rates, and interest risk hedging strategies.
- Establish robust contingency plans and risk management frameworks to address economic uncertainties.
- Diversify revenue streams and implement demand risk mitigation strategies.
- Enhance project governance and transparency to instil investor confidence.
- Continuously monitor and evaluate macroeconomic conditions and adjust project plans.

Managers in infrastructure projects are intermediaries between the government and citizens in delivering the infrastructure development agenda that must proactively manage macroeconomic risk exposures to boost infrastructure resilience, financial sustainability, and long-term success in changing environments.

2.3.4. Project management in infrastructure lifecycles

While infrastructure development is a critical component of Kenya's Vision 2030, the observed sovereign risk mispricing, partly from herding biases in an evolving macroeconomic environment, means innovative infrastructure project management must be paired with collaborative public policymaking. The Constitution of Kenya 2010 and the Local Content Act 2023 establish a legal framework for people-centric governance, transparency, stakeholder engagement, and sustainability to prioritise gender equality, cultural values, inclusivity, and diversity. It entrenches the separation of powers to decentralise national decision-making authority (Kenya Vision 2030, 2007). However, infrastructure governance and management constraints in county governments have emerged since Kenya introduced the devolved governance structure in 2013, splitting roles and responsibilities for infrastructure between national and county governments. Evidence suggests that some counties struggle with limited management capacity to address systemic underfunding, ineffective governance, resource allocation, infrastructure project phase integrations, and ICT integrations (Ombagi *et al.*, 2023d; Otieno, 2023). Strengthening human capacity and capabilities is vital to overcoming sustained national infrastructure procurement challenges and fostering successful project implementation.

Overestimated infrastructure project costs and completion risks have been linked to the misalignment of management practices with policy when political interests influence managers to underestimate costs and overestimate benefits (Flyvbjerg, 2007). Although misalignment can result from evolving cost structures, technology, liquidity, and construction delay, contemporary research reveals a culture-mediated project risk management theory implying contextual adaptability, collaboration, and environmental sustainability are soft managerial capacities influencing project success (Liu *et al.*, 2015). Initiating and planning phases often overrun budgets and timelines due to optimism bias, inadequate staff qualifications, and budget constraints (Flyvbjerg, 2021). While reference class forecasting offers a potential solution for selecting appropriate technology, herding and information cascade motives may sustain the misalignment between contractors and sponsors in terms of preserving old technological choices (Lovallo & Kahneman, 2003).

Communication styles, the perception of risk mitigation tools, legal frameworks, and information quality determine infrastructure risk perceptions. Delmon (2021) highlights the importance of these factors in infrastructure lifecycle management. Effective risk mitigation is crucial to project success and involves aligning financial strategies with public policy objectives. However, public policy's behavioural pooling effect may not effectively determine infrastructure project management practices. Obstacles faced by infrastructure project managers include scope creep, stakeholder conflicts, resource constraints, regulatory compliance, and technological disruption (Flyvbjerg, 2007). Conflicting culture-mediated perceptions of sustainability, these obstacles' evolving nature and interdependencies make the sovereign risk scope in infrastructure lifecycles challenging to define and manage (Meng *et al.*, 2016). Engaging diverse

stakeholders, like the public and private sectors, community groups, and individuals, adds complexity not captured by traditional project management approaches (Liu *et al.*, 2015; Meng *et al.*, 2016).

While better forecasting can align sovereign risk market pricing and cost-covering infrastructure project management models, its challenges include lacking managerial analytic tools and skills (Onjala, 2018). Unplanned macroeconomic events and inadequate expense metering in infrastructure sectors such as power exacerbate budget inadequacies. Effective management can balance public and private risks. However, price discrimination through cost-reflective end-user tariff-setting depends on the managerial soft capacity to reduce overall infrastructure project costs and boost revenue collection (Klein, 2017).

2.3.5. Culture-mediated socio-cognitive learning to mitigate sovereign infrastructural lifecycle risk

Culture is a contextual variable referring to slow-to-change shared values, beliefs, norms, traditions, and behaviours characterising a particular group (Hofstede, 1980). It entails how individuals within a society or community perceive, interpret, and interact with their environment and communicate and make sense of the world around them. Cultural constraints influence various aspects of human life, including social interactions, communication styles, decision-making, and attitudes towards authority, risk, and change (Schwartz, 1997). It influences how people approach work, relationships, and problem-solving, impacting everything from business practices to governance rules (Berry *et al.*, 2011). Hofstede *et al.* (2010) found that culture is a micro-level construct that shapes macro trends such as GNI, savings, and governance. Empiricists have shown that national culture is a context-specific defensive socio-cognitive learning construct influencing sovereign risk mispricing, infrastructure debt-side governance, project management, and macroeconomic risk perception. The Kenyan culture, as interpreted through Hofstede *et al.*'s (2010) six dimensions of power distance, individualism vs collectivism, masculinity vs femininity, uncertainty avoidance, long-term vs short-term orientation, and indulgence vs restraint, is a defensive socio-cognitive learning construct that can elicit managerial herding motives. Cultural value's role in decision-making and interpersonal relationships may mediate the influence of infrastructure project management practices on sovereign risk. According to Hofstede *et al.* (2010), Kenya displays the following cultural typology:

- Power distance reflects the extent to which a society accepts and expects an unequal distribution of power and authority. In high power distance cultures, there is a greater acceptance of hierarchy and centralised decision-making, while low power distance cultures value egalitarian relationships. In the Kenyan context, traditional cultural norms and respect for elders contribute to a relatively high power distance. Hierarchical structures within families, organisations, and society are commonly observed, reflecting respect for authority and seniority (Hofstede, 2013).

- Individualism vs collectivism contrasts societies prioritising individual interests and independence with those emphasising group harmony and interdependence. Kenyan culture leans toward collectivism, with strong community bonds and an emphasis on extended family relationships. People often identify with their social groups and prioritise collective welfare over individual desires (Hofstede, 2013).
- Masculinity vs femininity refers to the extent to which a society values assertive and competitive traits (masculinity) versus nurturing and cooperative traits (femininity). Kenya exhibits a mix of both, where traditional gender roles emphasise qualities associated with masculinity, but communal values and cooperation are valued. The rise of women in leadership roles reflects a shift to more balanced gender dynamics (Hofstede, 2013).
- Uncertainty avoidance measures a society's tolerance for ambiguity and uncertainty. High uncertainty avoidant cultures prefer rules, structure, and formalities to minimise uncertainty, while low uncertainty-avoidance cultures are more adaptable to change. Kenya demonstrates moderate uncertainty avoidance, with a blend of adherence to traditions and openness to innovative solutions (Hofstede, 2013).
- Long-term vs short-term orientation assesses a society's focus on short-term gratification versus long-term planning and perseverance. Kenya tends to have a balanced approach, valuing traditions while embracing progress and development (Hofstede, 2013). Cultural practices and rituals are preserved, but there is also a drive towards achieving long-term goals, as seen in initiatives like Vision 2030.
- Indulgence vs restraint examines a society's attitudes towards enjoying life and seeking pleasure versus controlling desires and adhering to social norms. Kenya exhibits elements of both, as celebrations, festivities, and social interactions are valued, but cultural norms and religious influences also promote self-restraint and discipline (Hofstede, 2013).

Socio-cognitive learning entails how individuals in infrastructure managerial roles utilise cultural values to acquire, share, and apply knowledge, skills, and insights during interactions with various stakeholders, experiences, and contextual factors (Bandura & Walters, 1977). It involves basing information exchange and expert perspectives on cultural values among practitioners, policymakers, and other stakeholders (Ombagi *et al.*, 2023d). Socio-cognitive learning can influence the collective understanding of challenges, opportunities, and best practices in decision-making, risk management, and project execution. This learning process influences the development of managerial capacities, behaviours, and attitudes, shaping organisational responses to dynamic risk in infrastructure management environments (Schwartz, 1997).

Understanding socio-cognitive learning motives is central to developing interventions that can enhance the adaptive and innovation capacity of managers to improve the influence of their collaborative learning methods on the governance and performance of infrastructure projects. Culture-mediated social cognition refers to the slow-to-change behavioural approaches that managers and stakeholders utilise to acquire, share, and apply knowledge within the context of Kenyan infrastructure projects. This concept recognises that norms and values are contextual factors shaping managerial perception, interpretation and response to information, collaboration, and decision-making across infrastructure lifecycles. Since national culture influences behaviour, it can moderate the embeddedness of herding, information cascade, and sovereign risk in the infrastructure development system. Cultural values, such as communication styles, separation of decision-making power, and attitudes towards reputational risk, can impact how managers learn from their experiences, interact with others, and navigate complexity (Schwartz, 1997). This culture-mediated social cognition highlights the interconnectedness of herding and sovereign risk as outcomes of inefficient collaborative decision-making in the financial and infrastructure sector, underscoring the need to consider cultural influences when designing and implementing infrastructure policies (Berry *et al.*, 2011).

The current study utilises herding behaviour to extend the infrastructure lifecycle management theory beyond traditional project management by integrating social cognition into the sustainable infrastructure evaluation framework (Meng *et al.*, 2016). It entails understanding how the emergence of self-organising social behaviour within the infrastructure project management context might influence the sovereign risk price in the international debt market. Effective sovereign risk and infrastructure project management acknowledges the diverse stakeholder interests and adapts to evolving sociocultural network dynamics. In Kenya, public policy is the guiding framework for infrastructure lifecycle management, to promote good governance, transparency, stakeholder engagement, and sustainability. Cost underestimation and benefits overestimation illustrate poorly understood socio-cognitive learning motives that managers utilise to cope with collaborative resource allocation that must be addressed to ensure the successful implementation of infrastructure projects (Onjala, 2018; Otieno, 2023; Pueyo, 2018). Figure 2-2 summarises the theoretical variables to evaluate culture-mediated herding and sovereign risk as embedded outcomes of sociocultural interactions between managers representing international debt providers and Kenyan debt seekers based on the shared values within the infrastructure development context.

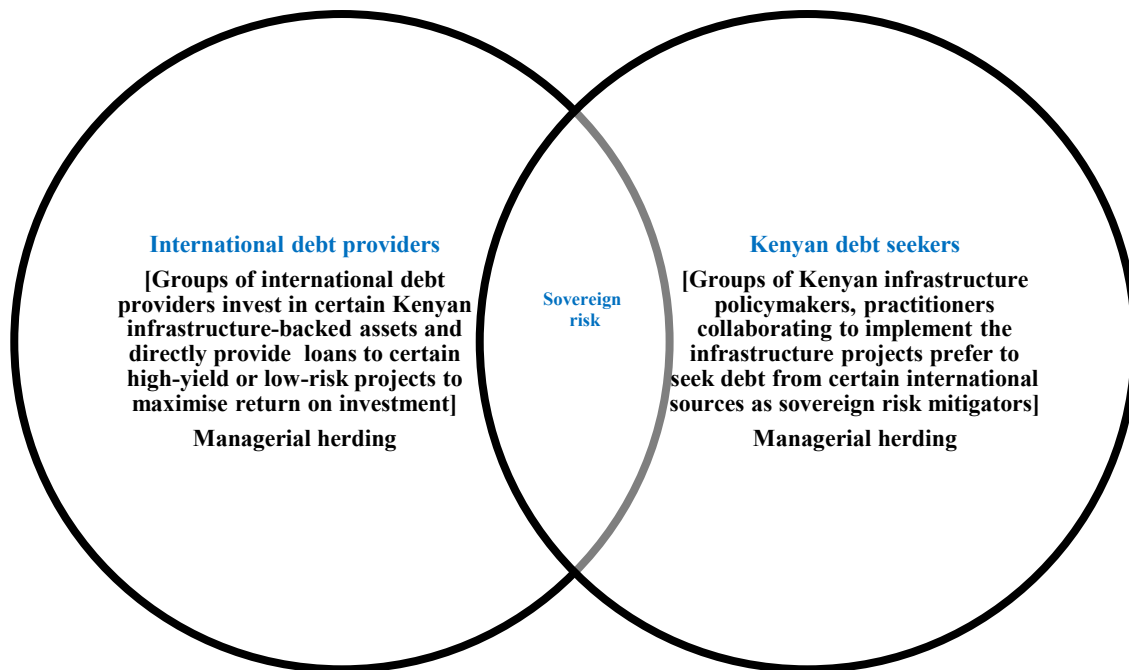


Figure 2-2: Theoretical interactions between sovereign risk and the infrastructure development context

Source: Author (2023)

The theoretical review shows that sound debt and project lifecycle management practices should lead to on-budget, on-time, high-quality infrastructure outcomes, enhancing human welfare and minimising sovereign risk. However, complex public policy interfaces and infrastructure lifecycle horizons, ranging from 5 years and upwards, limit forecasting risk and how uncertainty resolves. Judgement and decision-making errors (Kahneman *et al.*, 2021) elevate sovereign risk premiums and deprioritise some end-user benefits. Figure 2-3 summarises the theoretical managerial herding behaviours, information cascade, and sovereign risk determinants of managerial socio-cognitive learning complexity concerning debt-side governance, project management, and macroeconomic risks in evaluating the role of culture in the relationship between sovereign risk and infrastructure lifecycle management within the Kenyan context.

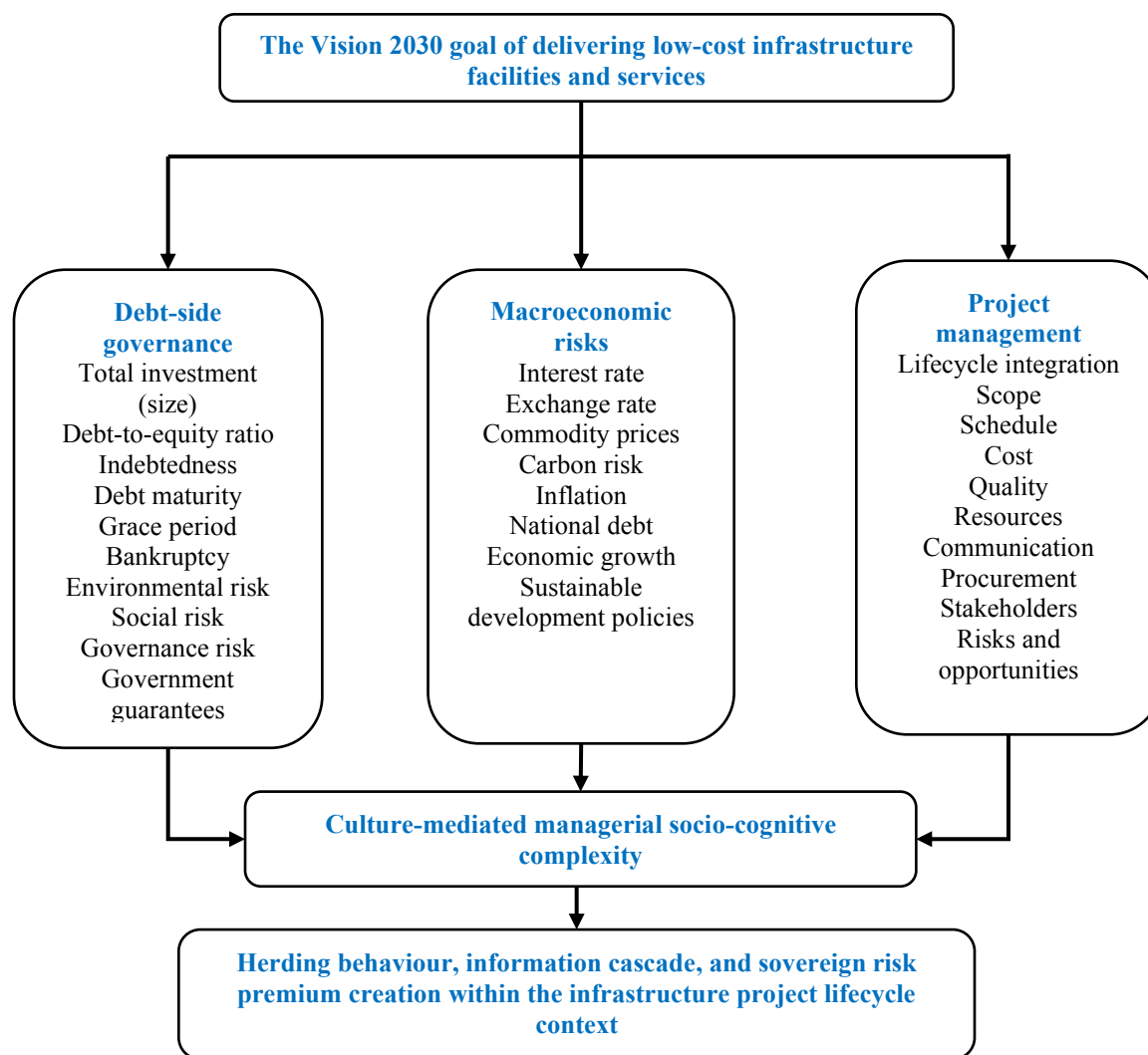


Figure 2-3: Theoretical variables of sovereign risk from managerial socio-cognitive learning about debt-side governance, macroeconomic risk, and project management complexity in the infrastructure context

Source: Gatti (2013); Project Management Institute (2013)

2.3.6. Infrastructure policy design and implementation institutions

This study stresses the role of “system” and “context” in forming sovereign risk because (i) a distributed network of policymakers and practitioners forms the interaction network in a government-regulated context, constituting an infrastructure lifecycle management system, and (ii) a public policy articulates infrastructure lifecycle management incentives and responsibilities shared between those government agents and the citizens whose welfare they must enhance.

2.3.6.1. The integrated energy sector policy

Vision 2030 and the Least Cost Power Development Plan 2010–2030 (LCPDP, 2009) influence Kenya’s energy landscape. The Energy Act 2019 and Petroleum Act 2019, assented to by former President Uhuru Kenyatta in 2019, modernised the energy sector by consolidating and updating energy laws, driven by the discovery of viable oil deposits in northern Kenya. This review focuses on the Energy Act 2019, which aims for affordable, efficient, and clean energy. Policies like the Renewable Energy Feed in Tariff Policy 2012 and Public-Private Partnerships Framework 2014 support the Act’s objectives, facilitating renewable energy investments in low-cost and low-emission technologies.

2.3.6.2. The renewable energy sub-sector policy

Kenya’s Energy Act (2019) defines “renewable energy” as energy derived from sustainable resources like solar, wind, biomass, hydro, and more. This policy undergoes regular revisions to adapt to new technologies and market conditions. In response to the global surge in renewable energy, Kenya updated its Energy Act 2019, focusing on revising the Feed in Tariff (FiT) guidelines promoting public-private partnerships (PPPs) for low-carbon energy access. This study centres on geothermal, wind, and solar projects with investments exceeding \$100 million, aligning with international contexts (Esty, 2004). Extensive consultations led to policy amendments, culminating in the Energy Act 2019, Feed in Tariff Policy 2021, and Renewable Energy Auctions Policy 2021 (Ministry of Energy, 2019).

2.3.6.3. The energy sector institutions

Figure 2-4 shows how Kenya has unbundled the energy sector to separate generation from distribution. The hierarchical structure shows centralised policymaking under the Energy and Petroleum Regulatory Authority (EPRA) and decentralised sub-sector governance to divide roles, responsibilities, and accountability boundaries (Ministry of Energy, 2019). The four units are: (i) petroleum and coal, divided into upstream, midstream, and downstream; (ii) renewable energy, comprising geothermal, hydropower, biomass, biofuels, biogas, solar, wind, and municipal waste; (iii) electricity; and (iv) nuclear energy.

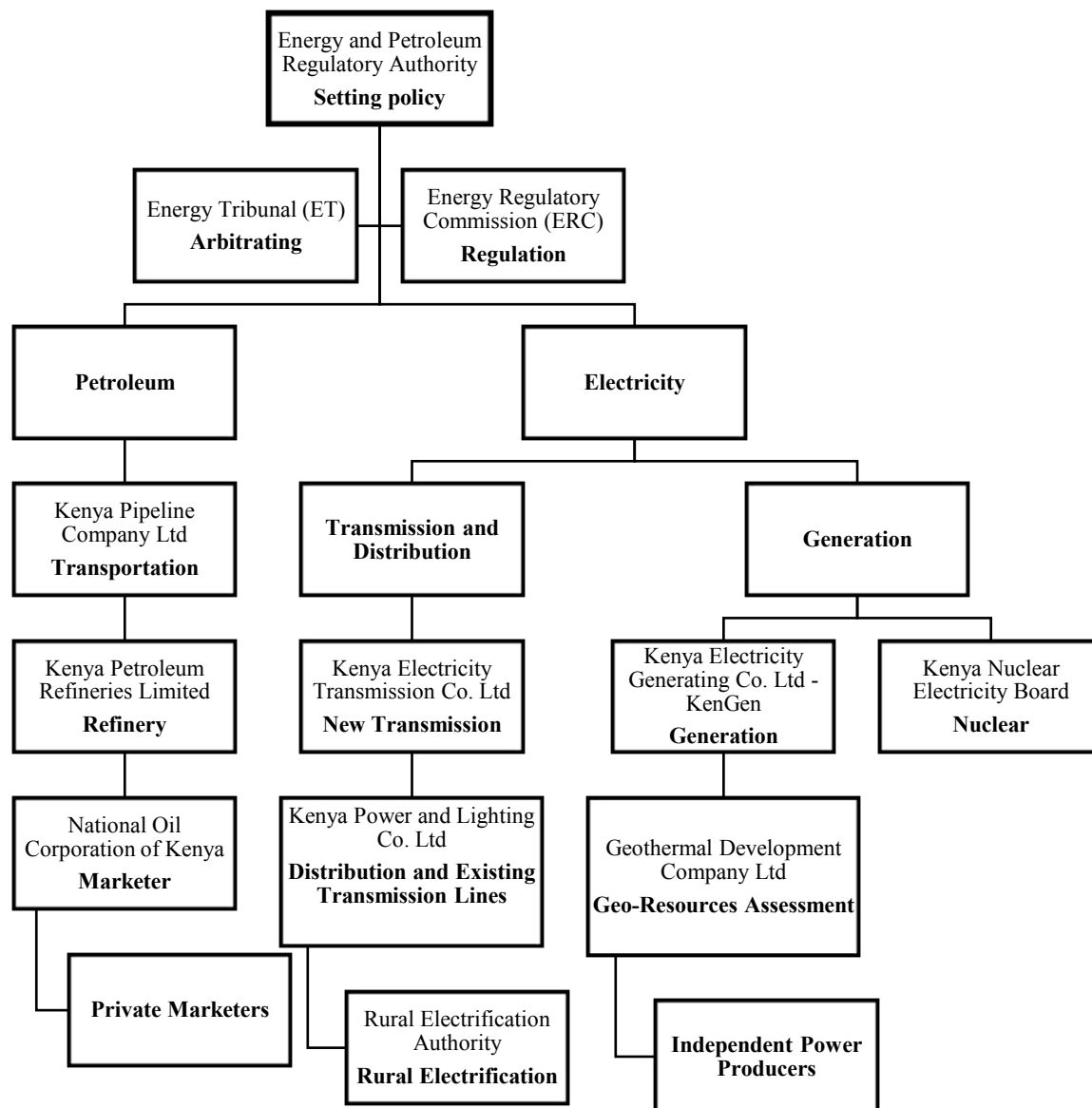


Figure 2-4: The institutional framework in the energy sector in Kenya

Source: Ministry of Energy and Petroleum (2023)

2.3.6.4. The transportation infrastructure institutions

In Kenya, the transport sector consists of six modes guided by the Integrated National Transport Policy (Ministry of Transport, 2009): road, rail, maritime and inland water, pipeline, air, and non-motorised and intermediate means of transport. According to the Integrated National Transport Policy (Ministry of Transport, 2009), Kenya envisions becoming a global leader in providing transport, infrastructure services, a maritime economy, a built environment, and urban development for socioeconomic development. Its mission is to provide efficient, safe, and integrated transport systems, a robust maritime economy, a built

environment, and urban development for sustainable development. The State Department of Transport (SDoT) is one of the five functional state departments under the Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works. In the Revised Executive Order No. 2 of 2020, the organisation of the Government of the Republic of Kenya, the Ministry of Transport (2009), outlines the functions of the SDoT, which are broadly classified into ten sub-sectoral mandates (Executive Order No. 1 of 2020, 2020)):

- Transport policy management
- Rail transport and infrastructure management
- Fast-tracking identified Northern Corridor integration projects, including oversight and coordination of LAPSSET project implementation
- Civil aviation management and training
- Maritime transport management
- Registration, insurance, and inspection of motor vehicles
- National transport and safety, including national road safety management
- National roads development policy management, mechanical and transport services
- Enforcement of axle load control
- Development and maintenance of airstrips

2.4. Part III: An empirical review of studies on infrastructure lifecycle management in Kenya

This section reviews empirical studies to assess the relationship between sovereign risk and infrastructure debt-side governance, project management, macroeconomic risks and culture and identify the behavioural pooling effects of formal and informal governance variables on managerial behaviour as herding patterns.

2.4.1. Herding, information cascade, and debt-side governance in infrastructure projects

When herding involves mimicking others' actions due to perceived superior information, leads to inefficient decision-making in financial markets and organisations because novel information is lost. Recent evidence traces Kenya's vulnerability to sovereign debt distress due to fiscal deficits and the financing of large-scale infrastructure projects (International Development Association (IDA) & International Monetary Fund (IMF), 2022). This risk is exacerbated by investor herding behaviour that has led to sovereign risk premium mispricing, particularly in Sub-Saharan African developing countries (Morsy & Moustafa, 2020). The mispricing, which has led to a 2.9% risk premium disparity relative to other regions, raises concerns about the potential of omitted information in mitigating Kenya's sovereign risk exposures due to investor herding. Furthermore, this exposure is exacerbated by the suboptimal benefits realisation from various infrastructure projects and their failure to boost real economic growth (Onjala, 2018). Thus, herding behaviour, as studied

by Morsy and Moustafa (2020), is a defensive socio-cognitive learning mechanism that poses a significant challenge to accurately assessing sovereign risk as the main risk-free benchmark when pricing infrastructure project investments in Kenya. This behaviour obstructs the inclusion of new risk-reducing information into the sovereign risk assessment model. The evidence that investor herding behaviour influences sovereign risk is relevant to Kenya's infrastructure development. It determines access to affordable project funding. The mispricing of sovereign risk can lead to overpriced infrastructure bonds, resulting in higher interest rates and consequences like increased debt burden, budget constraints, reduced investor confidence, credit rating downgrades, foreign exchange rate volatility, and restricted fiscal flexibility (Cantor & Packer, 1996). Unsustainable debt (Onjala, 2018) hinders Kenya's efforts to achieve 10% economic growth by reducing funding for infrastructure development and social programmes unless the country borrows expensively.

The evidence on sovereign risk mispricing due to investor herding indicates that Kenya's sovereign risk assessment models should include human-centred variables. For instance, Dang and Partington (2020) used Hofstede's cultural model to reveal cultural distance's impact on sovereign ratings. This evidence implies that culture-mediated socio-cognitive learning influences sovereign creditworthiness assessments. These social network effects, theorised by sociologists like Granovetter (1973) and economists like Hirshleifer and Teoh (2009), have tipping points. Hence, empirical research is needed to assess if localised contagion of cultural beliefs about sovereign risk affects infrastructure risk perception within a borrower's context.

Herding in international markets, where Kenya derives significant funding, implies infrastructure project managers and organisations acquire significant risk information from peers within and outside Kenya. The government's decision-making process, involving global experts, exposes Kenyan infrastructure project managers to learning about global debt markets and infrastructure project management trends. This exposure requires assessing their perception of the relationship between the elevated sovereign risk and the infrastructure project management landscape. Besides, some infrastructure project managers may exploit imperfectly rational investor herding tendencies in financial markets (Hirshleifer *et al.*, 1994) if their role in selecting projects influences the government to issue unsustainable debt. This likelihood can be traced to the cross-country comparative evidence that has shown that cultural distance influences sovereign risk rating (Dang & Partington, 2020) and infrastructure development (Mayfield & Mayfield, 2012). However, there is a gap in conceptualising culture as a within-country interpersonal information transmission mode blocking new information about the relationship between sovereign risk and infrastructure development.

To manage sovereign risk effectively, policymakers in Kenya need to adopt a human-centred approach to mitigate the negative impact of herding behaviour within the international market that can be transmitted to infrastructure contexts. Ho *et al.* (2023) revealed that national culture influences the spillover effect of

sovereign risk on financial and non-financial decision-making. Since sovereign risk ratings influence infrastructure ratings (Fitch Ratings, 2023), global social network interactions moderated by the cultural distance between Kenya and its cross-border partners can affect the assessment of Kenya's infrastructure creditworthiness through non-fundamental information. It is essential to evaluate how cultural interactions among Kenyan infrastructure managers and their international counterparts inform sovereign risk pricing.

Research investigating cross-border collaboration and managerial decisions reveals a complex landscape of Kenya's infrastructure development, reliance on international bonds and bilateral debt, and their risks. Hope (2010) emphasises the significance of power sector challenges in Kenya's Vision 2030 objectives. The study recommends utilising infrastructure bonds and private sector involvement through PPP and Private Participation Initiatives (PPI). These strategies aim to pool resources across borders and empower local practitioners with infrastructure management skills. However, studies on governance have cautioned about weak governance in bilateral agreements that negatively impacts cross-border collaboration in infrastructure project management and benefits realisation in Kenya. Kolstad and Wiig (2011) outlined that the China–Kenya relationship, a notable infrastructure partnership, presents unique governance risks. Concerns about lack of accountability have been raised. It implies that China's approach to governance in its infrastructure deals differs from Western standards, leading to a huge and sustained disparity between hard and soft infrastructure development outcomes. The Kenya–China collaboration depicts substantial hard infrastructure investments. Deficiencies in soft infrastructure raise the need to focus on managerial socio-cognitive learning motives and evaluate how soft infrastructure development shortfalls emerge.

Kenya's sovereign debt transparency and sustainable infrastructure development are vital for addressing sovereign risk. Onjala (2018) opines that limited transparency and vague policies have exposed Kenya to sovereign debt sustainability risk and suboptimal infrastructure benefits realisation. Research by Wekesa *et al.* (2016) underlines the importance of enhancing infrastructure development for economic growth. Improved transport, communication, water, waste infrastructure, and other factors are key determinants of foreign direct investment (FDI). These diversified sources of sovereign risk necessitate integrated and strengthened regional financial institutions and infrastructure development goals. Institutions like the African Development Bank (AfDB) support Kenya's debt management strategies and prioritise regional infrastructure investments. The support helps the country align hard and soft infrastructure development goals within bilateral and multilateral loan agreements for optimal governance improvements. However, political interests in infrastructure decisions introduce additional sovereign risk management challenges. Ferchen and Perera (2019) observe that short-term political lifecycles misalign with the long-term nature of infrastructure projects, leading to unsustainable risk-taking and discrimination in project selection that has perpetuated social inequality and instability.

Moreover, debt-trap diplomacy has been linked to unsustainable infrastructure loans from China to many developing countries in Sub-Saharan Africa, including Kenya (Were, 2018). However, China's foreign policy and hybrid infrastructure development model challenge the notion of debt-trap diplomacy, reflecting a two-way street in decision-making (Ferchen & Perera, 2019). Sustainably inclusive project selection and implementation decisions are vital to achieving desired hard and soft infrastructure outcomes. Geopolitical narratives further complicate the external sovereign debt landscape, heightened by social media influence on spreading sovereign risk narratives (Brautigam, 2020). Narratives about China's investments influence policies and public opinion, raising the question of where Kenya turns for infrastructure partnership.

In summary, the reviewed literature highlights a risk that the intricate web of social network factors could redefine the relationship between sovereign risk and infrastructure development. These social network factors manifest in the interplay of culture-mediated herding and geopolitics. However, researchers have analysed culture and herding independently. The study by Chang & Lin (2015) demonstrated that cultural values proposed by Hofstede (2001) are antecedents of herding that illuminate collaboration challenges and opportunities. Consequently, the emerging governance models and geopolitical narratives of discriminatory sovereign risk pricing due to investor herding expose defensive culture-mediated socio-cognitive learning. Herding is the observed outcome of the unobservable culture-mediated socio-cognitive learning motives. These motives can redefine the relationship between sovereign risk and infrastructure development. Thus, while infrastructure systems offer long-term benefits such as improved productivity, competitiveness, and economic growth, herding is defensive culture-mediated socio-cognitive learning about project selection and implementation, raising sovereign risk (Onjala, 2018) when it leads to suboptimal benefits realisation, negatively influencing GDP growth, unemployment, inflation, and social welfare (Brautigam, 2022).

2.4.1.1. Debt-side governance in renewable energy infrastructure lifecycles

Despite lower operational costs, Pueyo *et al.* (2016) emphasise the sensitivity of renewable energy projects to high upfront financing costs, exacerbated by suboptimal outcomes. The debt-to-equity ratio, equity cost, and interest rates determine the initial investment cost and return. In Kenya, the debt-to-equity ratio often follows the 70:30 ratio of developed countries with lower perceived risk (Egli, 2020), revealing a global standard in infrastructure debt contracts. Debt in Kenyan projects is typically denominated in US dollars or other foreign currencies to mitigate currency devaluation risk. However, rapid devaluation can undermine financial sustainability, particularly for the national utility off-taker. Equity investors in smaller or riskier projects demand higher returns, usually double the cost of debt, due to assumed residual risks. The equity cost in Kenya varies from 10% for publicly funded projects to 18% for Independent Power Producers (IPPs), reflecting lower financing costs compared to Ghana's 27% (Pueyo *et al.*, 2016). This difference is attributed to contextual investment risks at the sovereign and project-level management practices in Kenya.

Kenya heavily relies on external commercial and concessional debt. Pueyo (2018) shows that commercial finance offers quicker access but has higher interest rates and short maturities. Concessional debt involves longer processing times due to bureaucracy and negotiation complexities with international organisations like the World Bank and IMF. Project ownership influences debt terms, with public projects enjoying lower interest rates and longer maturities than private ones. Klein (2017) attributes this disparity to risk perception, suggesting that the public offers governments an open-ended risk guarantee through taxes, making public projects more attractive. Moreover, interest rates in Kenya are influenced by macroeconomic stability, with commercial lending rates remaining at 16%. Private equity costs range from 16% to 20%, aligning with lending rates. The 90-day treasury bill rates, a risk-free benchmark, fluctuate from 8.6% to 12%, reflecting market conditions and investor expectations (Pueyo, 2018). Market risk pricing determinants differ between public and private debt, with public debt carrying a lower uncertainty avoidance sovereign risk premium.

Kenya's classification as an intermediate uncertainty avoidance culture suggests balanced risk acceptance (Hofstede, 2013). However, changes influence end-user electricity tariffs due to benchmarking investment costs and fossil fuel costs. The slow adoption of new energy technologies (Baimwera *et al.*, 2017) despite FiT reforms for cost-reflective renewable energy tariffs (Ministry of Energy, 2019) may be associated with perceived uncertainty regarding policy implementation and business value. Indeed, some IPPs negotiated Power Purchase Agreements (PPAs) that deviate from the FiT Policy 2011, showcasing the influence of unique renewable energy project features and financial backing on negotiations (Pueyo, 2018). FiTs for renewable energy technologies in Kenya are linked to inflation, ranging from 8% for hydro to 20% for geothermal (Ministry of Energy, 2019). These Clean Development Mechanisms (CDM) attract subsidies, including a 7-year tax holiday and withholding tax exemption on loan interest for renewable energy investments (Ministry of Energy, 2019). Geothermal energy is the most advantageous technology in Kenya, offering high equity returns and the lowest FiT tariffs. Therefore, wind and geothermal energy projects can exhibit attractive returns under certain financing scenarios, making them competitive against fossil fuels.

Institutional gaps in pricing renewable energy projects are identified, emphasising the need to understand the role of formal and informal institutions in shaping managerial behaviour within tariff structures. The perception of FiTs and CDM as ineffective risk mitigants highlights the role of inflation-linked tariffs, financial incentives, technology competitiveness, and institutional dynamics in shaping risk management choices. Kenya faces policy implementation challenges in adopting renewable energy technologies and carbon finance diversification strategies at the required scale (Baimwera *et al.*, 2017). The determinants of carbon finance uptake include project size, technology, and market affiliation but not sector or carbon offset price. However, the low carbon finance uptake suggests potential constraints in traditional vs innovative risk management practices, influenced by stakeholder risk preferences and perceived technological novelty.

Policymakers in Kenya face limitations in increasing electricity access due to public budget constraints and low infrastructure investments. Pueyo (2018) offers a “green investment diagnostics” methodology to support policymakers. However, it targets commercial renewable energy investment policies without considering how social cognition influences adopting the method. Macroeconomic, social and sovereign reputational, and governance risks impact infrastructure debt governance. Governance issues in Kenya include regulatory opacity, procurement delays, and contracting complexities (Twesigye, 2022). These challenges reflect governance misalignment with project goals. The unbundling of the energy sector introduced new agency relationships but has not always led to performance efficiency.

Overall, empirical research into Kenya’s renewable energy projects highlights the debt-side governance determinants of sovereign risk without considering variables that elicit managerial capacity. It identifies significant debt financing strategies without eliciting how to bolster human-centred risk management. Kenya’s unique sociocultural context, including its infrastructure challenges, financial market disparities, and aid dependency, requires nuanced policy responses to mitigate sovereign risk and promote sustainable renewable energy development. These findings provide variables for evaluating the interplay between financial risk, project ownership and regulation, which hinges on managerial socio-cognitive learning as an essential soft competency that can complement the government's efforts in identifying what to change and how to support them in mitigating renewable energy project risks.

2.4.1.2. Debt-side governance in road transport infrastructure lifecycles

Sovereign risk in road infrastructure project management is critical for stakeholders in Kenya’s public and private sectors. One significant determinant of sovereign risk in road infrastructure projects is the limited participation of the banking industry in public-private partnerships (PPPs). Kamau (2016) found that commercial banks in Kenya have shown reluctance to participate in PPPs due to a lack of knowledge and information flow about these projects. It could reflect an inefficient separation of power between PPP authorities and potential banking industry participants. There is a need for tools that facilitate collective learning between public and private sector managers to bridge this gap. Research should investigate how hierarchical information dissemination and perceptions of authority affect knowledge diffusion within the banking sector. Furthermore, those who were aware of annuity programmes raised concerns about the complexity of the financing model, which could lead to increased non-performing loans and defaults. It highlights the value of collaborative risk assessment methodologies to manage PPP projects effectively.

The legal and regulatory framework for PPPs in Kenya is evolving, indicating ongoing learning processes among public and private sector stakeholders. However, the public sector has not completed a substantial number of PPP projects, and private sector stakeholders, including commercial banks, are not actively

involved (Kamau, 2016). Commercial banks provide advisory and banking services but do not finance PPPs, indicating the necessity for stronger collaborative efforts, regular consultative meetings, joint task forces, and co-development of financial solutions tailored to PPP projects. Consultative meetings between banks and the government, facilitated by the Kenya Bankers Association, should evaluate bank contextual risk averseness determinants and costs to create an environment encouraging bank participation while ensuring cross-sectoral infrastructure partnership sustainability (Pueyo, 2018).

Culture significantly influences decision-making processes in road infrastructure projects. The prevalence of Chinese contractors and procurement from China in Kenyan projects demonstrates potential herding. Alden and Jiang (2019) found that Chinese financing projects often come with stringent requirements for contracting firms, including a preference for procuring primary machinery and materials from China. This preference for familiarity reduces substantial uncertainty during project execution. Additionally, Chinese contractors implement most Chinese-funded projects, aligning with China's collectivist values that promote in-group cooperation and cohesion (Hofstede *et al.*, 2010). One could argue that the strict procurement rules in Chinese loan contracts protect the collective interests of China, potentially driving information cascades if subsequent managers imitate Chinese procurement rules without extensive risk evaluation (Shiller, 1995). It highlights the importance of understanding cultural factors in infrastructure decision-making.

Cultural narratives reflect socio-cognitive learning that could impact the distribution of lifecycle risks and benefits in infrastructure projects. Enns (2019) explored how rural land users in northern Kenya mobilised alternative ideas and contested land-use changes. The ability to mobilise and contest can be seen as collective action and cooperation sustained by the cultural dimension of collectivism. However, research on how cultural inclinations toward collective action influence managerial strategies for collaborating with rural communities to minimise project risks is limited. Understanding cultural norms and values that support unity and challenge land-use changes is crucial for successful project development.

Widened fiscal constraints affect the success of regional connectivity projects in historically marginalised communities. China's bilateral road development debt raises concerns about unsustainable sovereign debt (Carmody *et al.*, 2022). It instigates an interaction of the cultural dimension of long-term orientation and indulgence as determinants of how borrowing nations collectively address Chinese infrastructural debt. Long-term orientation refers to the consideration of intergenerational risk, and indulgence reflects a willingness to gratify desires instantly. Restraint emphasises self-control and adherence to societal norms when engaging local communities. Despite the challenges, Kenya has shown optimism (indulgence) in attracting external debt for ambitious infrastructure projects like the Lamu Port, indicating an orientation

toward fiscal ambition or short-term risks. It is necessary to evaluate how managers prioritise long-term risks in response to fiscal strain to illustrate how they balance fiscal responsibility and project ambition.

The cultural dimension of uncertainty avoidance can be a potential herding facilitator in African states. Chiyemura *et al.* (2023) explored the agency of African state actors in shaping engagements with China in the context of infrastructure debt. Their study included a context-sensitive analysis of African agencies, considering political elites, bureaucratic agencies, and local governance actors. This approach reflects a desire by African states to minimise uncertainty. Evaluating how cultural factors influence the risk-taking propensities of these states is useful to complement the literature on road infrastructure projects. It highlights the importance of bridging knowledge gaps by understanding cultural influences and promoting collaboration between the public and private sectors. Cultural factors, fiscal constraints, and agency dynamics significantly shape project outcomes and risk management strategies. More research is vital for informed decision-making in the complex infrastructure development landscape.

2.4.1.3. Debt-side governance in rail transport infrastructure lifecycles

The literature on debt-side governance in rail infrastructure projects, particularly the case of the Mombasa–Nairobi Standard Gauge Railway (SGR) in Kenya, reveals an interplay of sovereign risk, executive agency, financial statistics, loan dynamics, and governance factors (Wang, 2022). The Mombasa–Nairobi SGR, a flagship Vision 2030 and Belt and Road Initiative (BRI) project, is a critical rail infrastructure connecting Mombasa to Nairobi, funded by a \$3.23 billion loan from the Export-Import Bank of China. The Kenyan government contributed 10% equity funding (Irandu & Owilla, 2020). The loan had specific conditions, such as spending 40% of all costs on local supplies and choosing the China Road and Bridge Corporation (CRBC) as the main contractor, emphasising China’s influence on the project’s terms and reflecting herding towards the global market consensus in selecting counterparties. CRBC is a global investment-grade-rated infrastructure developer. This procurement method has raised concerns about lopsided bilateral contractual agreements, limiting borrower risk diversification and market price learning, which is typical in competitive bidding (Onjala, 2018). The project was awarded a gold standard rating (Engineering News-Record, 2018), underlining global consensus on the significance of China’s rail infrastructure development expertise. Questions about the SGR’s long-term profitability and economic return have arisen since the Export-Import Bank of China discontinued financing after the Naivasha extension.

Irandu and Owilla (2020) suggest there have been positive socioeconomic impacts of the SGR, including revenue generation through railway development levies and improved regional trade. However, their study echoes the need for more stakeholder engagement and affordable funding mechanisms in future. Sauer *et al.* (2022) explored the project’s impact on public opinion through social media analysis, revealing mixed

opinions about China's infrastructural lending motives. While the study shows the role of ICT in bridging public participation in infrastructure debt and management discussions, it also showcases shared language as a cultural stakeholder engagement artefact. Huang and Lesutis (2023) delved into the strategies of Chinese state-owned enterprises like CRBC, highlighting the alignment of economic productivity and political priorities deeply rooted in Confucian culture (Hofstede *et al.*, 2010). Despite initial contractual arrangements, CRBC's role in operations and maintenance depicts China's long-term goals and cultural negotiation processes.

The involvement of sub-national governance actors along the SGR line further demonstrates China's local stakeholder engagement strategies, consolidating power via negotiations and expanding capital circuits. This analysis aligns with the notion of China's state capitalism hybridity and geopolitical interests, emphasising the need for cultural-historical analysis to understand the sociocultural determinants of China's engagements in Kenya's infrastructure management system. Specifically, Confucian culture emphasises ethics, obedience, humanism, and collectivism, indicating that Confucian society may have a high power distance, low individualism, high masculinity, low uncertainty avoidance, high long-term orientation, and low indulgence (i.e. more restraint) (Chang & Lin, 2015), closely reflecting Kenya's cultural dimensions discussed in Section 2.3.5. On the other hand, Western culture has been associated with science, reality, individualism, and happiness. Its core idea is the requirements of fundamental human rights in governance (Chang & Lin, 2015). While these cultural attributes may imply preventing the emergence of herding in Western countries by prioritising individual rights and independent thinking, they offer evidence of variables that should be included in human-centred policy design and implementation frameworks. The literature underscores the complex interplay between China's state capitalism hybridity, geopolitics, and culture in Kenya's largest and most expensive infrastructure development project. The research suggests the importance of transparency, stakeholder engagement, and affordable funding mechanisms in mitigating sovereign risk while acknowledging the need for deeper cultural-historical analysis to comprehend China's role in Kenya's infrastructure development.

2.4.2. Sovereign risk and macroeconomic risks in infrastructure lifecycle management

Rambo and Lucas (2016) conducted a causal-comparative study, highlighting that inflation rates exert the highest impact on rail project financing, followed by interest rates, debt ratio, and taxation. The study recommended adjusting monetary, fiscal, and taxation policies and waiving the fuel levy to support concessionaires and enhance rail service competitiveness, indicating policy design and implementation shortfalls. Odhiambo, Rambo, and Okello (2020a) found an inverse relationship between inflation, interest rates, and financial risk on renewable energy PPP project performance. The study reinforced Rambo and Lucas's (2016) recommendation by advocating for a supportive macroeconomic policy environment and

risk mitigation measures for PPP contractors in renewable energy projects. Mose (2022) focused on road infrastructure and economic growth, establishing a positive contribution of road infrastructure growth to economic expansion and validating the infrastructure-growth hypothesis. Overall, the studies stress the importance of the macroeconomic environment, especially inflation rates, interest rates, and financial risk, in shaping infrastructure project success in Kenya. They call for supportive policy environments and risk mitigation strategies to foster fair competition and economic growth. Since studies focusing on sovereign risk show that investors ignore macroeconomic fundamentals when herding influences decision-making (Morsy & Moustafa, 2020), further research and qualitative analysis are needed to understand the sociocultural factors and elicit managerial socio-cognitive learning complexity in evaluating the key macroeconomic factors influencing infrastructure policy design and implementation on top of the recommended reforms.

2.4.3. Sovereign risk and infrastructure project lifecycle development

2.4.3.1. Project management in renewable energy infrastructure lifecycles

Eberhard *et al.* (2017) conducted research highlighting the well-defined and efficient division of labour in Kenya's renewable energy project planning, procurement, contracting, and permitting processes. These processes contribute to lower regulatory risks compared to other Sub-Saharan African countries. Additionally, the government conducts pre-feasibility and feasibility studies on renewable energy technologies, enhancing investment awareness. While the government has been responsive to regulatory problems, the study suggests that sovereign risk susceptibility in renewable energy projects may arise from fragmented responsibility in collaborative governance or a lack of human-centred capacity for effective policy implementation, a view echoed by Ndiritu and Engola (2020).

Osiolo *et al.* (2017) argue for a prominent state role in funding electricity networks and serving less profitable rural segments, contradicting the dominant private sector narrative in international development and favouring private sector-led infrastructure development. Twesigye (2022) found that the government's dominance in governing its utility off-takers led to loan covenant defaults and lower profitability due to interference in the scope of work. This contradiction highlights that state effectiveness in dividing roles and responsibilities in infrastructure development unfolds differently at citizen and institutional levels. It emphasises the need for managers to consider sovereign risk spillovers and the importance of understanding the dynamics between citizen and institutions engagement as critical infrastructure stakeholders.

Dalla Longa and van der Zwaan (2017) assessed Kenya's climate risk mitigation ambitions. They found that large-scale renewable energy infrastructure deployment is necessary to meet Nationally Determined Contribution (NDC) targets for greenhouse gas emissions reduction, indicating that prevailing large-scale

scope management complexity may heighten. Grid deficits must be resolved to align the Least Cost Power Development Plan 2010–2030 and the NDC policy. Collaborative cross-sectoral stakeholder engagement and stringent climate risk adaptation policies are crucial, particularly in the residential and transport sectors. Sarkodie and Ozturk (2020) complement these findings by examining the Kenyan environmental Kuznets curve hypothesis, emphasising the need for policies to engage the public in energy conservation to curb transmission risks. However, Oluoch *et al.* (2020) highlight the importance of government subsidies and awareness campaigns to address demand risk and cover infrastructure systems' lifecycle costs due to the unwillingness of citizens to pay.

Sergi *et al.* (2018) revealed significant international development institutional influence on power sector investments in Kenya and Tanzania. International development agencies favour large-scale on-grid and grid extension projects, while global donors fund niche off-grid technologies. This distinction reflects resource availability and management variations between the two countries. Overseas lenders play a significant role in Kenya's renewable energy projects, with information about the country's attractiveness being a key factor. Unbundling and privatisation in the energy sector have attracted significant private international debt, revealing that corporate governance incentives could reform infrastructure selection criteria and risks.

Based on a Lake Turkana Wind Power Project case study, Achiba (2019) revealed that corporate strategies depoliticise land claims and infrastructure development interventions. These strategies legitimise large infrastructure investments by presenting pastoralism as unviable. This evidence suggests that corporate managers imitate political leaders due to assumptions about infrastructure development objectives. Historical colonial discourses influence renewable energy project initiation, reinforcing political influence in corporate herds and information cascades. Thus, infrastructure gentrification and marginalised communities persist in Kenya due to historical power dynamics and resource allocation rules, which neglect peripheral regions and communities. Narratives framing pastoral economic activity as unviable justify land grabbing and hinder understanding of historical vs current infrastructure needs. It leads to unequal risk-bearing and a lack of citizen involvement in economic activity despite their contribution through taxation and tariffs. Therefore, Gregory and Sovacool (2019) identified limitations in conceptualising risk in infrastructure development, emphasising the importance of including human-centred variables in risk assessment to attract private capital and institutional investors in expanding electricity access.

Ndiritu and Engola (2020) exposed ineffective governance and stakeholder engagement by analysing the effectiveness of Kenya's FiT policy, revealing delays in renewable energy project commercialisation. The challenges included unavailable technical expertise, leading to recommendations for policy revision and market integration. Takase *et al.* (2021) explored human capital and technical challenges in renewable

energy development, highlighting the importance of skills development and capacity building. These risks corroborate Kamau's (2016) finding in the road sector by revealing local banks' reluctance to fund renewable energy projects due to perceived contextual implementation risks. In the rail context, technical expertise limitations were addressed by contracting a globally rated counterparty. Omenge *et al.* (2022) discuss delays in geothermal and wind energy projects due to environmental and social impact assessment procedures. This indicates the likely challenges associated with adapting frameworks to specific contexts. These findings underscore the need to design tools mediating socio-cognitive learning to help managers and policymakers adapt global procedural frameworks to their contexts.

Spatial and hierarchical tensions are commonplace in large infrastructure development contexts. Yaffe and Segal-Klein (2023) studied the socio-political challenges to local pastoralist populations in a renewable energy project and found that power relations were reproduced from the international to the national level. It highlights the importance of understanding power distance and its impact on local vs international collaboration. The literature on Kenya's renewable energy infrastructure management shows a complex interplay of policy design, governance, and public vs private sector role distribution. It highlights managerial capacity constraints with implications for sovereign risk, project success, and the achievement of SDGs. Understanding the local context, stakeholder dynamics, and power relations is crucial for effective project planning and implementation. Bridging socio-cognitive learning shortfalls, addressing skills shortfalls, and promoting inclusive stakeholder engagement are critical for mitigating risks, reducing costs, and ensuring the long-term success of renewable energy projects in Kenya.

2.4.3.2. Project management in road infrastructure lifecycles

One fundamental socio-cognitive learning aspect in road infrastructure project management in Kenya is the examination of historical narratives and state–citizen tensions related to national integration using infrastructure systems. Harvey and Knox (2012) emphasise the importance of understanding the historical context in which infrastructure projects are initiated. They described the belief in infrastructure to deliver development and national integration as “the enchantments of infrastructure”. While road projects promote development and integration, they can also engender new exclusions and tensions within society. Harvey and Knox (2012) argue that roads do not simply broadcast power in a unidirectional manner but can be avenues for contesting state power. This implies power distance can influence state–citizen collaboration and the overall success of road infrastructure projects. Pre-existing state–citizen tensions can escalate infrastructure lifecycle costs and hinder benefits realisation. The narratives associated with road projects in Kenya also reveal social and political anxiety in infrastructure development and modernisation, which raises questions about the geographical and social patterns of political beliefs and policy opinions regarding infrastructure development. The current study suggests that these patterns may be rooted in historical and

cultural dimensions, which can shape project managers' interactions with citizens and how they are perceived on the ground.

The literature highlights the significance of cross-cultural dimensions in road infrastructure project management, particularly concerning sovereign risk. While cross-border social interactions between individuals influence finance and management decisions (Ho *et al.*, 2023), there is a gap in research regarding the relationship between sovereign risk and cultural diversity in Kenya's infrastructure projects. Teipelke (2014) demonstrated the impact of political leadership regime changes on road projects. The Thika Highway Improvement Project was completed a year earlier and at a higher cost after a regime change. This suggests that political regimes significantly affect schedule management in infrastructure projects. Understanding the cultural dimensions of decision-making during political regime changes could elicit how Kenya can leverage managerial socio-cognitive learning complexity to mitigate sovereign risk creation in infrastructure projects due to avoidable schedule delays.

Gambino and Périer (2020) identified the controversies surrounding infrastructure projects involving Chinese state-owned enterprises in Kenya by highlighting poor working conditions and employment with weak human welfare and labour policy implementation. Other studies have identified governance and decentralisation challenges in road infrastructure project management. Kenya's decentralisation constitution addressed regional development disparity and equity in development planning. For instance, Otieno (2023) examined the impact of decentralisation on north-eastern Kenya and found an increased number of development projects and improvements in GDP, revealing resource allocation diversity. Still, poor financial management and limited transparency are corruption-related resource management risks. A cross-country study by Hofstede *et al.* (2010b) shows that culture determines corruption prevalence.

Chiyemura *et al.* (2023) demonstrated the role of local governance actors in infrastructure projects, particularly with Chinese participation. The study challenges traditional top-down decision-making to consider managerial experiences. The importance of policy network collaboration in road infrastructure management is emphasised. Ombagi *et al.* (2023a) found that collaboration in policy networks positively impacts policy outcomes in the road transportation sector. Effective collaboration involves information sharing, cooperation, and agreement among stakeholders, leading to better policy process outcomes. It highlights the need for increased transparency, communication, and trust-building among stakeholders in rail infrastructure projects.

The review of road infrastructure management literature exposes a complex landscape involving historical narratives, governance, and policy networks, all of which impact risk perception. While studies emphasise

behavioural infrastructure management risks, a gap exists in elucidating cultural influences on labour. Effective governance, decentralisation, and policy network collaboration are vital for successful road project management in Kenya. Yet, there is a gap in human-centred frameworks to evaluate managerial socio-cognitive learning in studies highlighting collaboration gaps. Addressing this gap is crucial for financing and managing road projects. Further research and evidence-based policy network collaboration interventions will enhance efficient and sustainable road infrastructure development in Kenya.

2.4.3.3. Project management in rail infrastructure lifecycles

The construction and management of the SGR in Kenya have attracted significant attention from researchers and policymakers due to its impact on trade, investment, and governance. International collaboration was instrumental in Kenya's efforts to bridge its gaps in SGR implementation. China, driven by its state-led internationalisation strategy as part of the One Belt One Road initiative (OBOR/BRI), has become a major investor in Kenya's infrastructure, particularly the SGR. The China Road and Bridge Corporation (CRBC), a subsidiary of China Communications Construction Company (CCCC), served as the engineering, procurement, and construction contractor (EPC) for the SGR, complying with the Export-Import Bank of China's debt-side governance conditions (Zhu *et al.*, 2022).

The SGR project faced culture-mediated implementation tensions, including the controversy surrounding community engagement, environmental risks, contracting arrangements, construction risks, and financing arrangements (Githaiga & Bing, 2019). From an environmental and social impact viewpoint, Liu (2017) highlights the importance of effective collaboration among stakeholders, including the Kenyan and Chinese governments, the Export-Import Bank of China, CRBC, and third-party monitoring agents, to address environmental and social challenges and comply with regulatory requirements. However, Wissenbach (2020) argues that local politics negatively affected SGR implementation by overlooking development opportunities, such as creating local jobs and knowledge transfer to enhance local managerial skills, emphasising the need for a cultural sensitivity assessment of social interactions within the SGR's economic and socioeconomic impact. Several studies have examined the socioeconomic impact of the SGR. Githaiga (2021) found that the railway enhanced transport operations by reducing travel time and improving safety and economic activity. Their study highlights the positive impact on tourism and employment, albeit with winners and losers based on business sizes, sectors, and locations. Studies show mixed outcomes, with some authors arguing that the SGR project showcases effective collaboration, transparent governance, and comprehensive socioeconomic assessments (Liu, 2017) in infrastructure development, while others expose governance shortfalls.

Governance reforms influence budget overruns and investor confidence (Githaiga & Bing, 2019). Debt financing and weak governance in the China–Kenya partnership are the most rampant themes. The Export-Import Bank of China’s project financing policy influenced the decision to single-source the SGR project (Otele *et al.*, 2022). This condition reflects Chinese contractors’ compliance with the Export-Import Bank of China’s risk mitigation incentives. Despite a legal ruling against the single-sourcing procurement process, it did not directly impact SGR construction, operation, and financing, underscoring China’s focus on profitability over governance risks. Otele *et al.* (2022) identified governance challenges associated with the SGR project, including land acquisition delays, financial risk, and weak local institutions. Other studies reveal that cultural factors such as social media have significantly redefined stakeholder management, engagement, and project outcomes.

In summary, research on rail infrastructure management highlights contextual challenges and opportunities in international collaboration, debt financing, and governance, reflecting socio-cognitive learning complexity in addressing stakeholder challenges and enhancing governance for successful future projects. Table 2-3 summarises the variables identified from the reviewed literature on large infrastructure lifecycle management in Kenya.

Table 2-3: Variables from the reviewed literature on large infrastructure lifecycle management in Kenya

Variable classification	Sovereign and infrastructure lifecycle risk indicators	Theory	Source
COUNTRY-LEVEL GOVERNANCE VARIABLE			
Sovereign risk management	Sovereign bonds, debt sustainability risk, lack of loan transparency, tied loans		Hope, 2010; Onjala, 2018; Carmody <i>et al.</i> , 2022; Brautigam <i>et al.</i> , 2022
	Sovereign credit risk rating and transparency index		Huang & Lesutis, 2023; Johnston, 2019
	Social media influence on sovereign reputation; moral hazards of unwillingness to repay the debt; multilingual digital expression of debt-trap diplomacy		Brautigam, 2020; Brautigam, 2022; Sauer <i>et al.</i> , 2022
Resource pooling	Public-private partnerships, regulatory risk guarantees, policy risk, uncertainty, ambiguity, the executive agency and the state's capacity to develop and implement projects African state actors' institutional, economic, political, and bureaucratic contexts are firmly embedded.		Chiyemura <i>et al.</i> , 2023
Debt-trap diplomacy	Economic risk; debt-trap framing, politics, trade, and regional integration through better rail connectivity		Eickhoff, 2022; Irandu & Owilla, 2020
Policy strength	Prominent state role required to enhance citizen buy-in, address poverty, economic and national integration in infrastructure project development and enhance diversity and inclusion; the state should play a pivotal role in the provision, operation, and regulation of a country's infrastructure development system and integration into global capital and value chains		Hoka Osiolo <i>et al.</i> , 2017; Kochore, 2016; Ogallo & Jha, 2017; Schindler & Kanai, 2021
	FIT policy is ineffective in stimulating renewable energy investment due to the lack of technical expertise for policy design and implementation inefficiency Road classification system fosters regional connectivity informed by resource accumulation and geopolitical interests.	Neoliberal theory	Ndiritu & Engola, 2020; Owuor & Elliott, 2023; Ombagi <i>et al.</i> , 2023b; Ombagi <i>et al.</i> , 2023c; Ombagi <i>et al.</i> , 2023d
	Policy network collaboration through transparent information sharing, communication, cooperation, and agreement; cross-sector collaboration and ICT systems; allocate more resources to policymaking; knowledge brokerage, mobilisation, and cognitive skills influence policymaking formulation, implementation, and adoption outcomes; evidence-based information; stakeholder perspective integration in policymaking		
Political governance	Control of corruption		Kaufmann <i>et al.</i> , 2009; Twesigye, 2022; Müller-Mahn <i>et al.</i> , 2021; Yaffe & Segal-Klein, 2023; Otieno, 2023
	Government effectiveness		
	Regulatory quality		
	Rule of law		
	Political stability and absence of violence/terrorism		
	Voice and accountability		
	Politics of aspiration		

Macroeconomic risks			
Inflation	Inflation		Xu <i>et al.</i>, 2021; Irandu & Owilla, 2020; Oyuga <i>et al.</i>, 2021; Wekesa <i>et al.</i>, 2016; Rambo & Lucas, 2016; Pueyo, 2018; Odhiambo, Rambo, & Okello, 2020a
Exchange rate	Exchange rate		
Interest rate	Interest rates		
Commodity price	Plant and equipment import price		
Economic growth	Economic growth rate measured as GDP growth rate	Economic growth theory	
National debt	National debt to GDP		
	National debt to reserves		
	Fiscal constraints		
Foreign investment	Foreign direct investment (FDI)		Stakeholder theory
	Taxation income		
	Partnership management moderates the link between macroeconomic factors and the performance of geothermal renewable energy projects		
Carbon risk and climate change	Climate change mitigation through large-scale renewable energy deployment and dedicated low-carbon energy policy and greenhouse gas emissions reduction, integrating off-grid technology in the national energy mix; global donors and the electricity sector operators favour large on-grid and grid extension; energy consumption exacerbates carbon dioxide emissions; load shedding and transmission loss Climate-sensitive policies, legislation, and development plans to protect critical infrastructure	Environmental Kuznets curve theory Behavioural finance theory's anchoring and adjustment concept	Dalla Longa & van der Zwaan, 2017; Sergi <i>et al.</i>, 2018; Sarkodie & Ozturk, 2020; Oyuga <i>et al.</i>, 2021
PROJECT-LEVEL GOVERNANCE VARIABLES			
Debt-side governance risks			
Project characteristics	Large size: financial investment decisions, funding gaps and international collections		Pueyo, 2018; Dimitriou & Field, 2019; Klagge & Nweke-Eze, 2020; Pueyo, 2018; Egli, 2020; Hope, 2010; Kolstad & Wiig, 2011; Baimwera <i>et al.</i>, 2017; Kamau, 2016; Alden & Jiang, 2019; Ndiritu & Engola, 2020
	High upfront financing and low operations and maintenance cost		
	Resource pooling		
	Corruption		
	Limited PPP participation by local banks		
Tariff rates	Tariff rate volatility and indexing to inflation/exchange rate		
Low-carbon financial instruments	Low carbon finance uptake		
Market affiliation	Market affiliation		
Carbon emission reduction	Carbon off-set prices		
Complexity	Lack of sufficient knowledge and the capacity to maintain the systems' quality and operational efficiency; limited technical know-how		
Technological risk	Technological risk		
Debt-to-equity ratio	70:30 debt-to-equity ratio		
Maturity	Longer maturity for public projects		

Grace period	Generous grace period for public projects		
Interest rate	The high interest rate on commercial debt and quicker loan processing		
	A low interest rate on the concessional loan and a longer processing time		
	Lower interest rates from international banks than local		
	Low interest rate for public projects		
Financial covenants	Restrictive procurement covenants		
Bankruptcy	Bankruptcy and litigation jurisdiction		
Lifecycle project management risks			
Initiation	Unsustainable project selection and implementation; corruption; political risk; information asymmetry; lack of transparency		Pueyo <i>et al.</i> , 2016; Ferchen & Perera, 2019; Chen, 2022; Daniel & Muchelule, 2023; Oluoch <i>et al.</i> , 2020
Lifecycle integration	Regulation and market access included project planning, procurement, contracting, market access, and securing land		
Construction phase	Resource and technology risks were resource uncertainty, new technology, low implementation capabilities, and industrial sector development		
	Low rates of budget absorption, cost overrun, and poor quality due to ineffective construction monitoring		
Operations and maintenance	Off-taking risks were plant operating performance, liquidity, credit risk, and financial structure		Kiplagat <i>et al.</i> , 2011; Lala <i>et al.</i> , 2022
	Type of energy, ownership, environmental impact, distance and visibility, community job creation, and yearly renewable energy tax influence the public's willingness to pay		
Scope and change management	Huge capital expenditures are required in the discovery and drilling of the well and construction of the plant, though the amount of operational expenditure is small; infrastructure designs, including type, height, and width, disrupt the wildlife ecosystem		
Schedule management	Inability to attract early-stage investors due to risk and uncertainty and slow industrialisation; executive leadership commitment mitigates schedule delay		Mbataru, 2018; Spittler <i>et al.</i> , 2021; Teipelke, 2014
Cost management	Lifecycle cost overrun, returns, and financial sustainability; executive leadership commitment mitigates cost overrun		Pram <i>et al.</i> , 2022; Pueyo <i>et al.</i> , 2016
Quality management	Poor quality and benefits realisation management		Githaiga & Bing, 2019
Resource management	Resources allocation, management support, stakeholder involvement, monitoring and evaluation, and staff competence	Change management theory Iceberg theory Critical success factors model Stakeholder theory	Githaiga, 2021; Densford <i>et al.</i> , 2018
Communication management	Policy, communication, and reporting		Ombagi <i>et al.</i> , 2023a; Ombagi <i>et al.</i> , 2023b; Ombagi <i>et al.</i> , 2023c; Ombagi <i>et al.</i> , 2023d

	Decentralised roles and responsibilities in project planning, procurement, contracting, and permitting power generation capacity responsibilities influence decision-making; feasibility studies, data labelling, and distribution		Eberhard <i>et al.</i> , 2017
Procurement management	Poorly designed procurement and contract management; contract management risk, performance, and monitoring; change management, administration, and compliance; opaque contractual agreements and colossal land-acquisition cost overrun	Stakeholder theory	Odhiambo, Rambo, & Okello, 2020a
Stakeholder management	The foreignness of PPPs influences cross-border stakeholder management	Globalisation/ internalisation theory	Dykes <i>et al.</i> , 2020; Hope, 2010
	Executive leadership interference in tariff setting; risk and cost management incentives; poor performance contracting; scope creep by inserting additional social or developmental objectives in contracts; lack of role clarity between the government and regulator; political objectives overweigh profitability; unbundled energy sector structure enhanced corporate governance, institutional capacity building, managerial focus, accountability, and transparency in sub-sectors		Twesigye, 2022
	Stakeholder satisfaction, completion time, cost reduction, quality, objectives, and investment; development expenditure determines PPP performance	Stakeholder theory	
	Partnership management moderates the link between macroeconomic factors and the performance of geothermal renewable energy projects		
Stakeholder engagement	Corporate strategies of depoliticising land claims by pastoralism as unviable with the goal of legitimising large-scale investments as the ideal through policy and planning without interrogation, which has distorted technical discourses around visions of economic viability; colonial discourse has perpetuated inequality; Indigenous peoples' policies are not triggered; lack of recognition of land rights; lack of consultation and free, prior, and informed consent; failure to address the unintended social and economic consequences of projects	Stakeholder engagement theory	Achiba, 2019; Renkens, 2019
	Integrate public participation, decision-making, project implementation, and monitoring in environmental impact assessment; stakeholder input and subject matter experts		Omenge <i>et al.</i> , 2022; Zhu <i>et al.</i> , 2020
Risk management	Political risk and issue management environment		Hoka Osiolo <i>et al.</i> , 2017
	Modern systems and tools for holistic error, risk, uncertainty, and ambiguity management culture		Alberti, 2020; Love <i>et al.</i> , 2022
	International experience in risk, frequency of social unrest events, and safety management		Morrisette, 2020
	Risk mitigation challenges in the approaches, ownership, and financing structure instruments; complex risk structure; public		Klagge & Nweke-Eze, 2020

	investment and support from domestic sources and development finance institutions		
SOCIOCULTURAL CONTEXT VARIABLES			
Education	Education level and university capacity to impart relevant skills; gross enrolment in tertiary education; highly centralised institutional arrangements; lack of accountability for supervisors; tendency to produce low-impact research; poor physical infrastructure – internet access		Colenbrander <i>et al.</i> , 2015; Pueyo, 2018
Talent shortfall	Rising unemployment and international migration of well-trained professionals to industrialised countries		Takase <i>et al.</i> , 2021
Human capital development	Lack of human-centred risk and uncertainty variables in conceptual frameworks; poor scientific research output		Gregory & Sovacool, 2019
Demographics	Incorrect population growth and demographics forecasting		Pueyo & Maestre, 2019
	Human capital development/soft infrastructure		Kolstad & Wiig, 2011
Socioeconomic discrimination	Socioeconomic class, ethnicity, and geography		Lesutis, 2020; Lesutis, 2022
	Socioeconomic discrimination through infrastructure development projects, low generation, distribution, and networking infrastructure		Pueyo <i>et al.</i> , 2016; Harvey & Knox, 2012; Gambino & Périer, 2020; Wissenbach & Wang, 2017; Githaiga, 2021; Otele <i>et al.</i> , 2022; Sang <i>et al.</i> , 2022; Enns, 2019; Huang & Lesutis, 2023
	Reproduced pre-existing power geographies and contributed to new power geometries; poor employment and working conditions		
Social governance	Social and reputational risks, including precedents of protests, poverty, consultation and compensation policy, human and labour rights, and governance risks, represented by unsustainable transaction costs, corruption, weak rule of law enforcement, and insecurity; low local content in projects, jobs, and skills development; employment, debt sustainability and neocolonialism.	Modernisation theory	
Environmental governance	The share of renewables in the energy mix, geographic diversification of the renewable energy integrated into the grid, connectivity and transmission costs denoted by the percentage of people connected to the grid, environmental and socioeconomic risk mitigation		
	Perception of property rights and rule-based governance; contracting and licensing; land and human rights dispute		
	Land users can use policy and legal knowledge to mobilise alternative ideas about the impacts of land deals and negotiate/contest government and international investors' land-use changes		
	Long-term geopolitical interests of the Chinese state that these actors are supposed to advance on the one hand, and their own short-term financial profit-oriented interests and Chinese SOEs are constantly improvising their on-the-ground activities under the state's influence		

Source: Author (2023)

2.5. Part IV: A review of regional research in infrastructure lifecycle management

2.5.1. Sub-Saharan African (SSA) analysis level

2.5.1.1. Sovereign risk and infrastructure debt-side governance

The acronym “SSA” represents Sub-Saharan Africa. Muhanji and Ojah (2016) used panel data regressions of secondary data to show that political and weak legal governance institutions, external debt, and economic indicators affect infrastructure investment outcomes. Their analysis focused on the East African regional bloc (Kenya, Uganda, and Tanzania) while considering the impact of political regime changes and governance trends. Kaufmann *et al.* (2009) demonstrated that improved governance, measured by world governance indicators, reduced external debt in Kenya following a political regime change in 2002. However, political risk after the 2007 elections resulted in declining governance. Similar patterns were observed in the Central Africa, Eastern and Horn of Africa, Southern Africa, and Western Africa blocs, but the relationship was less clear in North and West Africa. The research emphasises the role of geographic proximity, shared economic structures, intra-regional activity, and shared culture in enhancing regional integration. Were (2018) argues that the portrayal of China as Africa’s major creditor and the debt-trap narrative overlooks the decision-making power of African governments. These studies reveal that the complexities of governance, its impact on African development, and concerns about infrastructural debt and corruption must be included in sovereign risk assessments.

Fowler (2019) highlights the lack of project-level analysis and comprehensive documentation of China’s African economic strategies. Mpapalika and Malikane (2019) investigated the determinants of sovereign risk premiums in African countries, identifying key drivers such as public debt, GDP growth, inflation rate, and market sentiment. Morsy and Moustafa (2020) revealed that the mispricing of African sovereign risk is due to discriminatory behaviour of herding by investors rather than macroeconomic fundamentals. Despite improving real macroeconomic indicators, Sub-Saharan African countries still face higher borrowing costs, undermining the efficient market hypothesis. Brautigam (2022) challenges the Chinese debt-trap diplomacy meme and highlights the impact of sensationalised stories on African sovereign risk reputation. Their study emphasises the need for academicians to bridge the gap between policy, media, and research to build more accurate narratives. Cirolia (2020) discusses the financing challenges of sustainable urban development in Africa due to fractured fiscal authority and fragmented infrastructure.

Kengdo *et al.* (2020) analysed the effect of external debt on infrastructure development, finding a negative impact except for a sustainable debt level. Kapindula and Kaliba (2022) show that external debt servicing negatively affects infrastructure spending in Zambia. Brautigam (2022) uses Chinese loan data to debunk arguments about China’s purposeful use of loans in Zambia, emphasising that coordination problems and fragmented authoritarianism in Chinese lending are facilitated by moral hazards among decision-makers

within the borrowing nation. Arewa (2023) attributes Zambia's default and debt cycles to fragmented governance and colonial legacies, affecting low-income residents in developing countries. Gort and Brooks (2023) compare Zambia's default to the financial collapse of the 1980s, highlighting the influence of African borrowing on global economic dynamics and hegemony struggles. These studies reveal the relationship between governance institutions, external debt, and infrastructure development in Africa hinges on inaccurate narratives and a limited understanding of regional collaboration dynamics.

2.5.1.2. Sovereign risk and infrastructure project management

Environmental, social, and governance (ESG) in infrastructure selection, planning, and design processes are crucial for creating value for money for all stakeholders. Asongu *et al.* (2019) found that renewable energy consistently reduces carbon dioxide emissions, based on an assessment of the relationship between renewable energy and environmental quality in 40 African countries from 2002 to 2017, and recommended replacing non-renewable energy sources with green alternatives to meet energy SDGs. Governments should make environmentally conscious decisions, promote green energy, and consider sustainable CO2 emission reduction. Opeyemi *et al.* (2019) discovered that corruption control, regulatory improvements, and better private sector finance could positively impact renewable energy usage in manufacturing exports based on investigating the dynamic connection between renewable energy usage and trade performance in SSA. Soulé (2020) used a case study of Benin–China relations to argue that African infrastructure delivery allows political leaders to gain electoral support and consolidate power.

African bureaucrats are pivotal in dealing with Chinese stakeholders, exerting agency through institutional and regulatory power. Wang (2022) compared standard gauge rail projects in Kenya and Ethiopia to elicit state capacity variance in infrastructure development. The author proposes a political championship theory, emphasising bureaucratic capacity and political leaders' commitment as influential sociocultural factors in the infrastructure lifecycle development. Based on panel data analysis, Oluoch *et al.* (2021) propose an empirical model promoting renewable energy consumption in SSA based on a positive correlation between renewable energy consumption and GDP per capita and the education index. However, there was a negative correlation between renewable energy consumption with CO2 emissions and the life expectancy index. Nkemgha *et al.* (2023) revealed that infrastructure development enhances industrialisation moderated by financial development and human capital. Koppa *et al.* (2023) found that existing infrastructure sustainability assessment processes in Africa correspond to most global SDG targets. Studies focusing on ESG/SDGs highlight the need for sustainability assessment processes that address climate change, social justice, and environmental risk in infrastructure projects. However, they do not evaluate how managerial socio-cognitive learning motives affect adapting new processes to contexts.

In conclusion, studies at the SSA level underscore the importance of considering ESG, corruption control, regulatory quality, stakeholder engagement and human capital development in infrastructure project planning and implementation to ensure sustainable development outcomes. Yet, there is a gap in assessing the socio-cognitive determinants of regional collaboration among managers in infrastructure projects.

2.5.2. BRICS analysis level

2.5.2.1. Sovereign risk and debt-side governance

The acronym “BRICS” represents Brazil, Russia, India, China, and South Africa and was initially coined as “BRIC” by economist Jim O’Neill in 2001. The need for global debt-side governance policy reforms and infrastructure development disparities influenced the formation of BRICS. The first BRICS summit in 2009 occurred during the global financial crisis, where the member nations coordinated financial policy through the G20 – an intergovernmental forum addressing global economic issues (Vazquez, 2020). BRICS aimed to reform international financial institutions and increase the representation of emerging economies. Consequently, the New Development Bank (NDB) and the Contingent Reserve Arrangement (CRA) were established to provide funding to BRICS nations during liquidity crises. The NDB promotes sustainable infrastructure and regional integration but faces project selection and monitoring challenges. Critics argue that BRICS may create new power asymmetry and not substantially address the needs of the Global South. Despite this, BRICS represents a significant global population and GDP portion that has developed policy and institutional frameworks to streamline infrastructure development (Vazquez, 2020).

The impact of China’s carbon trading policy on carbon prices was investigated by Song *et al.* (2018), and their results demonstrate the need for government intervention for a smooth carbon market operation, reflecting weak role distribution between the state and markets. Joshua and Alola (2020) found a strong relationship between coal-led growth, FDI, and environmental sustainability in South Africa, emphasising policies that bolster the transition to renewable energy. Azam and Haseeb (2021) revealed the importance of renewable energy utilisation and market size among the factors affecting FDI in BRICS countries. Ahmed *et al.* (2021) found excess volatility in government bond prices among BRICS nations, which challenges the efficient market hypothesis consistent with the findings of Morsy and Moustafa (2020) within SSA. Pram *et al.* (2022) assessed Eskom’s financial and environmental sustainability, suggesting a shift to natural gas has long-term viability. Zhang *et al.* (2023) studied the impact of high-speed rail (HSR) stations and airports on local debt in China and revealed repayment constraints due to with poor performance of infrastructure systems. These studies find similar large-scale infrastructure policy design and implementation risks in BRICS to SSA. They reveal that regional groups of nations face similar challenges in collaborating to develop infrastructure systems, despite adopting sustainable development goals to raise the representation of emerging economies on the global infrastructure delivery landscape.

2.5.2.2. Sovereign risk and infrastructure project management

Liu *et al.* (2015) explored project risk management practices, comparing China, Poland, and Singapore using a case study approach and found that culture affects contractors' risk perception and management in infrastructure projects. Meng *et al.* (2016) corroborate the findings by exploring the relationship between national culture and infrastructure sustainability prioritisation by comparing practices in China, the United Arab Emirates, and Sri Lanka and found that national culture influences stakeholder interest prioritisation. Against a cross-border learning backdrop, Ansar *et al.* (2016) cautioned low to middle-income nations against unthinkingly following China's infrastructure development model, based on an analysis of its infrastructure investment boom that revealed that while infrastructure boosts economic productivity and competitiveness, poorly managed projects elevate economic fragility. Yan *et al.* (2018) found that land policy design often contradicts implementation due to various factors, including demographics and land compensation for rural resettlers in China and recommends raising land compensation standards and promoting benefit-sharing for successful resettlement. Chang and Murakami (2019) studied Shanghai's land-use rights prices under state leasehold systems, showing the impact of metro extensions on land values and the role of local government strategies and private developers in shaping pricing. Yilmaz and Changming (2020) highlight effective China–Russia cooperation in BRI projects, emphasising economic and political policy objectives contributed to their growth, while Banerjee *et al.* (2020) investigated the role of transportation networks on China's regional economic activity, finding that proximity to networks positively affects GDP levels but not growth. Li *et al.* (2020) explored the sustainability performance of BRICS and found that China and Brazil lead in terms of achieving sustainability, emphasising the need for cross-border renewable energy trade. Venter *et al.* (2020) analysed green infrastructure disparities across race and income in South Africa, revealing inequities since Apartheid and governance failures in urban greening. Bennett (2020) critiqued the fetishisation of Soviet ruins in infrastructure narratives, showing how political risks can lead to infrastructure obsolescence and decay. Tysiachniouk *et al.* (2020) studied interactions between oil companies and reindeer herders in Russia's Arctic, demonstrating that benefit-sharing policy arrangements shifted to increase herders' access to compensation and markets.

Vazquez (2020) identified operational challenges in Brazil's external public sector finance management, emphasising differences in political systems among BRICS nations. Adebayo *et al.* (2021) explored the nexus between coal energy consumption, economic growth, renewable energy, and CO₂ emissions in South Africa, advocating transitioning to renewable energy. Wang *et al.* (2021) explore mining-induced displacement in China and finds that cultural factors determine resettlement and should be considered in tailoring community assistance programmes to project contexts. Mazele and Amoah (2022) examined poor municipal infrastructure management in South Africa, identifying funding, planning, and oversight issues

that drive service protests and decay. Washbourne (2022) analysed urban environmental policy narratives in different cities and revealed that urban green infrastructure determines decision-making driven by biophysical, social, and economic risks. Sun *et al.* (2022) explored links between infrastructure development, technological efficiency, and resource consumption in BRICS, suggesting the potential for reducing resource consumption through technological efficiency. Zhang *et al.* (2023) examined the effects of China's high-speed rail network on regional tourism development, revealing market redistribution and urban centre reallocation. Williams *et al.* (2023) studied Indian infrastructure policy implementation and sub-national governance restructuring for mega projects, emphasising the need to reform implementation.

2.5.3. Global analysis level

2.5.3.1. Sovereign risk, debt-side governance, and macroeconomic risks

Müllner (2017) conducted a systematic review of international project finance, noting that firms use the project finance strategy to address identifiable sources of risk in global investments. Thus, Müllner (2017) proposed a shift towards practical and micro-level contractual management tools' analysis in international research. Gallagher (2018) found that China's development banks provide more flexible financing for cleaner energy than their traditional counterparts. Egli *et al.* (2018) analysed financing conditions for renewable energy, highlighting the effects of macroeconomics and industry experience on cost reduction. Dorobantu and Müllner (2019) evaluated debt-side governance in infrastructure projects, finding that banking syndicates' geographic composition reflects a trade-off between external leverage and internal reorganisation, driven by host-country political risk and systemic risk. Egli (2020) investigated changes in renewable energy investment risk in Italy and Germany, revealing declining premia due to technology reliability, data availability and assessment tools, and stable policies. Dang and Partington (2020) explored the relationship between culture and sovereign risk ratings, finding that culture significantly determines ratings and the probability of rating changes regarding upgrades and downgrades. Furthermore, Ho *et al.* (2023) find that national culture influences sovereign risk spillover effects in financial and non-financial contexts, demonstrating its implication for infrastructure development risks.

2.5.3.2. Sovereign risk and infrastructure project management

Mayfield and Mayfield (2012) triangulated four cultural models to reveal a significant relationship between national culture and infrastructure development disparities. Infrastructure project business cases do not always lead to benefits realisation. In this context, Albalade and Fageda (2016) revealed that the net effect of high-speed rail (HSR) on tourism in Spain was not consistently positive, potentially due to network design and a substitution effect on air transport, suggesting ineffective collaborative planning. Manley & Chen (2017) found that collaborative learning improved the governance and performance of large-scale

infrastructure projects in Australia. This study built on dynamic capabilities to propose a collaborative learning framework, identifying 18 learning routines across three phases: exploring, transforming, and applying knowledge. The study revealed that collaborative learning routines influence three KPIs of infrastructure projects, including (1) cost and time efficiency, (2) innovation, collaboration and quality of work, and (3) environmental, community impact, and safety. In line with the collaborative learning concept, Gray & Ulbrich (2017) found ambiguity acceptance and translation skills as the most critical ‘soft skills’ among managerial traits that can boost project success more than “technical skills”, like planning and scheduling. While this study recommends a shift to enhancing human-centred project management capacity for sustainable development, Ward and Skayannis’ (2019) evaluation of 27 projects from nine countries reveals a lack of adherence to SDGs. Dimitriou and Field (2019) emphasise large infrastructure investment decision-making frameworks, considering the challenges of meeting SDGs. However, Dykes *et al.* (2020) reveal that the foreignness in PPP may harm project completion time but not the probability of completion. The scale and scope moderate the effect of foreignness on performance. Hence, governments and policymakers must know that the participation of foreign firms has implications for local economies and stakeholders impacted by PPPs. Consequently, proper planning minimises costs by using available resources optimally and enabling cross-cultural project teams to have a shared vision when creating a regionally integrated infrastructure development project and strategic objectives.

Morrisette (2020) recommends reframing infrastructure risk management as an investment in long-term project success rather than mere cost optimisation. The study highlights that risk teams often oversimplify project contexts due to budget constraints, leading to inadequately defined risk programme objectives and team compositions. Despite the lack of extensive data, stochastic risk analysis methods are widely adopted for complex infrastructure projects. Illusions of risk transfer reliability often disregard the complex impacts of transferred risks. Risk governance challenges arise from the siloed nature of project delivery models and the propagation of risks across bureaucratic boundaries. Rapidly changing contexts and varied risk communication methods add further complexity. The study suggests that investing time and resources in active risk management is crucial. External peer reviews and continuous risk information updates are proposed to improve practice. Alberti’s (2020) research employed the fuzzy set theory to assess construction risks in Latin American transport projects and found that numeric, probability-based analyses insufficiently account for project ambiguity. Alberti (2020) emphasises using methodologies incorporating institutional context perception for enhanced risk management. Chen’s (2022) investigation into the Channel Tunnel project reveals that political forces in Britain and France impacted the world’s largest privately funded engineering project. The project faced financial and technical issues, missed deadlines, and disputes, causing cost overruns. Political risk and financial problems led to reorganisations and

substantial losses to the private sector despite the project being the UK's most expensive proposed construction. Chen's (2022) study highlights the importance of proper planning, design finalisation before construction, and international agreements to mitigate political risks and ensure project continuity under risk, uncertainty and ambiguity. Wiewiora and O'Connor (2022) found that US project managers face numerous ambiguities grouped into seven higher-order categories: task complexity, core project management, stakeholder management, human resource capacity, insufficient task and role information, mistakes and errors, and unforeseen circumstances and occurrences. While "task-related" ambiguity evoked positive emotions, "people-related" ambiguity evoked negative emotions, highlighting the need to emphasise human-centred infrastructure policy design and implementation approaches. In this context, Walker *et al.*, (2023) emphasise the value of dialogue as an observable cultural artefact for intervening power asymmetries in collaborative large-scale infrastructure development projects in Australia.

The common challenges in Kenyan, SSA, BRICS and global infrastructure projects indicate that despite an increasing number of large-scale infrastructure development projects, human-centred resource pooling through bilateral and multilateral agreements has not significantly yielded the desired economies of scale to mitigate sovereign risk. Recommendations for collaborative learning to improve the governance and performance of infrastructure projects, including cost reduction, revenue stability, technology funding, and policy reforms, reveal persistent human-centred policy design and implementation challenges. Large projects face hurdles like land disputes and environmental concerns. Understanding how managers utilise socio-cognitive learning for careful planning, community engagement, and sustainability is crucial. Weak governance, political risk, and macroeconomics contribute to sovereign risk, emphasising the importance of ESG factors, stakeholder engagement, and culture for infrastructure viability and risk mitigation. Table 2-4 summarises the findings from studies across the Sub-Saharan Africa, BRICs and global contexts.

Table 2-4: Variables from the reviewed literature on large infrastructure lifecycle management in the international context

Variable classification	Sovereign and infrastructure lifecycle risk indicators	Contextual analysis level	Source
DEBT-SIDE GOVERNANCE AND MACROECONOMIC VARIABLES			
Sovereign risk premium	Exchange rate, money supply to GDP ratio, and trade; public debt to GDP ratio, GDP growth, inflation rate, foreign exchange reserves, commodity price, and market sentiment are significant sovereign risk determinants	Normative and behavioural finance Africa and Sub-Saharan Africa	Mpapalika & Malikane, 2019; Morsy & Moustafa, 2020; Ahmed <i>et al.</i> , 2021
Sovereign risk rating	Hofstede's individualism and a long-term orientation cultural variable significantly determine sovereign ratings and the probability of a change in those ratings for an international bond portfolio based on S&P and Moody's ratings; individualism and a long-term orientation make upgrades more likely and downgrades less likely	Global National culture theory	Dang & Partington, 2020
Infrastructure development	The infrastructure development index measures infrastructure lifecycle management outcomes	Sub-Saharan Africa	Kengdo <i>et al.</i> , 2020
	Infrastructure creates economic value	China	Ansar <i>et al.</i> , 2016
	Debt-financed overinvestment in unproductive infrastructure projects results in the build-up of debt, monetary expansion, instability in financial markets		
	Poorly managed infrastructure investments mainly explain China's rising economic and financial problems		
	Higher-quality infrastructure investments can mitigate infrastructure-led national financial and economic crises		
	Political processes ignore community integration, perpetuating infrastructure obsolescence by rendering infrastructure and amenities along with the infrastructure obsolete	Russia	Bennett, 2020
	Transportation networks influence regional economic activity by connecting historical cities	China	Banerjee <i>et al.</i> , 2020
	Proximity to transportation networks has a moderately sized positive causal effect on per capita GDP levels across sectors but no effect on GDP growth because factor mobility plays an important role in determining the economic benefits of infrastructure development in China		
Regional resource pooling	International cooperation boosts regional development by spurring infrastructure, connectivity, and innovation	BRICS	
	Infrastructure development contributes to mitigating political risk by creating a more institutionalised and harmonious regional existence via an economy-driven approach to security to address such threats as extremism, separatism, and terrorism	BRICS	
	Cooperating with firms that dispose of superior risk-management capabilities can be economically feasible despite potentially higher costs	Global	Müllner, 2017
	China Development Bank and the Export-Import Bank provide more development finance than the World Bank and its counterparts and have a more flexible business model for financing cleaner energy	Global	Gallagher, 2018

	The current mix of Chinese energy finance is in carbon-intensive projects		
Debt-trap diplomacy	Underestimated decision-making power of African governments and corruption	Sub-Saharan Africa	Were, 2018
	Providing projects/loans with terms too challenging for states to pay back, ultimately forcing them to accept economic or political concessions in Brazil	BRICS	Vazquez, 2020
Debt management	Debt write-offs amplify unwillingness to pay the debt	Sub-Saharan Africa	Muhanji & Ojah, 2016; Fowler, 2019; Kengdo <i>et al.</i> , 2020; Kaliba <i>et al.</i> , 2009; Arewa, 2023; Opeyemi <i>et al.</i> , 2019; Vazquez, 2020
	Rising sovereign debt in Africa		
	Rising external debt, external debt to GDP		
	Shrinking official development assistance to GDP		
	Rising public external debt servicing burden		
	External debt cancellation signalling sustainability risks		
	Escalating borrower moral hazards		
	Limited transparency undermines public scrutiny of sovereign debt transactions		
	Regulatory reform to increase private sector project financing	BRICS	Vazquez, 2020
	Mismanaged external public sector financing in Brazil		
	Debt payment default by sovereign governments depends upon willingness to default and the nation's capacity to pay	Global	Dang & Partington, 2020
International trade	Terms of trade, exports to GDP, and imports to GDP; market size (GDP), trade, and tourism	Sub-Saharan Africa	Muhanji & Ojah, 2016; Azam & Haseeb, 2021
	FDI redirects capital to low-carbon infrastructure projects	Sub-Saharan Africa	Joshua & Alola, 2020
	Economic discriminatory behaviour by international investors leads to sovereign risk mispricing via herding	Sub-Saharan Africa	Morsy & Moustafa, 2020
	Widening sovereign bonds interest rate	Sub-Saharan Africa BRICS	Morsy & Moustafa, 2020; Ahmed <i>et al.</i> , 2021
	Sovereign bond issuance costs	Sub-Saharan Africa	
	High default insurance costs; widening credit default swap (CDS) spreads	Sub-Saharan Africa BRICS	Morsy & Moustafa, 2020; Ahmed <i>et al.</i> , 2021
	The geographic composition of banking syndicates for infrastructure project finance is partly driven by the level of host-country political risk and, in part, by the level of systemic risk in global financial markets	Global Debt governance theory	Dorobantu & Müllner, 2019
	Syndicates are more geographically dispersed when an investment faces high political risk in the host country		
	Systemic risk in global lending markets impedes debt-side governance		
Globalisation	Lack of sustainable urban financing frameworks	South Africa	Cirolia, 2020
	The foreignness in PPP may harm project completion time but not the probability of completion; the scale and scope moderate the effect of foreignness on performance	Global	Dykes <i>et al.</i> , 2020
Political and governance institutions	Control of corruption	Sub-Saharan Africa	Kaufmann <i>et al.</i> , 2009; Muhanji & Ojah, 2016
	Government effectiveness		
	Regulatory quality		

	Rule of law		
	Political stability and absence of violence/terrorism		
	Voice and accountability		
	Politics of aspiration		
	Complexity from decentralised governance systems		
	Fragmented decision-making		
	Hybrid infrastructure service delivery systems with under-accounted for realities, fractured fiscal authority, fragmented infrastructure networks, and hybrid service delivery	Sub-Saharan Africa	Soulé, 2020
	Institutional and regulatory power to frame infrastructure development as future-making to protect political careers by African bureaucrats, interchangeably understood as government officials, civil servants, and technical and administrative experts; exert agency when dealing with Chinese stakeholders		
	Project finance is practical proof that lenders can serve as political allies and providers of expertise	Global	Müllner, 2017
Policy strength	Political leaders disregarded their restraints on over-borrowing		
	Distinctive Chinese ideas about debt sustainability create additional disincentives for close Chinese monitoring		
	Frequent debt cancellations from China and other lenders exacerbated moral hazard risks		
	Fragmented governance and colonial overhang create incentives for debtors and creditors that contribute to cycles of sovereign debt	Sub-Saharan Africa	Brautigam, 2022; Williams <i>et al.</i> , 2023; Egli, 2020
	limited state capacity to navigate between different actors/lenders and assess technological risk in designing policy		
	Align infrastructure spatial planning and implementation to transform economic and urban geographies to transform national and sub-national governance		
Intragenerational, intergenerational, international sovereign debt risk-bearing	Cycles of sovereign debt pose a particular hazard to residents within countries; high debt service undermines the quality of life	Sub-Saharan Africa	Brautigam, 2022
	Contrary to most applications of transaction cost theory, governments, like firms, do not minimise transaction costs		
International project finance and management practices	Project finance provides a practical example of how firms devise strategies to address identifiable sources of risk in international investments		
	International business research has focused on uncertainty as a strategy determinant	Global Debt governance theory	Müllner, 2017
	Classical economic theory clarifies the difference between unmeasurable uncertainty and measurable risk		
	International business research should depart from broad uncertainty-related mechanisms such as hierarchy and control equity towards more micro, contractual management tools with high practical relevance		

	Financial arrangements cannot be viewed in isolation from other parts of the nexus of contracts		
	A holistic approach, including contractual and socioeconomic management, should be applied to the internationalisation strategy to achieve higher validity and practical relevance		
	Transaction cost theory has low managerial practicability because its static nature can provide false normative prescriptions		
	Project management research on international investments would benefit from addressing the pivotal role of debt providers in the dynamics of megaprojects' failures		
	Financing conditions have strongly improved due to macroeconomic conditions (general interest rate) and experience effects within Europe's renewable energy finance industry; experience rates contributed 5% (photovoltaic) and 24% (wind) to the observed reductions in the level cost of electricity (LCOE), indicating technological learning is critical to lifecycle management costs	Europe	Egli <i>et al.</i> , 2018
	There are risk governance issues, and the siloed nature of project delivery models contrasted with the tendency for risks to propagate across bureaucratically constructed boundaries and borders, spatially and temporally	Global	Morrisette, 2020
	Risk management teams cannot keep up to date with the reality of rapidly changing contexts, coupled with the friction introduced by varying modes of risk communication		
PROJECT MANAGEMENT VARIABLES			
Lifecycle integration	Loan-specific data, lenders and contractors, and process tracing in infrastructure lifecycle management	Global	Brautigam, 2022; Wang, 2022; Zhang <i>et al.</i> , 2023; Ansar <i>et al.</i> , 2016; Mazele & Amoah, 2022; Dimitriou & Field, 2019; Ward & Skayannis, 2019; Dykes <i>et al.</i> , 2020; Chen, 2022
	Coordination problems cause information asymmetry	Sub-Saharan Africa	
	Political decision-making in the infrastructure sector is highly dependent on bureaucratic expertise and practices interpreting and applying the "rules of the game", including informal laws, standards, norms, procedures, routines, and conventions		
	Economic growth from infrastructure projects is one of the benefits of realisation outcomes	Global	
	Investing in unproductive projects results in a boom during construction, followed by a bust when forecasted benefits fail to materialise, and projects drag the economy	China	
	Numerous causes of poor municipal infrastructure management include lack of funding and capacity, poor planning and oversight, lack of by-laws, grant dependency, and corruption. The municipality's failure to address these issues has resulted in increased service protests, destruction of public property, interruption of services, and loss of confidence in municipal administration	South Africa	

	Rail and road transportation projects are often deemed “unsuccessful” because they have been unable to meet their original expectations regarding outturn cost, on-time delivery, and construction quality	Global	
Initiation	Unsustainable project selection and implementation by African bureaucracies using institutional and regulatory power to exercise control over the process and outcome of negotiations	Sub-Saharan Africa	
	Land compensation and allocation standards for rural resettlers in China have gradually improved despite contradictions between policy design and practice	China	
	Moral hazards in land/property price adjustment due to infrastructure development reflecting ineffective (i) law and regulations, ii) procedure for land acquisition and compensation, and iii) land valuation approaches for compensation	China	
	Developing adaptive strategic decision-making frameworks for mega infrastructure investments is critical because contagious narratives about “the global infrastructure gap” and related estimates of more geographically specific ‘infrastructure deficits can effectuate inept outcomes if set against the multiple critical challenges of the 21st century. Inept outcomes are visible if one considers failing efforts at meeting global and local sustainable development goals. Lessons learnt should be revisited when evaluating new knowledge, evidence, and prospects offered by new technological horizons to deliver more sustainable infrastructure development outcomes	Global	
Planning	Proper planning helps in minimising costs by using available resources in an optimum condition	Global	
	Proper planning enables cross-cultural teams, influenced by home-country policy biases, to have a shared vision		
Construction phase	Varying state capacity of developing countries to implement projects; when a project is highly salient to leaders’ survival, they commit to it; leaders with strong authority build an implementation coalition, leading to higher lifecycle management effectiveness	Sub-Saharan Africa	
	Financial and technical issues, missed deadlines, and high-profile disputes between the Anglo-French company Eurotunnel, which oversees the project, and its suppliers caused cost overruns and schedule delays.	Europe	
Operations and maintenance	Cross-sectoral demand and supply elasticity undermine infrastructure profitability in rail and road transportation	China Spain	
Scope and change management	China has a distinct advantage in infrastructure delivery; technological efficiency change	Global	Ansar <i>et al.</i> , 2016
Schedule management	Within structural and institutional constraints, an individual agency influences the infrastructure lifecycle	Sub-Saharan Africa	Wang, 2022
	China’s track record in delivering infrastructure is no better than that of rich democracies	Global	Ansar <i>et al.</i> , 2016

	Banks do not comply with their loan appraisal, negotiation, and approval time commitments	BRICS	Vazquez, 2020
Cost management	Lifecycle cost overrun, returns, and financial sustainability; executive leadership commitment mitigates cost overrun	Sub-Saharan Africa	Wang, 2022
Quality management	Renewable energy consistently decreases carbon emissions	Global	Asongu <i>et al.</i> , 2019
Resource management	Financial development; resource consumption	Sub-Saharan Africa	Asongu <i>et al.</i> , 2019; Sun <i>et al.</i> , 2022
Communication management	Decentralised governance creates complexity	Global	
Procurement management	Multiplication of stakeholders has created fierce and unregulated competition for infrastructure contractors; fragmented authoritarianism by lenders has meant an absence of top-down coordination of firms' and lenders' activities	Sub-Saharan Africa	Brautigam, 2022
Stakeholder management	Governments should ensure that project stakeholders know the complementary policies' success in three dimensions: environmental effectiveness, economic efficiency, and limited effect on competitiveness; enact low-cost policies and avoid overlapping; create adequately forward-looking policy incentives to boost technological innovation	Sub-Saharan Africa	Asongu <i>et al.</i> , 2019
	Include community risk perception and resettlement preferences and options in project planning	China	Wang <i>et al.</i> , 2021
	Reluctance to relocate from the project development site was higher among the elderly, those with stronger social networks, the less educated, and those in agriculture		
	Even when ideologies of indigeneity are not influential, the use of existing laws and convergence of the governments and Indigenous groups' economic interests may shift legal processes and power relations toward greater rights for Indigenous groups to minimise land disputes	Russia	Tysiachniouk <i>et al.</i> , 2020
	Project finance illustrates the pivotal role of lenders in financing foreign investments in risky contexts. However, the role of the liability's side (borrowers) and the actors it inevitably connects to the investment is often disregarded	Global	Müllner, 2017
	Geographically dispersed syndicates pool more external leverage over host-country stakeholders, allowing them to mitigate host-country political risk	Global Debt governance theory	Dorobantu & Müllner, 2019
	Governments and policymakers must know that the participation of foreign private sector firms has nuanced implications for local economies and stakeholders impacted by PPPs	Global	Dykes <i>et al.</i> , 2020
Risk management	Typical infrastructure investment fails to deliver a positive risk-adjusted return in China	China	Ansar <i>et al.</i> , 2016; Müllner, 2017
	Risk reduction can be the key driver of strategy in infrastructure project development rather than transaction cost efficiency	Global Project finance theory	Müllner, 2017
	The geographic composition of an infrastructure project finance syndicate reflects a trade-off between its external political leverage and its ability to reorganise the syndicate if circumstances demand it across the project lifecycle.	Global Debt governance theory	Dorobantu & Müllner, 2019

	Syndicates are more geographically concentrated when they finance projects in years with increased systemic risk		
	Risk management should not be considered as a cost that can be ‘optimised’ but as an investment in the project’s long-term success and learning to improve outcomes on future projects		
	There is a tendency amongst risk teams to oversimplify the project context, thereby inappropriately defining and often under-specifying the risk programme objectives and team composition; budget constraints often drive this issue		
	Despite the lack of robust and extensive datasets to drive such practices, there is widespread adoption and reliance on stochastic risk analysis methods for more complex infrastructure projects		
	Illusions of risk transfer reliability are often undertaken without fully considering the transferability of certain risks, including the potentially multifaceted impacts of seemingly transferred risks that remain within the project and should be managed accordingly	Global	Morrisette, 2020
Risk ambiguity	Ill-defined construction risk assessment that is circumscribed using numeric, probability-based analyses cannot capture ambiguous risks	Global	Alberti, 2020
Risk premium	Risk premiums and investment risk have declined for solar photovoltaics and onshore wind technology in Germany and Italy due to increasing technology reliability at a lower cost, data availability, better assessment tools, and credible and stable policies, but curtailment and price risks are becoming more important	Europe	Egli, 2020
SOCIOCULTURAL VARIABLES			
Education	The education index correlates with renewable energy consumption	Sub-Saharan Africa	Oluoch <i>et al.</i> , 2020
Human capital development	Human capital moderates the relationship between infrastructure and industrialisation	Sub-Saharan Africa	Nkemgha <i>et al.</i> , 2023
Innovation capacity	Enhance innovative capacity to boost sustainable infrastructure development	Sub-Saharan Africa	Adebayo <i>et al.</i> , 2021
Shared culture	Geographic, economic, cultural proximity, intra-regional activity, shared official language, legal origin, and dominant religion	Sub-Saharan Africa	Muhanji & Ojah, 2016; Arewa, 2023
	Infrastructure development can prompt unintended sociocultural decay and disintegration		
Benefit-sharing with communities	Benefit-sharing has shifted from paternalism (dependent on community negotiation skills) to company-centred social responsibility (formal compensation rules); a formal methodology for calculating income lost due to infrastructure projects adopted by the regional government’s efforts to develop community integration in projects facilitated the shift	Russia	Tysiachniouk <i>et al.</i> , 2020
	Infrastructure can play a vital role in promoting economic growth while ensuring deprived sections of the population experience welfare	China	Banerjee <i>et al.</i> , 2020
Urbanisation	Discriminative green infrastructure development in urban areas based on race and income in South Africa	South Africa	Venter <i>et al.</i> , 2020

National culture	Based on Hofstede's variables, national culture influences infrastructure growth differences across countries	Global	Liu <i>et al.</i> , 2015; Mayfield & Mayfield, 2012; Meng <i>et al.</i> , (2016)
	Power distance		
	Individualism vs collectivism		
	Femininity vs masculinity		
	Uncertainty avoidance		
	Long-term vs short-term orientation		
	Indulgence vs restraint		
	Ambiguity tolerance		
Poverty	The broader negative societal impact of debt internally	Sub-Saharan Africa BRICS	Wiewiora & O'Connor (2022); Gray & Ulbrich, (2017)
	The world's poorest fully bear the human costs of sovereign risk and poor borrowing behaviour and infrastructure outcomes	Sub-Saharan Africa BRICS	
Quality of life	Framing modernisation to perpetuate a humanitarian crisis in the African infrastructure development context by Chinese and Western lending	Sub-Saharan Africa	Gort & Brooks, 2023
Geopolitics	African borrowing is not passive and shapes hegemonic struggles between China and the US		
	Africa provides a "spatial fix" for capital		
	Africa's relationship with debt is co-constituent in the remaking of the global economy	Sub-Saharan Africa	Backhouse & Lehmann, 2020
Social unrest	Contested execution and interpretation of large infrastructure development-as-modernisation		
	The consent and coercion of African governments partly engineer global capitalist hegemony		
	Green narratives legitimise land grabs in Mexico and Brazil, linked to climate protection and sustainable development, causing social conflicts	Sub-Saharan Africa	Muhanji & Ojah, 2016
Environmental governance	Natural resource rents		
	Market-based carbon emission price discovery	China	Song <i>et al.</i> , 2018
	Fossil-fuel dependant countries like South Africa might be stranded in the low-carbon transition	BRICS	Joshua & Alola, 2020
	Ineffective carbon emission capping policy implementation: emissions exceed regulatory approved limits in South Africa	BRICS	Pram <i>et al.</i> , 2022
	Uneven energy, economic, and environmental sustainability performance among BRICS	BRICS	Li <i>et al.</i> , 2020
	Building an energy system compatible with the Paris Agreement requires large-scale investment in renewable energy technologies	Europe	Egli, 2020
	Low adherence to sustainable development principles in rail and road transportation projects	Global	Ward & Skayannis, 2019
Collaborative learning	Utilising collaborative learning artefacts to integrate formal and informal governance mechanisms in boosting managerial task mastery	Global	Manley & Chen, (2017); (Walker <i>et al.</i> , 2023)

Source: Author (2023)

2.6. Part V: Comparison of reviewed studies and categorisation of the research gap

The literature reveals that infrastructure can be seen as a tool for sovereign risk diversification when its design and implementation framework aligns managerial incentives with the key performance indicators of project milestones, cost management, quality standards, and timely completion with the political, economic, social, technological, environment and legal and regulatory development objectives. Leveraging human skills offers an effective lifecycle alignment of the interests of the sovereign, which acts as the principal, funding the project with the project organisation (board and managers), which acts as the agent responsible for implementation. This is particularly relevant to advance Kenya's recent Local Content Act, 2023.

2.6.1. Phase 1: Initiating, selecting, planning, and designing projects

As established from the reviewed literature, governments are central to infrastructure development. Prolonged concessional debt structuring and misaligned commercial debt vs infrastructure project objectives lead to inefficiency (Pueyo, 2018). Inadequate feasibility studies, cost estimates, and risk assessments cause overruns and delays (Irando & Owilla, 2020). China's infrastructural loans and terms raise debt-trap diplomacy concerns (Carmody *et al.*, 2022). Neglecting environmental, social, and regulatory risk assessment leads to opposition, disputes, and reputational harm (Li *et al.*, 2020).

2.6.2. Phase 2: Procurement and contractual design choices

Transparent and competitive bidding in procurement management reduces corruption (Onjala, 2018). Contractual risk allocation clarifies responsibility and liability, fostering collaboration across projects. However, performance-based contracts lack incentives to align management and project success goals (Twesigye, 2022). Risk, ambiguity and uncertainty tolerance among private sector and commercial banks appear overlooked, posing procurement and contractual design hurdles (Kamau, 2016). Strong risk management provisions and contractor due diligence are vital for positive outcomes.

2.6.3. Phase 3: Construction, monitoring, and control

Quality construction and regulatory adherence are vital. Ignoring original design characteristics and technological capabilities elevates repair costs and sovereign infrastructural development reputation (Ansar *et al.*, 2016). Delays elevate cost overrun, financing costs, and economic growth shortfalls (Zhang *et al.*, 2023). Rigorous ESG prioritisation, value assessment, and stakeholder involvement reduce risk (Sang *et al.*, 2022), and transparent financial oversight and control ensure accountability (Onjala, 2018). Overall, proactive change management minimises disputes and delays.

2.6.4. Phase 4: Operations, maintenance, and termination

Efficient operational, maintenance, and termination of infrastructure systems bolsters profitability (Githaiga & Bing, 2019). Revenue-generating projects aid financial sustainability and fiscal strength. Effective revenue management ensures the viability of infrastructure systems in their operational and maintenance phases, while monitoring contractors and service quality can reduce lifecycle costs (Zhang *et al.*, 2023). Accessible services enhance social inclusion and stability (Banerjee *et al.*, 2020); outsourcing permits flexibility, and design choices and forecasting merit attention for long-term cross-sectoral economic and ESG implications (Lala *et al.*, 2022).

Tremendous research revealed that project management practices across infrastructure development phases influence risk outcomes. Yet, no conceptual model that is based on social theories currently exists to enable managers to understand how culture might mediate their socio-cognitive capacity to decipher risks as an essential soft competency that can complement government efforts in identifying what variables to prioritise in its people-centred governance framework and how to support them in terms of policy changes to mitigate emerging infrastructure risks as envisioned in Vision 2030 policy.

2.6.5. The influence of culture-mediated socio-cognitive learning in the relationship between the infrastructure development activity and sovereign risk through herding and information cascade

The fragmented theoretical and empirical literature on national culture's role in moderating the embeddedness of herding behaviour, information cascading, and sovereign risk spillover susceptibility (Borensztein *et al.*, 2013; Dang & Partington, 2020; Ho *et al.*, 2023; Morsy & Moustafa, 2020) and poor infrastructure lifecycle development outcomes (Onjala, 2018) lay the groundwork for exploring culture-mediated managerial socio-cognitive learning complexity in multicultural infrastructure project contexts. This fragmentation highlights the importance of addressing cultural diversity and implementing culturally sensitive management practices to navigate the dynamic multicultural challenges of global infrastructure projects effectively. The insights from the literature offer a contextual framework for the current study to investigate the complexity of managerial socio-cognitive learning within the context of culture and its role in shaping infrastructure project success and sovereign risk assessment. Consequently, the foundation of this study on the relationship between culture, herding, information cascades, and sovereign risk in infrastructure management is rooted in recognising that sovereign risk encompasses Kenya's financial capacity and willingness to fulfil debt agreements related to infrastructure projects as a collective decision-making process that involves managerial recommendations. This understanding is supported by insights from Eaton *et al.* (1986) and Dang and Partington (2020), who emphasise the role of culture in governments' decision-making through debt commitment, default, or willingness to pay. Drawing upon El Ghoul and Zheng (2016) and Guiso *et al.* (2006), the reviewed literature highlights the connection between

national culture, finance, and non-financial decision-making, particularly the cultural dimensions impacting how borrowers interact with lenders and negotiate debt terms.

Moreover, cultural factors influence communication styles, risk perception, leadership styles, and conflict resolution strategies within multicultural infrastructure project teams, leading to time and cost overruns, as evidenced by Liu *et al.* (2015). A comparative study of multicultural project teams in Kenya and the UK by Ochieng and Price (2009) revealed that culture shapes project planning practices, stakeholder engagement strategies, team cohesion, motivation, and satisfaction in infrastructure project teams. While the findings reveal the value of cultural sensitivity, effective team management, and the development of cultural intelligence for successful infrastructure project management in multicultural settings, the sovereign risk implication of sound cross-border collaboration in Kenyan infrastructure projects is unknown. Hence, incorporating Hofstede's cultural dimensions framework, including power distance, collectivism vs individualism, femininity vs masculinity, uncertainty avoidance, and long-term vs short-term orientation, into empirical analysis enables the current study to quantify cultural differences within Kenyan managers and across Kenyan managers and overseas lender nations to evaluate the significance of cultural factors in sovereign risk assessments, with implications for international infrastructure project finance and management in diverse cultural contexts.

2.6.6. Integrating sustainable development goals in infrastructure lifecycle integration

Multilateral and bilateral development banks have incorporated sustainable development goals (SDGs) into infrastructure lifecycles, aligning with frameworks like the Paris Agreement and the UN's SDGs. Institutions like the International Finance Corporation (IFC), African Development Bank (AfDB), and New Development Bank (NDB) have implemented sustainability mandates (Vazquez, 2020). IFC's framework demands greenhouse gas reporting and human rights protection. AfDB's Integrated Safeguards System focuses on climate resilience, gender equality, and transparency. NDB allocates significant project finance to sustainable infrastructure, emphasising economic, environmental, and social aspects. Safeguard policies ensure that environmental and community impacts are managed. Borrowing countries implement these safeguards, which involve assessments, consultations, monitoring, and reporting. Multilateral lenders guide and support clients, ensuring compliance. Decarbonisation challenges intersect with renewable energy, road, and rail infrastructure, thus impacting sovereign risk. Industry 4.0, the fourth industrial revolution, enhances infrastructure management with its interoperability, decentralisation, real-time capabilities, and modularity principles (Alaloul *et al.*, 2020). It aligns with SDGs, yet data silos and ICT limitations hinder planning and revenue generation. Industry 4.0 can improve data quality, enabling accurate forecasts, connectivity planning, and obsolescence mitigation. Integrated lifecycle management improves interoperability but may overlook human-centric project management and sociocultural risks, which

influence sovereign risk. Studies emphasise the value of recognising infrastructure's impact on sovereign risk premiums.

2.6.7. National culture as a time-invariant moderator of the relationship between sovereign risk and the infrastructure development activity

Empirical studies have used Hofstede's cultural dimensions to validate a significantly direct influence of national culture on infrastructure development outcomes (Mayfield & Mayfield, 2012), project risk management (Liu *et al.*, 2015), sustainability (Meng *et al.*, 2016) and spillover of sovereign ratings on corporate ratings (Ho *et al.*, 2023). Dang & Partington (2020) found a significant positive effect of the cultural distance between the home country of the rating agency and the sovereign on downgrades and upgrades. These fragmented findings validate the hypothesis that national culture could be an antecedent of the social cognition managers use to navigate the complex, risky, uncertain infrastructure development environment. Their national culture mediates herding as a defensive socio-cognitive learning method by mimicking group behaviour as a cue for appropriate behaviour. It leverages the reliance on social proof to reduce the risk of being blamed for poor decisions to preserve suboptimal practices. Following the majority or leaders inhibits the capacity of managers to engage in collaborative learning by challenging norms or proposing innovative approaches to improve the governance and performance of infrastructure. Based on studies presenting culture as a time-invariant variable, the spillover effect exposes a gap in eliciting how culture moderates the relationship between infrastructure development and sovereign risk.

2.6.8. Categorisation of the research gap

The exposure of infrastructure projects to sovereign risk spillover effects highlights several areas where further investigation is needed to help managers understand how their socio-cognitive capacity to confront risk is an essential soft competency that can complement the government's efforts in identifying what to change to improve people-centred governance and how to support them in mitigating infrastructure risks:

- **Evidence and knowledge gap:** Studies revealed practice-based infrastructure development risks, broadly grouped into debt-side governance (Onjala, 2018), project management (Pueyo, 2018), and macroeconomic risk (Rambo & Lucas, 2016). They revealed that practitioners are calling for the Kenyan government to offer a conducive environment to realise infrastructure's economic growth and development benefits without explaining the sovereign risk implication of these risks.
- **Soft infrastructure analysis gap:** While prior research has highlighted that national culture influences infrastructure development (Mayfield & Mayfield, 2012) and sovereign risk spillover (Ho *et al.*, 2023), there is a gap in explaining how it may have contributed to the gap between soft and hard infrastructure development (Kolstad & Wiig, 2011) as a moderator of this relationship.

- **Practical-knowledge gap:** No conceptual model with human-centred variables exists to show how the managerial capacity to address risks in collaborative infrastructure development projects (Gregory & Sovacool, 2019) influences infrastructure governance and performance.
- **Methodological gap:** Quantitative studies (Mayfield & Mayfield, 2012) investigating the influence of national culture on infrastructure development, investors herding (Morsy & Moustafa, 2020), sovereign risk spillover (Ho *et al.*, 2023) utilised secondary data analysis elucidated direct effects, which may not capture managerial lived experiences of managers. On the other hand, qualitative case studies on how culture influences managerial practice in collaborative infrastructure projects did not quantify the effects (Liu *et al.*, 2015; Meng *et al.*, 2016) nor map them to sovereign risk. A mixed-method research combining quantitative and qualitative methods is essential to enhance the validity and reliability of conclusions. Moreover, the study should investigate the moderating influence of culture on the relationship between sovereign risk and infrastructure development.
- **Empirical gap:** While some research has focused on sovereign risk premium mispricing from lenders' perspectives (Morsy & Moustafa, 2020), the borrower's viewpoint is missing. Moreover, studies looking into how culture influences risk management in large-scale infrastructure projects did not quantify the effects (Liu *et al.*, 2015; Meng *et al.*, 2016) were based in China, Poland, Singapore, the Middle East and the US, limiting the generalisation of the research findings to the Sub-Saharan region, considering its distinct contextual attributes.
- **Theoretical gap:** Floricel *et al.*'s (2014) call to extend project management theory using insights from social theory remains unexplored. Some of the least used practice-oriented theories are the activity, social network, and structuration theories, despite their potential to extend infrastructure development research by bridging the gap between theory and practice. Besides, there is limited integration of behavioural science and human-centred design theories despite the evidence that national culture may be a context-specific determinant of infrastructure development disparities (Mayfield & Mayfield, 2012) and sovereign risk spillover (Ho *et al.*, 2023).
- **Population gap:** Studies often focus on macro-level considerations of sovereign risk and lack insight into the micro-level managerial practice as a foundation of the meso-level and macro-level relationship between the infrastructure development system and sovereign risk.
- **Infrastructure development and sovereign risk:** The impact of infrastructure development on sovereign risk has not been adequately estimated, considering national culture as a time-invariant contextual variable that may moderate the managerial capacity to make strategic decisions across the project lifecycle while mitigating moral hazards (Brautigam, 2022).

The reviewed literature reveals that national culture is a construct that can be used to understand and influence individual managerial behaviours in the infrastructure development context. However, national culture remains underexplored as a time-invariant moderator of the relationship between infrastructure development as an activity and sovereign risk. Besides, there is limited integration of behavioural science and human-centred design theories despite the potential of behavioural science theory to isolate specific behavioural problems and grounds its diagnostic approach in academic theory and scientific evidence from the infrastructure development context. This limits the proposition of human-centred variables Kenya can leverage to measure its people-centred governance objective's Key Performance Indicators (KPIs) and optimise national culture to foster inclusivity in its Vision 2030 development objectives. As a result, the proposed solutions in other contexts are less likely to succeed at the managerial level in Kenya due to the limited understanding of their specific behaviours or the gap between their intentions and actions. Addressing the gap calls for a human-centred infrastructure policy design and implementation framework.

2.7. Chapter summary

This chapter reviewed how past research has articulated the relationship between sovereign risk and infrastructure development based on renewable energy, road, and rail transportation infrastructure projects. The government's substantial influence on these infrastructure development projects establishes a relationship between sovereign risk and infrastructure development activity. However, emerging evidence suggests that this sovereign risk is mispriced due to investor herding, and this mispricing may spill over to infrastructure organisations. Hence, the chapter compared infrastructure development risks in Kenya, SSA, BRICS, and global samples, grouped into debt-side governance, project management, and macroeconomic risk variables. While the literature revealed common challenges, it highlighted that theoretical and empirical studies had used Hofstede's national cultural constructs to validate a significant direct influence of social and cognitive factors on infrastructure development practices, including risk management and sustainability prioritisation. This evidence was from cross-country comparisons in Asia, the Middle East, and globally. There is a gap in elucidating how national culture might moderate the relationship between infrastructure development and sovereign risk as embedded outcomes of herding. Herding in this context refers to the observed outcome of defensive socio-cognitive learning when managers leverage social proof to reduce the risk of being blamed for poor decisions. The following chapter will discuss the proposed human-centred conceptual framework for investigating national culture as a moderator of the relationship between the infrastructure development system and sovereign risk as embedded outcomes of managerial herding.

Chapter Three: Proposed Conceptual Framework

3.1. Introduction

The chapter draws on the reviewed literature in Chapter Two to propose a conceptual framework for the relationship between sovereign risk and infrastructure development that integrates human-centred activity. It integrates four main social theories. Engeström's (2001) cultural-historical activity theory is the main practice-oriented framework for analysing expansive socio-cognitive learning through interaction among managers within the infrastructure development workplace. This expansive learning framework does not provide context-specific constructs to identify the affordances of the infrastructure development activity. This shortfall was overcome by adopting Gibson's (1979) affordances theory to elicit debt-side governance, project management and macroeconomic risk as what the infrastructure development environment affords managers to be successful. Since national culture constrains actions, Hofstede's (2013) cultural psychology theory provides dimensions of analysing beliefs as the main socio-cognitive learning constructs mediating interactions among managers within the infrastructure development workplace. These dimensions provide the sociocultural characteristics of the Kenyan infrastructure development context without eliciting their behavioural pooling effect. Scharfstein & Stein's (1990) theory that people believe others possess superior information exemplifies herding as a defensive socio-cognitive learning attribute where managers align their actions with socially formed groups to mitigate personal risk and avoid negative consequences.

3.2. Theoretical background review

3.2.1. Herding, information cascade, and sovereign risk in infrastructure projects

The herding hypothesis in behavioural science theory proposes that people learn by observing and imitating. Scharfstein & Stein (1990) pioneered the hypothesis that managers in organisational decision-making are influenced by observing others' actions and disregarding their private information due to reputational career concerns. Bikhchandani *et al.* (1992) argued that people mimic decisions due to a belief that others possess superior information, acknowledging that culture is an unobservable variable driving the observed direction and strength as a social pattern of herding. Herding causes an information cascade if early actions dominate subsequent choices. Information cascades occur when individuals make decisions based on the actions of those before them, creating a domino effect of choices. It means that lessons from past projects may not yield transformative management practices. When managers herd, the capacity to retrieve and integrate new information or contrarian views into decisions is undermined. Scharfstein and Stein (1990) state that information cascading persists even in the presence of superior private signals, suggesting it blocks the managerial capacity to question existing norms and propose innovative solutions. Shiller (1995) highlights the role of psychology in herding as an interpersonal information transmission mode that preserves pattern-based behaviour in collective decision-making processes. Hence, herding and information cascade are the

observed behavioural pooling effects of sociocultural cues in collaborative decision-making processes in domains ranging from financial markets and public opinion formation to organisations via phenomena like:

- (i) Frequent convergence on mistaken actions with limited investigation and information
- (ii) Fragile social outcomes from seemingly minor shocks
- (iii) Delayed decisions followed by sudden synchronised actions

From a financial market viewpoint, empirical research by Morsy and Moustafa (2020) established that investor herding exacerbates the mispricing of sovereign risk, particularly for emerging markets. It shows that financial markets overlook political stability, institutional quality, and macroeconomic fundamentals, leading to inaccurate sovereign risk assessment. Mispriced risk causes unfair borrowing costs for countries, where riskier nations obtain lower borrowing costs than warranted and less risky nations face higher costs than is reasonable. This finding highlights the necessity for enhanced risk assessment models incorporating qualitative factors into sovereign risk evaluation for equitable sovereign risk pricing and borrowing terms. The finding also reveals weaknesses in quantitative models, which fail to account for the sociocultural antecedents of the managerial herding in elucidating market consensus, such as national culture, and how it drives social patterns in collaborative decision-making contexts such as infrastructure development.

Sovereign risk diversification through infrastructure development is a key strategy (Onjala, 2018). Bilateral and multilateral infrastructure development debt involves governments borrowing based on projected future revenues. External debt establishes a multicultural interaction environment by bringing together managers from different countries to work together within an infrastructure development context. Thus, infrastructure project execution significantly bolsters a government's capacity to repay debt commitments as they mature. Effective project identification, feasibility assessments, planning, and procurement bolster the probability of positive outcomes (Eberhard *et al.*, 2017) which can alleviate default sovereign default.

Conversely, suboptimal infrastructure development planning and execution amplifies a default likelihood, thereby elevating risk premiums (Ferchen & Perera, 2019). Managers are intermediaries steering projects through this two-way interaction between borrowers and lenders. The observed sovereign risk mispricing and spillover imply that managerial interpersonal information transmission modes at the intersection of the financial market and infrastructure development contexts could contribute to the embeddedness of herding, and sovereign risk mispricing. Managers are key in recommending infrastructure projects and funding tools to governments through policy-regulated collective decision-making. As discussed in the next section, the perception of policy affordances demonstrates the relationship between infrastructure implementation and the managerial assessment of sovereign risk exposures.

3.2.2. Affordances of the infrastructure development context

Coined by Gibson (1979), affordances frame agentic actions about objects in specific environments. The object of this study is infrastructure development. Perceived affordances refer to the opportunities and constraints that policies and regulations create for collective decision-making in infrastructure development to capture lifecycle effects. External debt-side governance, project management and macroeconomic policy affordances determine how infrastructure development projects are designed, funded, and implemented (Eberhard *et al.*, 2017). Managers are among the infrastructure policy users who identify immediate action opportunities, termed affordances, shaped by economic, political, and cultural factors. Le Galès (2016) highlights that public policy instruments define social relations, while individual intentions and capabilities define affordances. Perceived affordances bridge managerial perceptions and actions, influencing how managers naturally adapt to their infrastructure development environment. Socialisation determines the relationship between sovereign risk and the infrastructure development system (Gibson, 1979).

Governments design infrastructure development laws, regulations, and public campaigns to disseminate policy information and promote desired behaviour (Hutchby, 2001). A framework of mechanisms and conditions helps assess how the behavioural pooling effect of infrastructure development policy leads to varied managerial actions as affordances managers observe through perception, skill, cultural constraints, and legitimacy (Howlett, 1991). Perceptible affordances establish a link between sovereign risk and infrastructure development (Le Galès, 2016), and hidden affordances cause managerial misunderstandings (Norman, 1999). Hence, affordances determine agent–system interactions, suggesting that the perception of sovereign risk and infrastructure development practices may align policy affordances and management practices (Norman, 1999). Sovereign risk, an affordance in the public borrowing policy, determines the perception of sovereign risk and strategic infrastructure project management actions (Norman, 1999) to mitigate it. Thus, policy instruments have technical and social affordances that orchestrate relations and actions concerning sovereign risk and infrastructure management. As Norman (1999) states:

- Affordances suggest potential interactions
- Efficacy depends on the context or environmental niche of the policy
- Affordances are context-dependent since they are rooted in relations
- Users may not fully grasp policy affordances

Policies hold cultural values (Norman, 1999), suggesting that cultural values can influence them, and they can influence cultural values. The reviewed empirical research studies recommend several policy reforms, exposing misunderstandings between practice and infrastructure policy instruments (Norman, 1999). Sovereign risk pricing studies propose reforming risk-pricing practices (Morsy & Moustafa, 2020) by

acknowledging geographical and cultural biases (Dang & Partington, 2020) in sovereign risk ratings. These misunderstandings also exposed collaborative learning improvements required to design PPPs that bolster infrastructure project bankability and private sector participation (Kamau, 2016). Studies focusing on resource management emphasised a prioritisation of human capital development to align hard with soft infrastructure development policies and practices (Kolstad & Wiig, 2011) to augment transparent debt management (Onjala, 2018), project selection (Ferchen & Perera, 2019), and optimal regional resource allocation (Otieno, 2023). Studies evaluating debt-side governance proposed reforming infrastructure funding mechanisms, like PPPs, to offer substantial financial support and incentives for infrastructure development via PPPs/PPIs for regional resource pooling (Hope, 2010). Pueyo (2018) advocated for clear and consistent regulatory frameworks to streamline project approval and permitting processes to reduce schedule delays. Other studies proposed reforming macroeconomic policy to mitigate inflation, exchange rates, interest rates and commodity price fluctuations in order to incentivise infrastructure developers (Rambo & Lucas, 2016).

Pueyo (2018) instigated lifecycle integration reforms by proposing a cross-sectoral collaboration. Besides, Sang *et al.* (2022) inferred scope management reforms by suggesting streamlining environmental and sustainability policy and implementation procedures to promote responsible infrastructure project design, green investment, and project reputation. Researchers focusing on stakeholder engagement recommend mandated public engagement and consultation to foster community support, improve project design, and mitigate opposition. Lala *et al.* (2022) emphasised that well-defined land use and zoning regulations ensure project alignment with urban planning goals and minimise conflicts with local communities. Studies evaluating cross-border stakeholder engagement advocated aligning local needs with international standards and best practices to enhance project quality, attract foreign investment, and improve overall infrastructure project outcomes (Onjala, 2018). Those looking into procurement, schedule, and cost management advocated for clear contract laws and frameworks to enhance legal stability for project contracts in order to enhance competitive bidding and reduce contracting disputes, which will enhance timely infrastructure delivery (Eberhard *et al.*, 2017). Lastly, studies evaluating ESG suggest improving human resource capacities and green economic development by developing supportive policies for technology adoption and innovation to drive efficiency and cost-effectiveness in project execution (Renkens, 2019). These policy reform recommendations expose tensions between the intended behavioural pooling effect of the guidelines within the infrastructure development policy and practice that should be evaluated, accounting for Kenya's unique sociocultural dimensions. This analysis mirrors Gibson's (1979) ecological theory approach to visual perception, suggesting that culture constrains some activities and encourages others. The following section discusses its behavioural pooling effect on managerial actions.

3.2.3. Hofstede's cultural framework

Hofstede and Bond (1988) pioneered the theory of cultural psychology by defining national culture as the “collective mental programming of the mind that distinguishes the members of one group or category of people from the others.” The theory holds that culture manifests as “patterns of thinking, feeling, and potential acting”. This seminal theoretical proposition suggested that national culture is learned through socialisation, with much learning occurring through familial and the education system in early childhood. The hypothesis was confirmed by a survey of managerial practices between 1967 and 1973 based on 116,000 questionnaires distributed to IBM's international subsidiaries in 40 countries. It revealed that culture influences managerial conflict and remains stable over long periods. After that, Stulz and Williamson (2003) studied the impact of culture on decision-making processes, identifying three transmission channels. First, culture affects individuals' values, subsequently impacting their attitudes and behaviours. This means that herding behaviour emerges from the context-dependent way of learning. Second, culture reshapes the interpretation and intent of laws in a society. Thus, sovereign borrowing and infrastructure development policy guidelines embody the cultural values of the context in which they are designed and implemented. Third, culture significantly influences resource allocation within a country, exposing culture-mediated mechanisms of allocating infrastructure development resources. Thus, culture bridges the perceived gap between micro-, meso-, and macro-level collective decisions.

Consequently, herding behaviour is a macro-level observation of a social pattern reflecting individual defensive communication styles of culture-mediated information transmission and group interactions. It appears logical that external infrastructural debt establishes a multicultural interaction environment where managers from different countries work together to build large Kenyan infrastructure systems. Working together entails adapting the international debt and infrastructure development policy to the Kenyan context while acknowledging Kenya's unique formal governance rules and cultural attributes. Section 3.2.2 showed prior researchers had proposed policy reforms suggesting tensions between the managerial perception of affordances in the current Kenyan sovereign borrowing and infrastructure development policy. The notion that policies hold cultural values of the context in which they are designed (Norman, 1999) and implemented may explain how misunderstandings occur. The emerging tensions embody culture-mediated misunderstandings between sovereign borrowing and infrastructure development policymakers and their implementation instruments. Hofstede (2010) propose six contextual dimensions that provide insights into how cultural values could mediate or moderate the relationship between sovereign risk and infrastructure development policy design and legitimisation as culture-mediated misunderstood affordances:

- Power distance refers to the degree to which less powerful members of a society accept and expect power to be distributed unequally. In societies with high power distance, individuals accept authority without question, while lower power distance has a more egalitarian power distribution.
- Individualism vs collectivism gauges the preference for individual vs collective well-being. Individualists emphasise personal goals, whereas collectivist cultures prioritise a group's interests.
- Masculinity vs femininity captures the preference for assertiveness, achievement, and material success (masculinity) vs cooperation, modesty, and quality of life (femininity).
- Uncertainty avoidance reflects a society's comfort level with ambiguous situations. High uncertainty avoidance implies a preference for strict rules and structure, while low uncertainty avoidance denotes a higher tolerance for uncertainty.
- Long-term vs short-term orientation gauges a society's focus on immediate vs long-term outcomes. While long-term-oriented cultures value perseverance, short-term ones prioritise immediate gains.
- Indulgence vs restraint represents societies that allow gratification of natural human desires, while restrained societies suppress such gratification through strict norms.

Considering these dimensions, the hypothesis is that shared values moderate the strength and direction of the relationship between sovereign risk and infrastructure development through managerial practices as the main social interaction network. Culture is an interpersonal information transmission mode that can pool managerial behaviour towards common socio-cognitive learning motives to avoid personal trial-and-error risks. Here is a summary of the likely behavioural pooling effects of the Kenyan cultural context.

- Kenya's power distance can affect collective decision-making and community participation in infrastructure management. An emphasis on top-down decision-making and limited participatory involvement might influence managerial participation in infrastructure policy formulation and implementation (Norman, 1999).
- Kenya's collectivist orientation may influence managers to prioritise community needs and social impacts in infrastructure decision-making contexts (Hofstede, 1980). The extended family and community interests could significantly influence project considerations.
- Kenya's relatively high masculinity score might underscore managerial preference for material achievements and economic growth in infrastructure projects, potentially sidelining social objectives. Balancing objectives is vital (Kolstad & Wiig, 2011).
- Kenya's moderate preference for uncertainty avoidance may predispose managers to adherence to established procedures and regulations. While this could provide stability, it may hinder their

adoption of innovative approaches, unconventional infrastructure designs, and management practices (Baimwera *et al.*, 2017).

- Kenya's lower long-term orientation may predispose managers to prioritise immediate needs over long-term sustainability and maintenance in infrastructure projects, leading to suboptimal actions like corruption to persist (Otieno, 2023).
- Kenya's moderate restraint orientation could influence managerial adherence to cultural norms and values in infrastructure decision-making, potentially moderately enhancing the adoption of new approaches with an equal risk of limiting adoption (Kamau, 2016).

These Kenyan national culture dimensions represent defensive socio-cognitive learning as moderators of the relationship between sovereign risk and infrastructure development. It means that the concept of herding depicts the behavioural pooling effect of formal policy guidelines influenced by culture and cultural psychology as a constraint that has evolved individually. Nevertheless, their unit of analysis is micro-level human activity, which reconciles micro-meso- and macro-level behaviour through social theories. It elicits national culture as an interpersonal information transmission mode (Shiller, 1995), commonly influencing organisational and national behavioural analysis. Vygotsky's cultural-historical activity theory (CHAT) offers a micro-foundational theoretical framework of human activity with the potential to unify fragmented behavioural analyses by grounding the analysis of the relationship between sovereign risk and infrastructure development in human-centred practice. The following section presents the CHAT concept.

3.2.4. Cultural-historical activity theory (CHAT)

From Vygotsky's work, CHAT provides a micro-foundational analytic framework for describing the infrastructure development's broader cultural and historical context and how it can influence sovereign risk. It unifies individuals, institutional artefacts, social interactions, and sociocultural systems to grasp activities and processes influencing the relationship between sovereign risk and infrastructure development as a system (Vygotsky & Cole, 1978). Applying CHAT demonstrates how sociocultural factors influence the effectiveness of the separation of power and decentralisation of national decision-making authority in 2013 in the Kenyan infrastructure decision-making system (Leontiev, 1978). It bridges imagined, simulated, and real situations, facilitating engagement with material objects and human interactions to actualise future activity models (Engeström, 1978). CHAT can elicit the emergence of herding behaviour as socio-cognitive learning motives and behavioural habituation within the Kenyan infrastructure development context. As a micro-foundational theory, it unveils how shared culture might moderate the embeddedness of managerial herding in Kenyan infrastructure organisations and sovereign risk in an underexplored SSA context. The rising sovereign risk due to suboptimal infrastructure outcomes suggests that the Kenyan context has

inefficiently brought managers from different countries to collaborate within its infrastructure development context. Kenyan policymakers and practitioners struggle to adapt international and local infrastructure policies in evolving multicultural contexts. Here are likely outcomes.

- External and internal groups could perceive infrastructure lifecycle tasks differently due to individual and sector-specific policy content obscuring the sovereign risk structure.
- Due to differing policy content, similar sovereign risk structures can yield distinct meanings in various infrastructure lifecycle management contexts.

CHAT enriches the evaluation of the complexities inherent in the Kenyan sovereign risk management framework based on the Kenyan infrastructure development context across its three generations.

First generation

Vygotsky and Cole (1978) introduced mediation and the zone of proximal development (ZPD) to bridge the managerial current abilities and potential with help from knowledgeable others. Learning by mimicking others depicts the interpersonal information transmission modes observed as herding. This sociocultural approach to learning emphasises cultural tools such as language in shaping cognition and psychological dependence on social groups with shared norms. Furthermore, Engeström (2001) delineated stimulus (risky project), response (elevated sovereign risk), and complex mediated acts (infrastructure project management behaviour). Leontiev (1978) expanded Vygotsky's model, incorporating community and labour division to analyse historical-cultural experiences systematically. Leontiev added levels to the model: motive-driven activity, goal-guided action, and condition-tool-mediated operations. This systemic framework integrates cognitive and physical facets for holistic infrastructure management analysis, as shown in Figure 3-1. In Figure 3-1, X is the mediating artefact between the subject (S) and response (R), which is the object of the study (improving infrastructure management to mitigate sovereign risk).

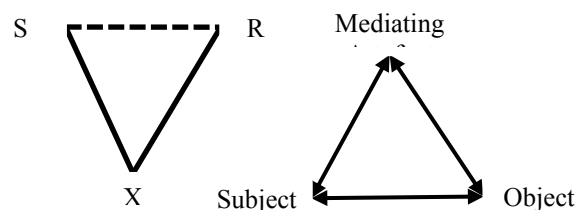


Figure 3-1: First-generation CHAT

Source: Engeström (2001, p. 134)

The hierarchical structure of the activity

Leontiev (1978) expanded the understanding of the CHAT framework by introducing the hierarchical structure of the activity, shown in Figure 3-2. The three levels depict the infrastructure development motive, goal, and conditions bidirectional arrows indicate. Diverse characteristics distinguish specific activities (debt-side governance, project management, and macroeconomic risk control processes), including the form, methods, emotional intensity, time and space, and physiology.

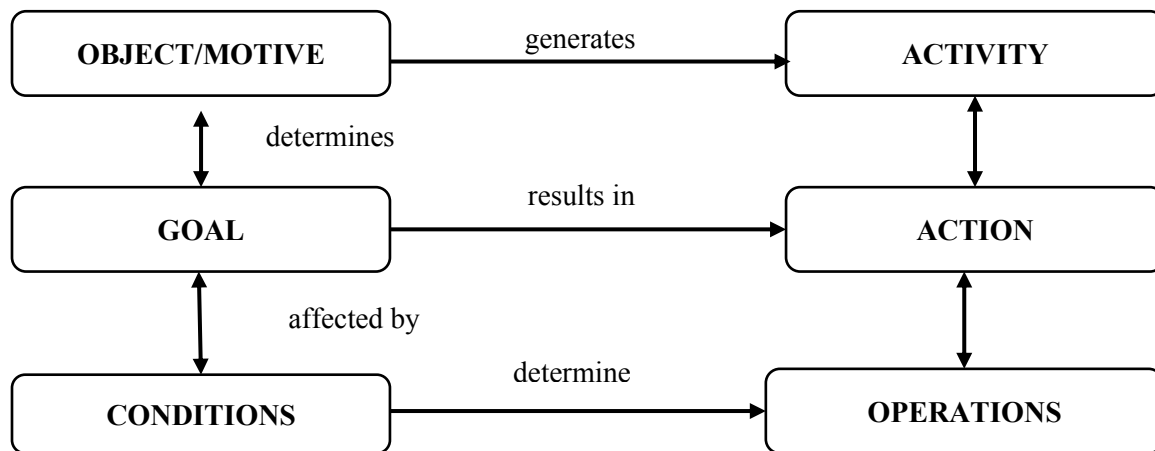


Figure 3-2: Activity hierarchy showing what and how motives are pursued

Source: Kaptelinin & Nardi (2006)

The first level, object/motive difference, distinguishes each infrastructure development activity and gives it a specific direction. The object of infrastructure development activity is its true motive. Motives can be material or ideal and can differ from general understanding. The main idea is that there should always be a need behind the infrastructure development activity and that it should always answer one need or another, e.g. the motive to have a good sovereign risk rating should facilitate accessing low-cost international debt to build world-class infrastructure systems and improve service delivery and the quality of life for Kenyans by 2030. Therefore, motives can be present in perception or exclusively in imagination or thought. The second level is where the purpose is related to action. An infrastructure development process is an action if it is subordinated to the representation of the result that must be attained. It must be subordinated to a conscious purpose. Goal-directed processes and actions are interchangeable. The third level is “operations — conditions”, where every purpose is accomplished objectively in a certain situation. Thus, a well-performing infrastructure development system must be achieved. In addition to its intentional feature (what must be achieved), the action has an operational feature (how, by what means this can be achieved). The operational feature is determined not by the goal but by the objective-object conditions of its achievement. This means that the infrastructure development action being carried out is adequate for the task; the task

then is a goal assigned in specific circumstances. As a result, seeking infrastructure development knowledge by herding has a specific quality that “formulates” it specifically, particularly the methods by which it is accomplished in a specific context.

The methods for accomplishing infrastructure development actions are operations (Leontiev, 1978, p. 102). Leontiev did not give a diagram for this three-level structure of activity, although Kaptelinin and Nardi (2006) point out that it is a two-way relationship and designed Figure 3-3. Figure 3-3 shows that CHAT provides an interdisciplinary philosophical framework for studying human behaviour's individual and social aspects that create sovereign risk in infrastructure project management. From the perspective of CHAT, human activity or “what people do” is the basic unit of analysis when studying human behaviour, i.e., mimicking the actions of others (herding). CHAT’s most important aspect is understanding individual and collective features of human practices from a cultural and historical perspective. Kaptelinin and Nardi (2012) summarised five principles of Leontiev’s activity model:

- a) Object-orientedness
- b) The hierarchical structure of the activity
- c) Mediating artefacts/tools/instruments
- d) Internalisation and externalisation
- e) Development through expansive learning processes

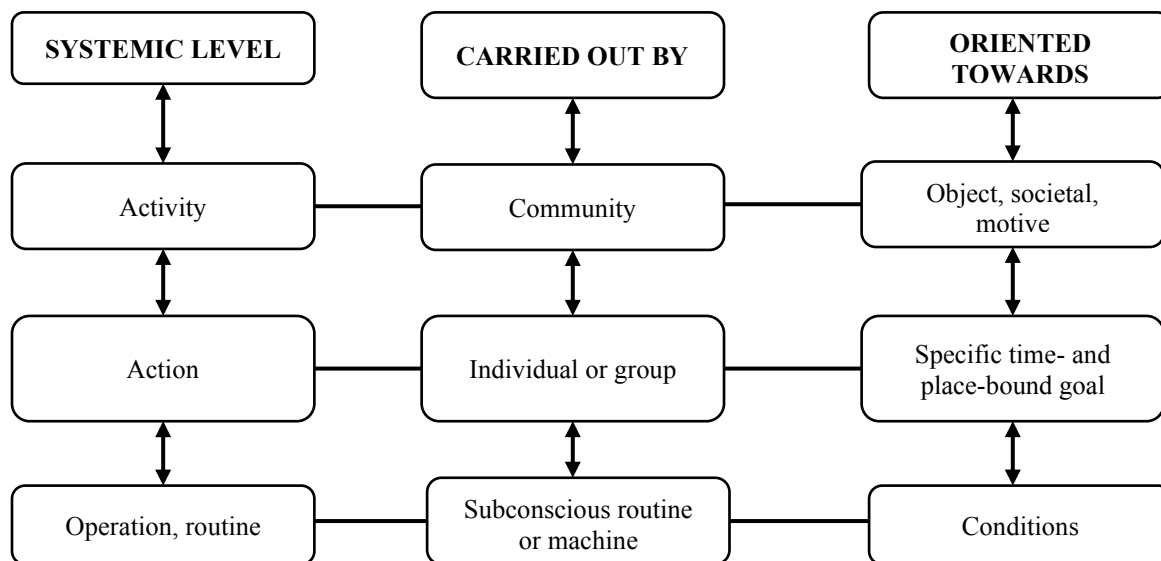


Figure 3-3: The hierarchical organisation of human activity

Source: Virkkunen & Newnham (2013)

According to Leontiev (1978), human activity does not exist except in the form of action or a chain of actions. For example, work activity exists in work actions, school activity in school actions, and social activity in actions (acts) of society. Nothing will be left of the infrastructure development activity if the actions that constitute the activity are mentally subtracted. This argument can be expressed in another way: when an infrastructure development process is taking place before us, external or internal, then from the point of view of its relation to motive, it appears as a human activity, but when it is subordinated to purpose, then it appears as an action or accumulation of a chain of actions. In addition, activity and action represent a genuine and non-coinciding reality of infrastructure development behaviour that contributes to sovereign risk. The same action may accomplish various activities and transfer from one activity to another, showing relative independence. The opposite is obvious – specifically, one or another motive may be given concrete expression for various purposes and correspondingly may elicit various actions (Leontiev, 1978, p. 100). Kaptelinin and Nardi (2006) point out the transformation between actions and operations:

“Levels of activity can transform into one another. Automatisations are an example of transformations between actions and operations. Throughout practice, actions can become automatic operations. The opposite process is ‘de-automation,’ transforming routine operations into conscious actions. For instance, such a transformation can occur when an automatised operation fails to produce the desired outcome. The individual reflects on the reasons for the failure and how the operation can be ‘fixed.’ A new, more appropriate procedure is devised, first carried out as a conscious action, and then becoming an operation” (Kaptelinin & Nardi, 2006, pp. 63–64).

Second generation

Engeström (1978) pioneered the second generation of activity theory. Vygotsky’s earlier concept of mediation, encompassing learning alongside others like the zone of proximal development and through interaction with artefacts, was the basis for this edition. These interactions inform the conceptualisation of herding as a socio-cognitive coping mechanism. Engeström’s approach explains human thought processes not based on the individual alone but in the wider context of the individual’s interactions within the social world through artefacts, specifically in situations where activities were being produced, to culture within their historical development context. Engeström (1978), therefore, incorporated the first generation of CHAT into his ideas by considering interrelationships between the individual and the community, history, context, and interaction of the situation and activity, as illustrated in Figure 3-4. This model emphasises the importance of understanding the collective and cultural dimensions of how herding behaviour and sovereign risk emerge from cultural-historical human activities of managing infrastructure in a specific sociocultural context. It implies that cultural psychology mediates herding through individuals’ values, beliefs, and decision-making processes. The strength and direction of this influence determines the embeddedness of

herding behaviour and sovereign risk, which can only be analysed in the specific context. The zone of proximal development demonstrates how different cultural orientations determine how people perceive information, make choices, and respond to social pressures.

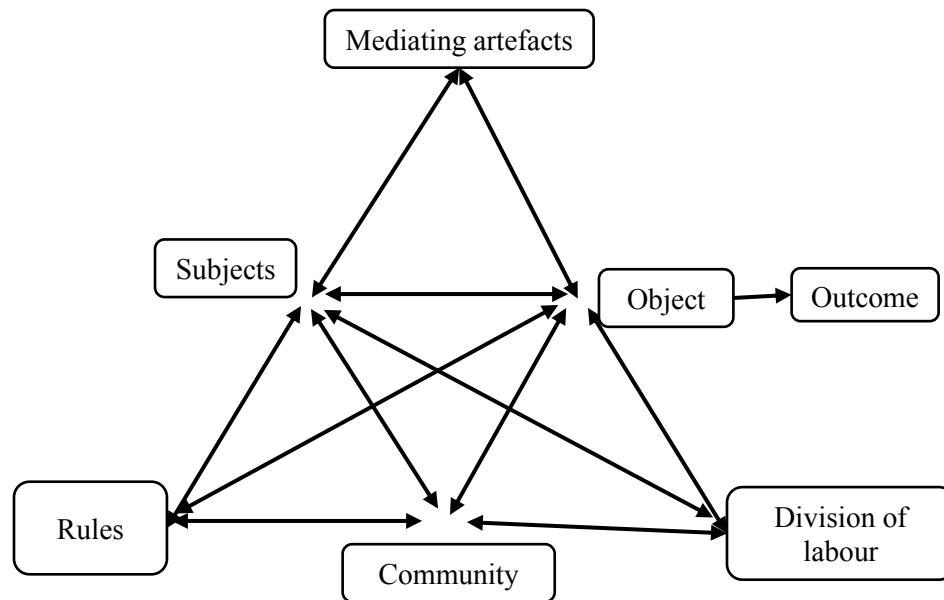


Figure 3-4: Second-generation CHAT

Source: Engeström (1987)

Figure 3-4, informed by Engeström (1978) and applied to the infrastructure context, depicts the activity system. The subject, individual, or group engages with the object of successful infrastructure development, which contributes to sovereign risk. A spillover implies that if the sovereign risk premium increases, infrastructure projects within the sovereign are perceived as riskier and vice versa. Mediating artefacts encompass symbols, signs, and ideas, including culture and policy tools. The community establishes norms that guide behaviour. Division of labour allocates tasks. CHAT depicts relationships between actions, operations, and contextual factors in the infrastructure project environment that influence sovereign risk. This framework has seven elements for understanding how national culture moderates the embeddedness of herding behaviour and sovereign risk as an outcome of psychological dependence on social groups among managers to cope with infrastructure lifecycle development risks, ambiguity and uncertainty.

Third generation

Engeström (2001) extended the activity systems to address tensions. The main idea is that expansive learning occurs by changing the current infrastructure development practice when managers experience tensions. Acts are based on Leontiev's unity of activity, actions, and operations – the minimum unit of human behaviour analysis. Activities are motivated, object-oriented endeavours rooted in cultural history,

involving goal-oriented actions driven by specific reasons. Environmental surroundings and experiences influence unconscious actions for an activity. Operations define goal pursuit mechanics. Applying these concepts to infrastructure management enables the analysis of sovereign risk formation via Vision 2030 policy design and implementation in Kenya, as depicted in Figure 3-5. This third-generation CHAT builds on five key principles for analysing complex social contexts.

- (i) Openness focuses on artefact-mediated systems within activity networks, contextualising them within broader relationships. Individual and group actions and operations are analysed as interdependent parts of these systems.
- (ii) Multivoicedness of activity systems reflects diverse viewpoints and traditions.
- (iii) Historicity entails understanding that activity systems require acknowledgement of their historical evolution, which shapes their features and potential.
- (iv) Contradictions expose weak interactions among open activity systems that accumulate and drive infrastructure management, policy, and development changes.
- (v) Expansive transformation arises from openness, multivoicedness, and contradictions. Deviations from established norms (e.g. herding and information cascading) catalyse systemic changes (e.g. policy reforms), culminating in expansive transformation.

These five principles illustrate that socio-cognitive learning recognises that learning is a dynamic process influenced by social and cognitive factors, highlighting the importance of contextual, interactive, and adaptive learning. Social interactions and cultural norms shape contextual learning, interactive learning is enhanced through active engagement with others, and adaptive learning involves adjusting behaviours based on feedback and observed outcomes. This integrated approach provides a human-centred framework for understanding how individuals acquire knowledge and skills in a social context of infrastructure design and implementation based on the framework in Figure 3-5 (Engeström, 2001).

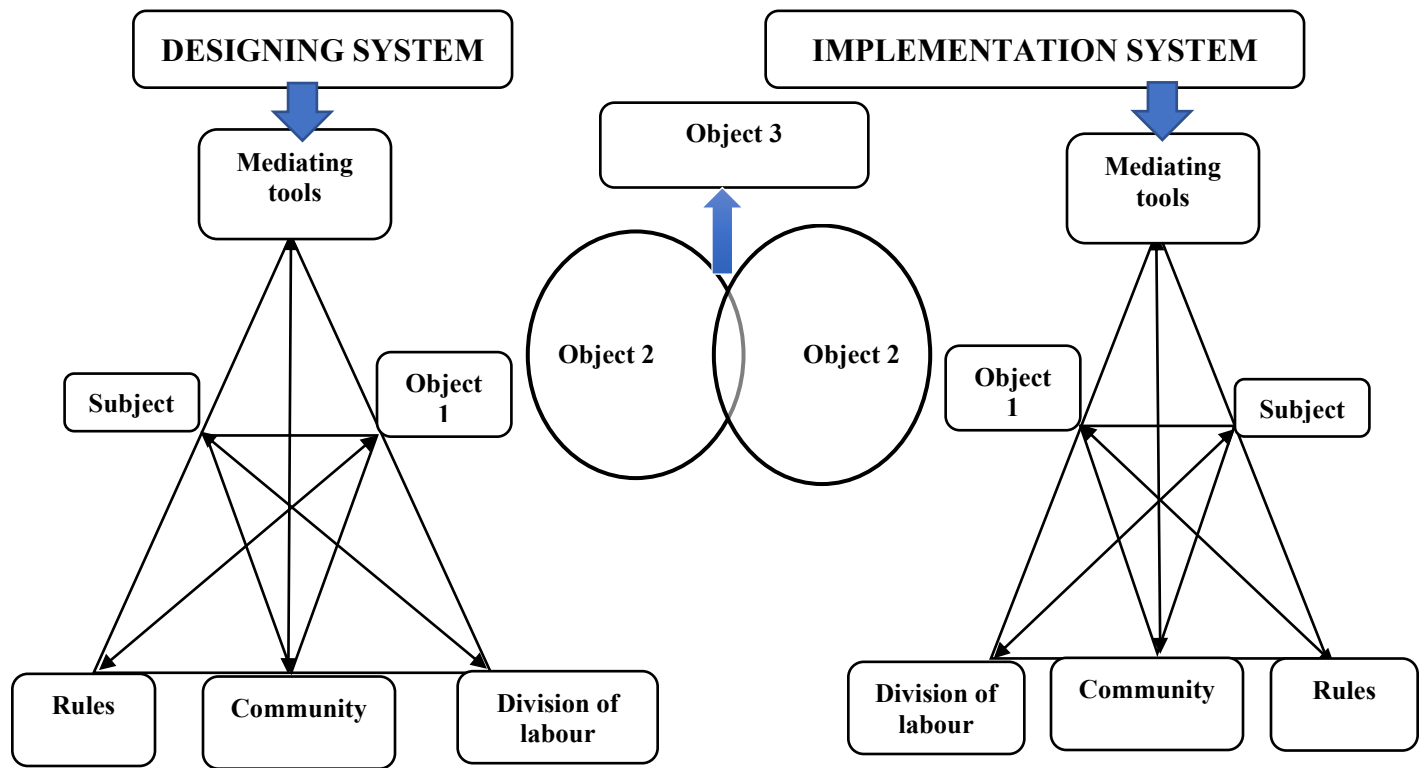


Figure 3-5: Third-generation CHAT

Source: Engeström (2001)

Table 3-1 describes how the herding concept, Hofstede’s cultural framework, affordance theory, and CHAT elements have been integrated into a CHAT framework and applied in the study.

Table 3-1: CHAT application to the relationship between sovereign risk and infrastructure development

Element	Description
Activity	The study focuses on enhancing infrastructure risk management. The activity systems include actors, tools, rules, and communities in the Kenyan infrastructure development system.
Subjects	The subject, an individual or group, is the actor in a large infrastructure development system. This group is the subject since group dynamics influence sovereign risk susceptibility.
Object/motive	The objective is to mitigate sovereign risk by improving group decision-making in infrastructure development by mitigating inefficient herding and information cascade.
Instruments/Tools/Artefacts	The tools and artefacts used in infrastructure development can be physical, conceptual (the mind), procedural and processes, like the policy guidelines, decision-making frameworks, and data management systems that the subject (group) uses to affect the object, influencing decision-making processes and outcomes. Tool availability, effectiveness, and accessibility can shape decision quality, enabling group-based subject-object interaction.
Mediating artefacts and distributed cognition	CHAT underscores mediating artefacts' role in human activity, including physical tools and cultural symbols. Distributed cognition recognises cognition spanning individuals, artefacts, and context. In infrastructure development, formal and informal mediating artefacts can impact decision-making attributes: • Decision-making guidelines: Frameworks, standards, and best practices shape approaches, facilitating informed choices. ▪ Cultural norms and values: Traditions, values, and historical influences impact decisions, reflecting community involvement, sustainability, or economic development considerations.
Rules	Rules are written or unwritten guidelines that constrain and justify the subject's actions and affordances. Rules govern what the subject can do when using instruments to affect the object, including formal regulations described by the affordance theory and cultural norms described by Hofstede's national culture framework.
Division of labour	Division of labour outlines sub-system capabilities and role organisation in infrastructure development, affecting group decision-making conceptualised as debt governance, project management and macroeconomic risk conditions. Roles assigned to actors—government, project managers, community members, and contractors—impact authority and influence.
Community	The activity environment includes stakeholders like officials and community representatives shaping group decisions and negotiation dynamics in infrastructure lifecycles. Collaboration and consensus-seeking are common. The community serves as a nexus, providing context for subject work. Shared elements unite this diverse community, influencing Vision 2030 outcomes via shared methodologies and ideas across infrastructure agencies and departments.
Internalisation and externalisation	Herding emerges as a coping strategy for participating in complex group decisions stemming from negotiated observational learning and social influence. Internalising (self-focused) and externalising (social interaction) behavioural issues explain innate social group dependence leading to herding behaviour and information cascades in multi-agent systems like infrastructure development and sovereign risk perception.
Outcome	Sovereign risk, the outcome, is shaped by object-defined goals. As herding and information cascades emerge along infrastructure development lifecycles, it influences this outcome through transformed group decision-making and culturally negotiated managerial social learning objectives. Variations in decisions impact outcomes, e.g., improved lifecycle decisions lower sovereign risk, enhance benefits, reduce delays costs, and increase quality. Observing and quantifying lowered sovereign risk premiums in infrastructure lifecycles does not require directly observing managers. Declining sovereign risk suggests that expansive learning in infrastructure development enhances human capital and reflects transformative policies and improved outcomes, explaining Kenya's soft and hard infrastructure results.

Source: Author (2023)

3.3. A cultural-historical activity theory of the culture-mediated relationship between sovereign risk and infrastructure development through managerial herding

By sequentially integrating CHAT, affordance, culture psychology and herding theory constructs, this study offers a practice-based understanding of how culture influences managerial perception, processing, and response to infrastructure development risk as social cues and group dynamics. The insights contribute to infrastructure development knowledge, informed decision-making, and effective risk-mitigating strategies in Kenya. Herding behaviour, affordance, and cultural-historical theory emphasise the need for a unified approach to designing practical interventions grounded in academic theory. Influenced by cultural values and norms, infrastructure policymakers and managers play a significant role in the study. However, there are gaps in explaining how herding in groups may indirectly elevate sovereign risk in infrastructure projects, particularly in complex multicultural contexts:

- Behavioural finance (herding and information cascade) focuses on investor decisions, ignoring systemic behavioural determinants of their counterparties (borrowers).
- Prior research on herding overlooks decision-makers seeking infrastructure debt.
- Multicultural infrastructure contexts lack investigation in explaining sovereign risks.
- Behavioural finance does not fully capture micro-foundations of observational learning as potential managerial socio-cognitive learning complexities within infrastructure management.

Defining the socio-cognitive characteristic of infrastructure lifecycles from funding to termination is crucial to support theoretical integration with the sovereign risk evidence from Kenya:

- Infrastructure development involves diverse opinion-seeking sub-systems. Cultural exchange and shared meanings are crucial but lost in individual analysis.
- Different cultural backgrounds and communities interact to achieve common goals in the infrastructure context.
- Sovereign risk involves multiple decision-makers, including debt providers and seekers, each with agency and intentionality.

This complex decision-making process requires a comprehensive theory. It involves multiple stakeholders with distinct geopolitical and sociocultural backgrounds striving for mutually beneficial agreements through policy design and implementation. Defining rules is the primary step in formulating comprehensive infrastructure policy and implementation strategies, reflecting various behavioural aspects. In this context, “policy instruments” refer to government tools for policy execution in infrastructure development, also known as “governing instruments” or “tools of government” (Salamon, 2001). Hood (2010) identifies four

governmental resources for behavioural influence: informational, financial, coercive, and organisational. These instruments encompass policy guidelines and institutions, empowering the government to oversee and modify infrastructure development practices. These resources include “nodality, authority, treasure, and organisational” (NATO), shown in Table 3-2.

Table 3-2: Hood’s model of the tools of government

	Nodality (information)	Treasury (Finance)	Authority	Organisation
Effectors	Finance/Advice	Grants/loans	Laws	Service delivery
Detectors	Surveys	Consultants	Registration	Statistics

Source: Howlett (1991)

Governments can use these resources as behavioural pooling interventions, “detectors”, or “effectors”. The government’s instrument choice is circumscribed by existing social, political, and economic conditions constraining or enabling specific infrastructure policy instruments. Governments must consider four traits of individual instruments when selecting or designing policies (Le Galès, 2011): (i) resource intensiveness, including administrative cost and operational simplicity; (ii) targeting, including precision and selectivity; (iii) political risk, including support, opposition, public visibility, and chances of failure; and (iv) constraints on state activity, including difficulties with coerciveness and ideological principles. The assumption is that government policy instruments are substitutable but context-specific to acknowledge social, political, and economic goals (Howlett, 1991). Considering constraints, policymakers balance resource use, political risk, and targeting (Le Galès, 2016). Figure 3-6 shows the third-generation CHAT for interactions between policymakers and practitioners.

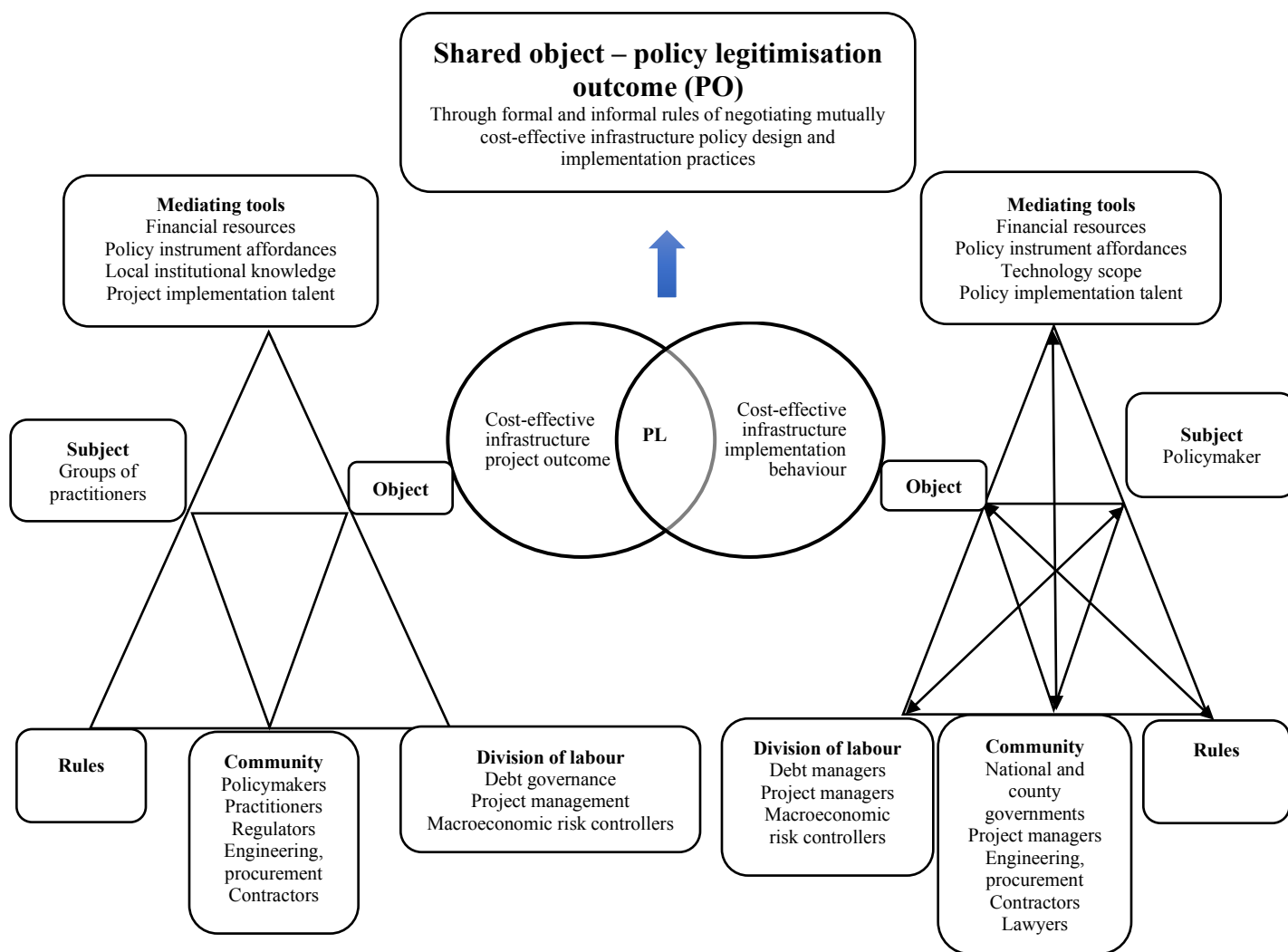


Figure 3-6: A cultural-activity theory of human-centred infrastructure policy design and implementation

Source: Author (2023)

Herding behaviour can be understood as defensive socio-cognitive learning, where individuals align their actions with their group to mitigate personal risk and avoid negative consequences, as deviating from the norm can lead to social disapproval or exclusion. Sociocultural psychology, specifically CHAT, shifts the focus of the unit of analysis not on the individual nor the group but on the social “activity” (herding). Such understanding will guide recommendations for appropriate policy reforms in the Kenyan context to bolster expansive managerial learning in order to reduce sovereign risk creation by dislodging suboptimal motives. The activity is understood as a finalised, transformative, and developing interaction between the actors (“subjects”) and the world (“objects”). Talamo *et al.* (2017) state that all these aspects can be conceptualised as meaningful choreographies for compatible infrastructure development and sovereign risk objectives. Converging infrastructure development and sovereign risk diversification objectives enable Kenya and

international lenders to coexist, coordinate and complement each other in infrastructure development by collaboratively learning how to mitigate risks to reach a rewarding and mutual agreement.

Developing investible infrastructure projects is the second step to entering the global market. With declining interest rates, the Kenyan government has borrowed through various international instruments, including sovereign bonds and bilateral and multilateral infrastructure project loans (Onjala, 2018). Creditors include sovereign wealth funds, pension funds, and private investors (Public Debt and Borrowing Policy, 2020). Suppose the elevated sovereign debt distress escalates due to suboptimal infrastructure performance. In that case, debt overhang (Myers, 1977) occurs. A debt overhang will exist if there is some likelihood that, in the future, debt will be larger than Kenya's repayment ability, and expected debt servicing costs will harm growth by inhibiting investment. Escalated uncertainty over future economic growth due to suboptimal infrastructure performance would increase investor information asymmetry.

Escalated risk and uncertainty can lead to the Kenyan infrastructure development system being classified as a high-risk geography. This classification may lead to mispricing its sovereign debt due to pervasive subjective risk ratings, particularly if the Kenyan macroeconomic fundamentals theoretically show that sovereign risk conditions will improve if infrastructure systems gradually bolster economic activity and generate stable cash flows (Rambo & Lucas, 2016). Sovereign risk mispricing may arise from international investors' herding behaviour if more infrastructure performance asymmetric information and inadequate risk evaluation tools used to analyse future economic fundamentals constrain optimal collaborative decision-making (Morsy & Moustafa, 2020). The international market size is vast. Institutional governance reasons such as geographic heuristics for diversification may lead international investors to flee from funding future infrastructure development projects to mitigate potential losses (Shiller & Pound, 1986). It seems logical to argue that sovereign debt providers represent adversarial agents (attackers) navigating the global financial system to search for higher yields and low risk. Kenya's low-carbon infrastructure development resources provide this type of investment opportunity. Alternatively, Kenya represents a team of defending agents (defenders) blocking sovereign default pathways by improving its infrastructure development practices to attract low-cost external debt and enhance infrastructure benefits realisation. Markowitz (1952) pioneered the portfolio theory that the return and risk relationship is an optimal selection problem. The normative sovereign risk-return trade-off formula is as follows:

- **Risk premium** = project loan interest rate – risk-free rate (the 10-year USD treasury bill rate)

The forces in the interaction between debt seekers and debt providers are in disequilibrium relative to fundamental asset information when risk is mispriced, as per Figure 3-7.

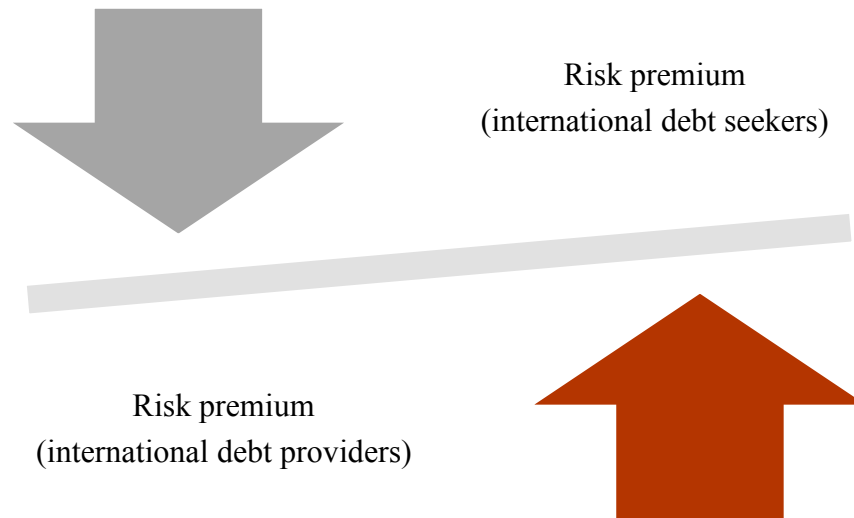


Figure 3-7: A risk-return trade-off disequilibrium

Source: Author (2023)

The efficient market hypothesis (Fama, 1970) posits that rational investors utilise available information, reflecting asset prices and yield differentials. Sovereign risk mispricing depicts suboptimal risk-return trade-offs (Fama & French, 1993). Developing countries such as Kenya attract high-risk investments (Morsy & Moustafa, 2020), necessitating debt-side governance interventions (Triantis & Daniels, 1995). Debt-side governance theory highlights the role of access to information by stakeholders as a mechanism for controlling managerial slack and lowering bankruptcy costs. Stakeholders influence collective interest, impacting decision-making in infrastructure finance and lifecycle management (Triantis & Daniels, 1995). Debt instruments, management covenants, and objective convergence offer an assessment of the Kenyan infrastructure development context (Vygotsky & Cole, 1978). Local content development aligns with Kenya's infrastructure policy for future capacity. Elevated sovereign risk disrupts system interaction, causing losses to debt seekers and providers. Herding in the financial system amplifies economic and social risks in developing nations like Kenya (Figure 3-8). The interplay between international financial and local non-financial resources shapes the infrastructure lifecycle development landscape.

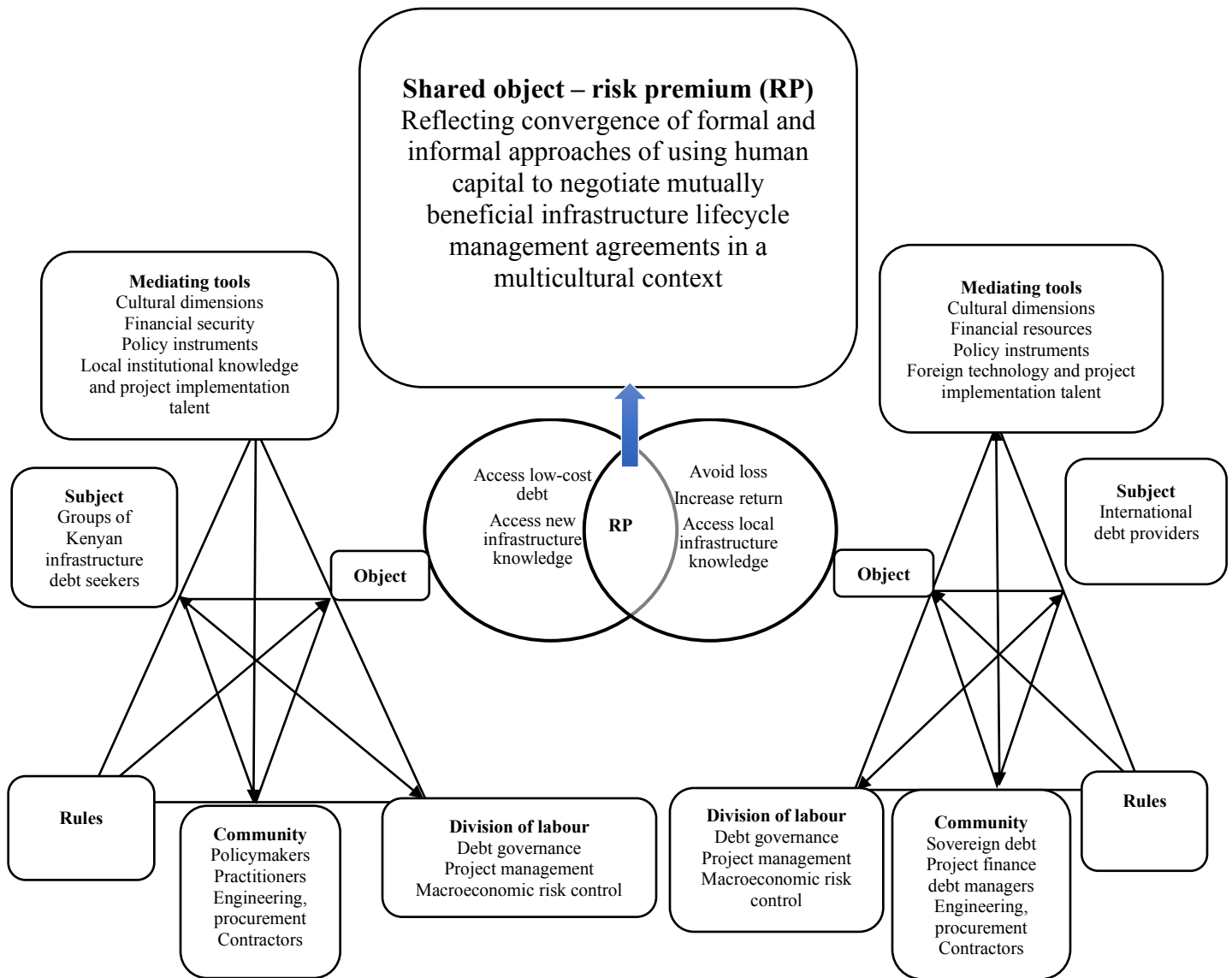


Figure 3-8: A cultural-historical activity theory framed in infrastructure lifecycle management as conceiving sovereign risk premiums due to herding

Source: Author (2023)

Figure 3-8 illustrates the objectives and expectations of activity systems, with debt providers seeking optimal returns for infrastructure risks. A risk premium represents investment return over risk-free rates, compensating for varying default risks (Mpapalika & Malikane, 2019). Bonds from developed countries have a lower default risk, offering lower rates compared to developing nations like Kenya, which have a higher risk. Herding behaviour blocks communication between systems, leads to information loss and stalls innovation. Integrating Hofstede’s cultural framework, CHAT, and herding provides insights into Kenya’s infrastructure lifecycle and sovereign risk evolution. Cultural factors shaping sovereign risk in Kenya are

unveiled by applying these dimensions to infrastructure management. Herding behaviour leads individuals to follow the consensus, influencing decision-making and risk perceptions. The actions of influential actors potentially lead to biased risk perceptions. Conformity, social influence, risk aversion, and resistance to change can all result from herd instincts, shaping human-centric approaches and innovation adoption.

As discussed in Section 3.2.3, Hofstede's (2001) cultural dimensions can be used to identify if cultural and geographic distance between managers in Kenyan infrastructure projects and lenders' locations influence shared understanding of sovereign risk phenomena. Kenya's cultural dimensions influence infrastructure decision-making. High power distance suggests hierarchical structures that could limit community participation and diverse perspectives. Collectivist values prioritise consensus and community needs, as deviating from the norm can lead to social disapproval or exclusion. Masculinity fosters assertive risk-taking for economic growth, which can be leveraged to dislodge herding tendencies. High uncertainty avoidance favours structured, risk-averse processes, possibly inhibiting innovation because by following the majority or leaders, individuals reduce the risk of being blamed for poor decisions, as they can justify their choices based on the collective action of the group. Long-term orientation promotes sustainability and risk mitigation, which can dislodge information seeking shortcuts such as herding as simplified decision-making that allows individuals to rely on the presumed expertise or better information of others to save cognitive resources and time. Balancing indulgence vs restraint can influence herding by dislodging the fear of isolation because deviating from the norm does not lead to social disapproval or exclusion. Acknowledging these dimensions is essential for informed and inclusive infrastructure management.

Consequently, the CHAT framework highlights how the interplay between individuals, artefacts, and the context mediates herding. Integrating the herding concept and Hofstede's cultural framework into CHAT helps to uncover how infrastructure lifecycle management in Kenya conceives sovereign risk as follows:

- **Activity systems analysis:** analysing the activity systems can reveal the division of labour, roles of different actors, and collaborative dynamics that shape decision-making processes in human-centred infrastructure lifecycle management.
- **Actors:** a CHAT framework identifies various stakeholders involved in infrastructure lifecycle development, such as government agencies, private investors, communities, and experts. Each stakeholder group brings perspectives, values, and interests, which can influence the conception of infrastructure benefits and sovereign risk.
- **Mediating artefacts:** infrastructure development plans, policies, regulations, and historical experiences are all artefacts that shape risk conceptions. Past infrastructure successes or failures can influence how sovereign risk is perceived and managed in Kenya. Examining the mediating

artefacts, such as decision-making guidelines and cultural symbols, can shed light on their influence on human-centred approaches.

- **Historical and sociocultural context:** the broader sociocultural context, including historical factors, socio-political dynamics, norms, and values, shapes risk conceptions. Understanding Kenya's sociocultural context provides insights into how the country's unique circumstances influence risk assessments and decision-making processes. The factors specific to Kenya, like colonial legacies and societal norms, provide insights into the context in which human-centred infrastructure lifecycle management operates.
- **Contradictions and conflicts:** CHAT recognises that conflict within activity systems can drive change and innovation. Recognising contradictions and conflicts within the activity system helps identify areas where human-centred principles may be in tension with existing practices. Addressing conflicts is crucial for effective infrastructure lifecycle policy design and implementation. The literature identified that conflicts between stakeholders, competing goals, or resource limitations influence infrastructure lifecycle development decisions. Resolving or addressing these contradictions can shape decision-making processes and outcomes.

By integrating the theoretical components, researchers articulate how culture, affordances, and sovereign risk co-exist as outcomes of managerial socio-cognitive learning motives within the Kenyan infrastructure development context. This integrated approach accounts for the formal and informal context as situations where state actions are publicly observable, and managerial actions reflect risk responses to state actions that are contingent on social motives. This assumption was reasonable because managerial performance measures in an infrastructure development activity are easily describable from a public policy standpoint.

3.4. Proposed conceptual framework

Shared culture within groups involved in infrastructure project development contexts can mediate herding behaviour and, likely, the information asymmetry contributing to observed sovereign risk mispricing. While herding and sovereign risk premiums are observable social patterns, they imbue shared cultural values as unobservable interpersonal information transmission modes. The integrated analytical framework for sovereign risk in infrastructure projects, including the herding concept, CHAT, affordances, and national culture, offers a possible explanation for how people work with those from their cultural background and other cultures by enabling them to understand their "worldview". The integrated theoretical framework's implication for understanding the increasingly important horizontal dimension of learning informs the conceptual framework shown in Figure 3-9.

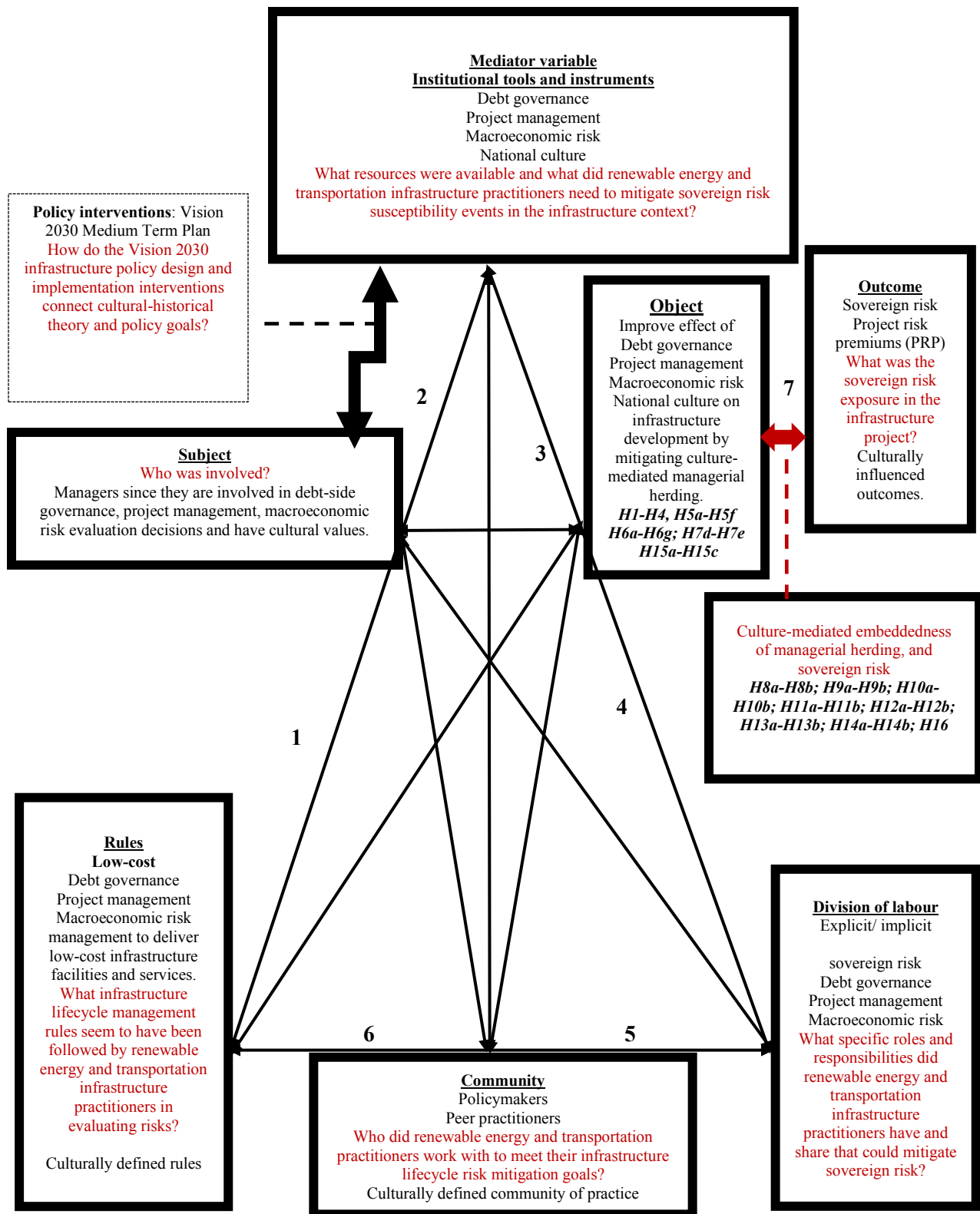


Figure 3-9: Proposed conceptual framework

Source: Author (2023)

The numbers (1 to 7) in Figure 3-9 are the nodes in the activity network representing the analysed social interactional pathways in the study. Debt-side governance, project management, macroeconomic risk, and the culture in the infrastructure development system influence project-level and sovereign risk perception. However, tensions may arise within individual nodes of the activity system (primary tensions), between multiple nodes (secondary tensions), between old and new modes of the activity (tertiary tensions) and between newly organised activity systems and their neighbouring activity systems (quaternary tensions) (Engeström, 2001). Essentially, the rising risk is driven by the tensions or contradictions that manifest when the object of the activity system conflicts with institutional tools and instruments, rules, or division of labour. Tensions reflect the specialisation, coordination opportunities, and challenges emerging from the multivoiced perception of sustainable infrastructure development as practical responses to changing circumstances and priorities (Engeström, 2001). Multivoicedness means the managerial perceptions of sustainable infrastructure debt-side governance, project management, and macroeconomic risk mitigation tools and practices differ (Engeström, 2001). Through rigid quantitative analysis of the relationship between infrastructure development and sovereign risk (Node 7), the conceptual framework minimises the limitations of qualitative research, such as social desirability bias where people feel compelled to give the “right answer” or embarrassed to answer certain questions. However, the quantitative research method of predicting the relationship between sovereign risk and infrastructure development at node 7 falls short in accounting for the social network effects in the activity system addressed at nodes 1 to 6 to account for the tensions from which suboptimal infrastructure development practices emerge. Activity participants can transform the object (infrastructure development), establishing causal relationships among different elements that constitute the activity system. As a result, the study recasts the quantitative predictions into the activity system using a qualitative case study and in-depth interview method. The thematic analysis of participant views describes managerial herding as a defensive culture-mediated socio-cognitive learning motive. It reflects a particular aspect of mitigating social practice risks among managers that should not be separated from the infrastructure development activity from which it refers and sovereign risk emerges.

3.5. Methodological implications of the proposed conceptual framework

Figure 3-10 illustrates the methodological implications of evaluating the conceptualised infrastructure development as the primary activity system conceiving sovereign risk. It elucidates the interconnected components, like stakeholders, processes, tools, and managerial knowledge-sharing variables.

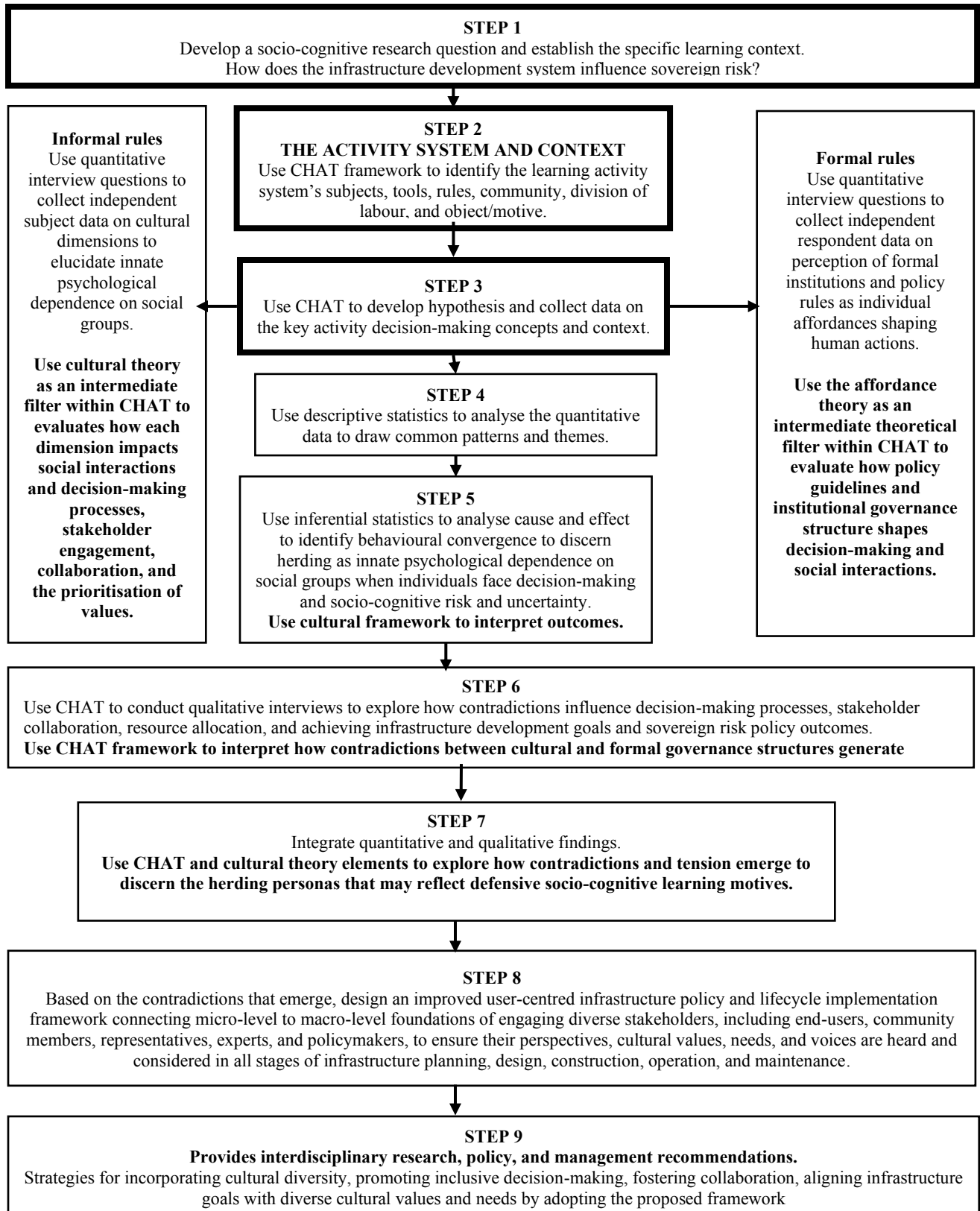


Figure 3-10: The explanatory sequential mixed-method research design

Source: Author (2023)

3.6. Variables and their measurements

3.6.1. Dependent variable: Sovereign risk

The dependent variable is the foreign currency-denominated risk in infrastructure development projects. The study uses two approaches to measure this risk based on primary and secondary data:

- The study uses sovereign risk perceptions in the survey data model since the local currency is more likely to be affected by inflation rather than sovereign default risk (Hill *et al.*, 2018). Also, financial markets often use foreign currency to denominate external debt, which has led to Kenya indexing inflation and exchange rates to end-user infrastructure tariffs to mitigate these risks. Therefore, managerial perception of sovereign risk involves assessing how the stability and reliability of the Kenyan government affect their view on the viability and security of long-term investments.
- In the secondary data model, the project risk premium (PRP) is computed as the difference between the annual interest rate on each infrastructure project loan and the US 10-year sovereign bond yield (Morsy & Moustafa, 2020). It aims to identify risk determinants based on longitudinal data since it captures changes across time and economic states. Consistent with prior research, investor herding in this context means financial analysts can reproduce signals that omit significant contextual information, redirecting infrastructure investments to developing nations with lower risks or higher yields for the equivalent risk in other contexts (Eberhard *et al.*, 2017).
- Finally, managerial perceptions of sovereign risk in the qualitative analysis validate the findings from the quantitative models using detailed descriptions of the relationship between sovereign risk and infrastructure debt-side governance, project management, macroeconomic risks and how it can be improved through collaboration. Theoretical elaboration elicits emerging cultural constraints.

As shown in Figure 3-9, the dependent variable is an embedded unit of analysis comprising managerial practices in the infrastructure development context reflecting herding motivations, with sovereign and project risk premiums as outcomes. Suppose cultural variables significantly influence sovereign risk and project risk premiums. In that case, it will reveal the weight that managers place on cultural constraints as an unobservable social cue for appropriate behaviour by correlating their actions with group norms despite different perceptions, which signals to herd. It implies that managers who take contrarian actions may be perceived as uncollaborative and face social exclusion. Factors underpinning managerial herding motives include reputational payoffs, preferences, and rationality. Incorporating the effects into the risk assessment framework for the relationship between sovereign risk and the infrastructure development activity supports human-centred infrastructure design and implementation theory, focusing on collaborative learning among

managers as core project participants. It is based on the subjective aspect of affordances, focusing on how managers interpret actions and outcomes enabled or constrained by cultural factors in their environment.

3.6.2. Independent variables

3.6.2.1. Debt-side governance variables in infrastructure projects

Debt-side governance is perceived through the lens of governance structures' effectiveness in managing project debt, influencing managers' confidence in financial oversight and risk management. The included debt-side governance variables (DG) in the measurement model are the debt as a percentage of the total investment in each project: loan maturity, grace period, total investment, and environmental and social governance. Whitehead (2015) argues that debt-side governance variables, such as debt-to-equity ratio, loan maturity, grace period, reporting rules, and covenant compliance, determine monitoring costs. Interest rates are monitoring costs reflecting the information asymmetry level that shapes the geography of infrastructure projects due to varying policies, regulations, and practices for sustainably managing financial resources.

3.6.2.2. Project management variables in infrastructure projects

Project management affordances are interpreted based on the managerial assessment of their ability to manage and execute projects effectively. Measurement items for the infrastructure project management variable (PM) include lifecycle integration, design, risk, cost, communication, procurement, stakeholders, schedule, and resource management to control for variables directly affecting the sovereign risk premium for evaluating an infrastructure project and the spillover effect of sovereign bond spreads from ratings. The secondary data for the infrastructure project management variable are selected from various databases based on prior literature. The study controls those factors, such as the projects' expected internal rate of return, size, operating conditions like vandalism that affect creditworthiness, and the ability to handle outstanding debt by including the project management-level control variables listed in Table 54 in Appendix F.

3.6.2.3. Macroeconomic risk variables in infrastructure projects

Macroeconomic risk is perceived in terms of economic stability and predictability in Kenya, affecting resource allocation, budgeting, and financial planning decisions. Past studies show that infrastructure lifecycle performance positively correlates with macroeconomic factors (Rambo & Lucas, 2016). Ignoring these macroeconomic variables can skew the estimate of the effect of the risk premium when evaluating infrastructure lifecycle management. The study includes macroeconomic variables that have been shown to correlate with the sovereign risk effects in previous literature (Borensztein *et al.*, 2013). These conditions include inflation, exchange rates, commodity prices, carbon risks and fiscal policies. The secondary data model includes the external debt to imports (the ratio of international debt to import goods, services, and

primary income), the natural log of GDP per capita, commodity prices (carbon and crude oil futures prices), syndicate size, and corruption to account for the propensity of the issuer to exploit investor herding as drivers of the geography of infrastructure project finance syndicates (Dorobantu & Müllner 2019).

3.6.3. Mediating variables: Cultural dimensions

Cultural dimensions are understood as local norms and practices, constraining how managers engage with stakeholders, negotiate, and implement projects. Cultural dimensions are shared values and norms describing the informational sources of herding or dispersing, mediating the motive to follow the crowd by thinking that the crowd has superior information. For the primary data models, managerial perceptions of national culture dimensions closely aligned with Hofstede's dimensions were applied. The national culture variables (CUL) across countries in each lending syndicate were retrieved from Geert Hofstede's website for the secondary data model. The research employs the indices of six national culture dimensions proposed by Hofstede *et al.* (2010): power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restraint (IVR). These cultural factors can describe the effects of society's culture on the values of its members and how these values relate to the country's payment behaviour.

Cultural dimensions shape collective memory among managers (Hofstede, 1980) that can lead to common practices in Kenya's infrastructure lifecycle development community. Kluckhohn and Strodtbeck (1961) note that societies facing similar challenges respond based on shared values and norms. This means that the Kenyan infrastructure development community collectively responds to information similarly when exchanging debt-side governance, project management, and macroeconomic risk insights. It facilitates the creation of collective memory about significant facts and common assumptions. While communication patterns address sovereign competition in risk mitigation, collective behaviour in projects can sometimes be counterproductive when it reproduces inefficient practices elevating risks. Hofstede (2001) highlights inequality, the association between individuals and groups, gender disparities, and uncertainty as societal problems reflecting culture-mediated behavioural convergence as follows.

- (i) Cultural immersion subconsciously influences practitioners' values and objectives, creating barriers to change.
- (ii) As part of the cultural context, social networks impact governance and functions through collective pressure and environmental inertia.
- (iii) Resource dependency requires adhering to local norms to ensure access to necessary resources while maintaining legitimacy.

- (iv) Institutions guide the infrastructure system's behaviour through informal and formal rules, influencing practitioners to follow "best practices" aligned with cultural expectations. This interplay reveals how cultural dimensions address societal challenges within the infrastructure sector.

3.6.4. Control variables

The Kenyan renewable energy and transportation infrastructure sector features unique characteristics, including project nature, investment patterns, and market conditions. These sector-specific distinctions are control variables to account for sector-level collaboration opportunities and challenges, including:

- **Information and knowledge:** quality and availability of data and expertise that moderate behaviour related to sovereign risk.
- **Organisational culture:** shared beliefs impacting practitioner perceptions and responses to sovereign risk.
- **Regulatory environment:** government frameworks could shape infrastructure practitioners' behaviours and sovereign risk management perceptions.

By focusing on perceived affordances, the study acknowledges that the success or failure of infrastructure projects is influenced by the objective reality of these determinants and how managers interpret and respond to them, highlighting the critical role of managerial perceptions in project outcomes. The question addressed here is whether too little weight is put on private information in making decisions due to cultural constraints.

3.7. Hypothesis on how national culture may mediate the relationship between sovereign risk and the infrastructure development system through managerial herding behaviour

The hypothesis incorporates cultural relativism (Berry *et al.*, 2011), which posits that cultural practices and beliefs are understood and evaluated in their contexts. There is no universal standard for judging cultures. What may be considered acceptable or unacceptable behaviour varies across cultures. Hence, cultural norms and values in the borrower's infrastructure context are antecedents of herding if they lead managers to base choices on the group's collective action to reduce the risk of being blamed for poor decisions. Considering the gap in the theoretical and empirical literature on the embeddedness of herding among managers in infrastructure development projects and sovereign risk, the study takes insights from financial markets where herding and sovereign risk mispricing have been studied to develop hypotheses. Financial studies assess the interaction between risks and analysts' recommendations to identify herding. In these footsteps, managerial interaction with the government in recommending infrastructure projects and interacting with

stakeholders to implement them is cast in social practice to identify culture-mediated herding behaviour within the infrastructure development and how it influences sovereign risk.

Managerial herding, drawn from the financial market literature, is the constraining effect of culture on risk response actions within the infrastructure development activity. Consistent with past studies, herding is observed through the regression coefficients of the cultural dimensions. Positive regression coefficients mean managerial risk perceptions align with the international market's risk consensus. In contrast, negative coefficients mean managerial perceptions and behaviour diverge from international market consensus, which may signal herding behaviour. The following points offer explanations for both outcomes:

- Herding towards market consensus: managers in the Kenyan infrastructure development context tend to align their risk perceptions with the prevailing international market trends. This behaviour implies that managers perceive that the market values certain infrastructure governance practices favourably and capitalises on that sentiment, leading to a positive regression coefficient.
- Dispensing from market consensus: managers in the Kenyan infrastructure development context deviate from the international market consensus. These perceptions and behaviours may arise when managers believe that the market is overly optimistic or pessimistic about their project's risk and that it is time to take a contrarian approach, observed as a negative regression coefficient.

Herding towards market consensus can lead to short-term increased sovereign risk prices if the market approves the elevated sovereign risk pricing strategy. It may increase risk if the market sentiment changes abruptly, causing the company to follow the market into unfavourable territory. Herding towards market trends can foster investor confidence and attract capital when the company aligns with popular trends. Alternatively, dispensing from the international market consensus may protect the sovereign from market mispricing by avoiding herd-driven decisions. Moreover, it can lead to long-term competitive advantages if the project's contrarian strategy succeeds. It might result in short-term criticism if the market initially disagrees with the divergent approach. Hence, the choice between herding towards or dispensing from the market consensus depends on the managerial assessment of conditions, risk tolerance, and strategic vision supporting the central government's infrastructure development goals. Effective leadership often involves a balanced approach when considering market sentiment and long-term infrastructure value creation.

3.7.1. Objective 1: Identify the key determinants of sovereign risk, debt-side governance, project management, macroeconomic risk, and culture in Kenyan renewable energy and transportation infrastructure projects

Sovereign bond spreads, the difference in yield between 10-year government bonds and the benchmark US 10-year Treasuries, represent Kenya's long-term creditworthiness (Morsy & Moustafa, 2020). The reviewed literature revealed that the determinants of sovereign bond spreads include credit ratings and fiscal

health. Economic factors include economic growth, inflation, and exchange rate stability. Political stability, governance quality, and government policies affect risk perception. External factors, like global economic conditions and market sentiment, contribute to the spread of fluctuations. Market dynamics, including investor sentiment and herding behaviour, influence spreads. External shocks and events, such as natural disasters or financial crises, and market supply and bond demand impact the spreads, leading to the following hypothesis.

***H1.** Certain factors positively and significantly determine the perception of sovereign risk among managers in renewable energy and transportation infrastructure projects.*

Williamson (1988) pioneered the interactive debt-side governance theory as discriminatory alignment (Williamson, 2000). Several informational factors, such as the total investment, debt-to-equity ratio, maturity, grace period, covenants, external debt, economic development, and default history, signal borrower quality, directly influencing managerial actions. It leads to the following hypothesis.

***H2.** Certain factors positively and significantly determine the perception of debt-side governance among managers in renewable energy and transportation infrastructure projects.*

Infrastructure lifecycle development encompasses initiation, development, construction, operations, maintenance, and termination phases. According to the practitioners' guides from the Association for Project Management (2019), ten knowledge areas – lifecycle integration, scope, cost, schedule, resource, quality, procurement, communication, stakeholders, and risk management across the project lifecycle management processes. This leads to the following hypothesis.

***H3.** Certain factors positively and significantly determine the perception of project management practices among managers in renewable energy and transportation infrastructure projects.*

Macroeconomic variables determine infrastructure lifecycle performance. Rating agencies consider current economic indicators, like GDP per capita and economic growth prospects, exchange rate and currency convertibility risk transfer from the sovereign, in making forecasts and seek peer input to estimate future economic performance when assigning ratings. Infrastructure risk managers may have more optimistic forecasters for cultures associated with stronger economic performance characteristics.

***H4.** Certain factors positively and significantly determine the perception of macroeconomic risks among managers in renewable energy and transportation infrastructure projects.*

Cultural constraints within the community of practice (Wenger, 2000) identify norms and values that shape group behaviour. Managers adopt these norms in specific contexts. National culture determines human

activity in specific ecological niches and their zone of proximal development. Hence, the study proposes six hypotheses to describe the Kenyan multicultural infrastructure project context:

H5a. Power distance (PDI) negatively and significantly determines the characteristics of the infrastructure project context.

H5b. Individualism (IDV) negatively and significantly determines the characteristics of the infrastructure project context.

H5c. Masculinity (MAS) positively and significantly determines the characteristics of the infrastructure project context.

H5d. Uncertainty avoidance (UAI) positively and significantly determines the characteristics of the infrastructure project context.

H5e. Long-term orientation (LTO) positively and significantly determines the characteristics of the infrastructure project context.

H5f. Indulgence (IVR) negatively and significantly determines the characteristics of the infrastructure project context.

3.7.2. Objective 2: Examine the relationship between culture and managerial demographics in Kenyan renewable energy and transportation infrastructure contexts

This objective tests the reciprocal determinism hypothesis that a person's behaviour influences and is influenced by personal factors, including cognitive, emotional, biological, and social environment, cultural norms, and access to resources. Demographics are cultural symbols shaping the context of international infrastructure by bringing certain people together from different cultures and subcultures, widening managerial social networks. According to the recommendation by Hofstede *et al.* (2010, p. 46), gender, generation, and class are contextual dimensions because they are categories of people in the Kenyan multicultural infrastructure development system, not integrated social systems such as countries or ethnic groups. Hence, demographics, including gender, generation, and class cultures, are described in their terms. Mayfield and Mayfield (2012) found that culture shapes infrastructure development disparities worldwide, suggesting that demographic factors could influence the effectiveness of the infrastructure development system. With varying degrees of rationality or irrationality, Ashiya and Doi (2001) found that Japanese macroeconomic forecasters and board members followed trends in evaluating mergers. Stickel (1992) found that reputation, performance incentives, and industry benchmarks impact peer-to-peer or group dynamics. Mikhail *et al.* (1999) found enhanced analyst accuracy in an "all-American research teams". Similarly,

Wiewiora & O'Connor (2022) found that experienced project managers in the US engage in common practices to manage ambiguity effectively, reflecting Gray & Ulbrich's (2017) view that addressing social relational ambiguity through effective collaboration, information-seeking, and communication influences individual-level ambiguity intolerance positively. Walker *et al.*, (2023) found that dialogue, a language attribute of culture, enhanced task mastery in Australian large-scale infrastructure development projects.

Hong *et al.* (2000) found that experience influences financial analyst behaviour where novices copy experts and analysts tend to align themselves with prior expectations. Studies reveal that demographics, self-perception, and shared norms may not occur randomly but reflect how managers use social cognition to mitigate personal risks by aligning with prevailing performance incentives and industry benchmarks. This influence of values and norms establishes a dialectical relationship between the informativeness of the Kenyan infrastructure development system and sovereign risk that can redefine project management practices. This evidence leads the study to propose seven hypotheses that culture's behavioural pooling effect determines managerial herding motives. While the dependent variable is each cultural dimension, the independent variable is managerial demographics as individual-level cultural symbols.

H6a. Managerial demographics significantly influence ambiguity tolerance (AT) within the infrastructure project context through managerial herding.

H6b. Managerial demographics significantly influence power distance (PDI) within the infrastructure project context through managerial herding.

H6c. Managerial demographics significantly influence individualistic (IDV) within the infrastructure project context through managerial herding.

H6d. Managerial demographics significantly influence masculinity (MAS) within the infrastructure project context through managerial herding.

H6e. Managerial demographics significantly influence uncertainty avoidance (UAI) within the infrastructure project context through managerial herding.

H6f. Managerial demographics significantly influence long-term-oriented (LTO) within the infrastructure project context through managerial herding.

H6g. Managerial demographics significantly influence indulgence (IVR) within the infrastructure project context through managerial herding.

3.7.3. Objective 3: Assess how culture mediates and moderates the relationship between sovereign risk and the development of Kenyan renewable energy and transportation infrastructure projects

Consistent with the sovereign ceiling policy (Borensztein *et al.*, 2013), the project risk premium will depend on the state of the economy, measured as sovereign risk. Sovereign risk is public information. Although each manager can observe this signal, managers may retrieve varying information about its effect on their project. This objective addresses how well the aggregate level of risk reflects all the available information. The moderating influence of culture in the relationship between sovereign risk and the infrastructure development system is the assumption that managers are irrationally correlated due to cultural constraints. Suppose the aggregate variance in shared cultural values and norms is large enough to significantly skew their actions and decisions towards the majority or leaders. In that case, it may reflect herding by aligning their actions with culturally defined groups to mitigate personal risk and avoid negative consequences. For instance, Morsy and Moustafa (2020) reveal that sovereign bond spreads are larger by 2.9% for government bonds from emerging markets in the Sub-Saharan African region than other developing countries due to investor herding, indicating higher perceived risk and discriminatory alignment. Despite the sovereign ceiling rule, infrastructure risk evaluation, even for unrated projects in the Sub-Saharan African region, is expected to be lower than sovereign ratings due to extensive project risk-sharing contracts (Delmon, 2021). History shows that investors may sometimes consider infrastructure financial and non-financial decisions more creditworthy than a host government bond (Iyer & Purkayastha, 2017), contrary to the sovereign ceiling policy (Borensztein *et al.*, 2013). By examining data from 29 countries and 478 non-financial firms containing advanced and emerging economies and controlling for the effect of firm-level creditworthiness and macroeconomic conditions, Borensztein *et al.* (2013) offer evidence of the spillover effect of sovereign ratings on corporate ratings. This spillover occurs through the sovereign ceiling, especially in emerging markets with capital control and political risks. Borensztein *et al.* (2013) argue that firms will be riskier than their home government since the sovereign default directly influences the solvency and liquidity of the private sector. Hill *et al.* (2018) found that sovereign rating actions affected domestic firm-level ratings daily in 34 countries. Their findings show that firm-level rating actions have the same direction changes after sovereign rating actions within 21 days. Other results (e.g. Ho *et al.*, 2023) report a spillover bias in some countries where negative sovereign rating actions severely impact corporate rating actions than positive sovereign rating actions. The study expects infrastructure project management practices to influence sovereign risk because issuers are inclined to exploit investor herding motives (Hirshleifer & Hong Teoh, 2003), potentially through suboptimal infrastructure project management practices (Carmody *et al.*, 2022). Hence, the following five hypotheses are proposed:

***H7a.** Debt-side governance perceptions positively and significantly influence sovereign risk perceptions by managers in renewable energy and transportation infrastructure projects.*

H7b. Project management perception positively and significantly influences sovereign risk perceptions by managers in renewable energy and transportation infrastructure projects.

H7c. Macroeconomic risk perceptions positively and significantly influence sovereign risk perceptions by managers in renewable energy and transportation infrastructure projects.

H7d. Sovereign bond spread (SBS) changes positively correlate with the project risk premium (PRP) for evaluating cross-border infrastructure project management actions.

H7e. Sovereign bond spread (SBS) changes positively correlate with the project risk premium (PRP) for evaluating cross-border infrastructure project management actions in the private sector.

These hypotheses were the baseline models into which cultural variables were included to estimate the strength and direction of their mediation effect on the managerial perception of sovereign risk. Secondary data analysis was used to investigate national culture as a moderator of the relationship between project risk premium and sovereign risk. The aim was to validate the hypothesis that borrowers exploit investor herding by leveraging the information asymmetry between them and investors to propose infrastructure projects (Ferchen & Perera, 2019) based on governance structures. The study developed seven hypotheses based on the effect of national culture on debt repayment behaviour and the likely spillover of sovereign risk to non-financial decision-making contexts such as infrastructure development. In the following sections, these hypotheses evaluate how culture mediates or moderates the relationship between sovereign risk and the infrastructure development system as embedded outcomes of managerial herding motives.

3.7.3.1. Ambiguity tolerance (AT)

According to a survey among project managers in the US, Wiewiora and O'Connor (2022) found that ambiguity tolerance is the “soft” competency determining success. US project managers faced numerous ambiguities grouped into seven higher-order issues: task complexity, core project management, stakeholder management, human resource capacity, insufficient task and role information, mistakes and errors, and unforeseen circumstances and occurrences. While “task-related” ambiguity evoked positive emotions, “people-related” ambiguity evoked negative emotions. Therefore, experienced project managers engaged in common practices to manage ambiguity effectively, suggesting behavioural convergence. To understand ambiguity tolerance in project environments, researchers have focused on its sources, such as legal contracts (Chan *et al.*, 2021), magnitude (Wiewiora & O'Connor, 2022) and how creativity, innovation and social interaction affect team collaboration under risk, uncertainty or ambiguity (Walker *et al.*, 2017). Attitudes towards ambiguity are valuable predictors of leadership skills, job performance, and creativity, influencing their followers’ performance (O'Connor *et al.*, 2022). For instance, Gray & Ulbrich (2017) found ambiguity

acceptance and translation skills as the most critical managerial traits that can boost project success more than “technical skills”, such as planning and scheduling. While this finding implies that highly ambiguity-tolerant managers may emerge as early-informed decision-makers or herd leaders, Hirshleifer *et al.* (1994) found that overconfidence among early-informed analysts encourages herding among risk-averse analysts in the security trading context. Each investor expects to win in the competition to understand “hot” stocks. This literature presents a significant positive relationship between managerial ambiguity acceptance and organisational outcomes, leading to the following hypothesis:

***H8a.** Ambiguity tolerance (AT) positively moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour.*

3.7.3.2. Power distance index (PDI)

Countries with a high power distance index, like Kenya, often have centralised government systems and limited transparency and accountability; this can increase the risk of political violence and revolutionary change, which outsiders may view negatively (Hofstede *et al.*, 2010). In infrastructure projects, Kenya’s high power distance score is expected to influence managerial herding through limited transparency and accountability between higher-ranking and lower-ranking managers. A study by Liu *et al.* (2015) found that bureaucrats often act as superiors in such cultures, issuing orders that deviate from project plans and raise cost overruns. Power distance mediates managerial herding motives of conforming to authoritative figures as a cue for appropriate action, especially in uncertain situations if deviating from the norm leads to social disapproval or exclusion. Prendergast’s (1993) principal-agency theory of “yes men” suggests that institutions may engage in endorsement herding when expert opinions guide decisions. In Kenya, the high power distance culture may influence herding through respecting authorities and valuing expert opinions, resulting in actions aligned with authority figures. This leads to the following hypotheses:

***H9a.** The power distance index (PDI) positively moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour.*

***H9b.** The power distance index (PDI) positively moderates the spillover of sovereign bond spreads on infrastructure risk premiums through managerial herding behaviour.*

3.7.3.3. Individualism versus collectivism (IDV)

As highlighted by Hofstede *et al.* (2010), collectivist cultures, which emphasise adopting group norms, have weaker legal systems. Collectivism introduces uncertainty regarding enforcing individual legal rights. The positive association between collectivism and low levels of GNI (Hofstede *et al.*, 2010, p. 38) manifest in lower sovereign risk ratings, likely due to uncertainty about individual law and legal rights enforcement. Conversely, individualism positively influences sovereign rating. Dang and Partington (2020) found that

the cultural distance between individualism and collectivism determines sovereign risk rating upgrades or downgrades. Liu *et al.* (2015) offer insights into how collectivism influences the behaviour of infrastructure contractors, favouring group interests and accommodating self-sacrifices, which may, in turn, lead to project delays. Washbourne (2022) argues that historical narratives are cultural symbols in infrastructure development contexts, suggesting potential information cascades. Past studies find a negative influence of collectivism on sovereign risk perception and project risk management in cross-country sample analysis. However, they find a positive one when fostering mutual trust and in-group collaboration. Consistent with these findings, Gray & Ulbrich (2017) proposed resolving social relational ambiguity through effective collaboration, information-seeking, and communication to positively influence individual-level ambiguity intolerance which can boost multicultural group cohesion, leading us to propose the following.

***H10a.** Individualism (IDV) positively moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour*

***H10b.** Individualism (IDV) positively moderates the spillover of sovereign bond spreads on infrastructure risk premiums through managerial herding behaviour*

3.7.3.4. Masculinity versus femininity (MAS)

Kenya's national culture exhibits masculinity, as outlined by Hofstede *et al.* (2010), emphasising material achievement, which can positively influence economic growth. Masculinity can be viewed positively in the context of infrastructure project risk. However, as El Ghouli and Zheng (2016) note, an overly aggressive masculine approach may lead to opportunistic behaviour, acceptance of higher levels of indebtedness, and an aggressive negotiation style under dispute. This cultural value implies that societies may be more willing to accept high indebtedness to pursue a welfare-oriented society. However, excessive debt becomes a negative factor when the benefits of social inclusion through infrastructure projects are compromised. Feminine cultures prioritise consensus decision-making, which may mediate herding if managers leverage reliance on social proof through the perception that it is likely correct if many agree with the choice. Masculinity, focusing on competition and authority, tends to discourage herding and may even give rise to influential leaders within herds. Zitzewitz (2003) found that overconfident analysts may under-update forecasts. Masculinity can foster risk tolerance and focus on individual gains over group among managers, as Liu *et al.* (2015) observed. This literature presents a significant positive relationship between masculinity and risk perceptions, leading to the following hypothesis.

***H11a.** Masculinity (MAS) positively moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour.*

H11b. Masculinity (MAS) positively or negatively moderates the spillover of sovereign bond spreads on infrastructure risk premiums through managerial herding behaviour.

3.7.3.5. Uncertainty avoidance index (UAI)

Liu *et al.* (2015) discovered that project contractors with high uncertainty avoidance tendencies opt for stringent contract terms. High uncertainty avoidant (UAI) countries, as suggested by financial sector evidence, typically have less market-oriented economies, sluggish payment cultures, slower bill payments, and extended check collection periods (Hofstede *et al.*, 2010). These nations also exhibit higher tax evasion (Allam *et al.*, 2023) and are perceived as more corrupt by external observers (Hofstede *et al.*, 2010). Moreover, high UAI societies tend to lean towards intolerant political ideologies of aggressive nationalism, often harbouring extremist minorities (Hofstede *et al.*, 2010). The combination of lower market orientation, poor payment practices, increased tax evasion, heightened corruption, and the potential for extremist political groups are undesirable attributes for sovereign risk assessment. A higher UAI score is anticipated to impact risk perceptions negatively. Hirshleifer *et al.* (1994) revealed that market prices are influenced by herding when early-informed analysis influences risk-averse individuals, with the early unwinding of positions unfavourably influencing prices. Liu *et al.* (2015) compared contractors in China, Poland, and Singapore, demonstrating that managers with high uncertainty avoidance (UAI) prioritise rigorous contract terms to mitigate contracting and bidding risks.

Conversely, low uncertainty avoidant managers may arbitrarily extend project durations for political reasons, disregarding potential uncertainties like quality problems or accepting design changes without thorough consideration. The variation in safety risks between China and Singapore was attributed to differing safety awareness levels (influenced by UAI) and stringent government inspections. In Kenya, which exhibits intermediate uncertainty avoidance, decision-makers may align their actions with risk aversion, expert consensus, and established practices. Herding simplifies decision-making by allowing individuals to rely on the presumed expertise or better information of others, thus saving cognitive resources and time. This leads to the following hypotheses:

H12a. Uncertainty avoidance (UAI) positively moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour.

H12b. Uncertainty avoidance (UAI) positively moderates the spillover of sovereign bond spreads on infrastructure risk premiums through managerial herding behaviour

3.7.3.6. Long-term versus short-term orientation (LTO)

High long-term orientation (LTO) in societies leads to a view of good and bad as context-dependent and places importance on network relationships, resulting in higher scores on the Bribe Payers Index (Hofstede

et al., 2010). LTO can have positive and negative impacts on ratings: it correlates positively with growth and savings rates, favouring higher ratings, but also with more bribes and corruption, which lowers ratings. Short-term orientation, in contrast, relies on historical practices and reinforces information cascades. Time orientation significantly affects risk perception and information usage, as seen in herding patterns in financial markets (Holden & Subrahmanyam, 1996) and sovereign risk ratings (Dang & Partington, 2020). Managers with a high LTO prioritise future planning and value negotiation over arbitration for long-term cooperation, influencing sustainability prioritisation in management practices (Liu *et al.*, 2015). Long-term-oriented managers prioritise environmental risks, which emphasises sustainability (Meng *et al.*, 2016). In contrast, short-term-oriented managers may prioritise immediate gains, potentially diminishing the long-term informativeness of infrastructure performance and creating sovereign risk contexts. This leads to the following hypotheses:

***H13a.** Long-term orientation (LTO) positively moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour.*

***H13b.** Long-term orientation (LTO) positively moderates the spillover of sovereign bond spreads on infrastructure risk premiums through managerial herding behaviour*

3.7.3.7. Indulgence versus restraint (IVR)

Indulgence plays a role in shaping attitudes towards governance. Societies with high indulgence prioritise democratic governance and freedom of speech as national values but may score lower on maintaining order (Hofstede *et al.*, 2010). The impact of indulgence on risk ratings is mixed: it weakly correlates positively with national wealth, favouring optimistic risk ratings, but factors like short-term orientation, bribes, and corruption can contribute to pessimistic ratings (Allam *et al.*, 2023). In indulgent societies, political leaders are often optimistic despite crises, desiring performance without assertiveness, which positively influences risk ratings. Brown *et al.* (1985) found a similar contrast between long-term optimism and short-term pessimism in US security forecasts. Indulgent cultures may embrace riskier, more innovative projects due to the promise of immediate rewards, potentially fostering herding among managers who conform to this consensus. Managers with high indulgence may prioritise leisure, potentially causing schedule delays. In construction, Chinese contractors use the winter season to expedite projects, influenced by collectivism, power distance, and a restraint culture emphasising group interests (Liu *et al.*, 2015). Restraint-oriented cultures prioritise stability and may adopt cautious risk mitigation strategies. Here are the hypotheses:

***H14a.** Indulgence (IVR) positively moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour.*

***H14b.** Indulgence (IVR) positively or negatively moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour.*

Due to shared institutions of cultural embeddedness (Williamson, 2000), the infrastructure context was expected to display cultural dimensions consistent with the sovereign; hence, a positive and significant coefficient was expected for **H8a** to **H14a**. Subsequently, a moderation effect was tested based on **H9b** to **H14b** using secondary data to estimate how culture's interaction with sovereign bond spreads influences the relationship between the sovereign risk premium for evaluating infrastructure projects and infrastructure development practices across time and economic states. Panel data models regressed the interaction terms of cultural distance and sovereign bond spreads on project risk premium. Positively significant coefficients mean herding towards market consensus about sovereign risk, while negatively significant coefficients indicate herding away from market consensus.

3.7.3.8. Career selection in the infrastructure development context

Kenya's renewable energy and transport infrastructure sector has distinctive attributes, including policy guidelines, technology, investment trends, and market conditions. Due to significant financial investments, decision-making, and government participation, managing sovereign risk, infrastructure debt governance, project management, and macroeconomic risk are crucial in this sector. Additionally, shortages in technical expertise within this field reflect individual career preferences in infrastructure lifecycle management. This leads to the following hypotheses:

***H15a.** Debt-side governance risk perception positively influences infrastructure management career choices.*

***H15b.** Project management risk perception positively influences infrastructure management career choices.*

***H15c.** Macroeconomic risk perception positively influences infrastructure management career choices.*

3.7.4. Objective 4: Propose a human-centred infrastructure design and implementation framework

Extensive literature shows that cultural values mediate the managerial tendency toward strategic imitation (Shiller, 1995) in collaborative infrastructure projects without eliciting how defensive socio-cognitive learning influences sovereign risk through the governance and performance of infrastructure projects. For example, Walker *et al.*, (2023) discovered that dialogue improved team cohesion and collective task mastery in large-scale Australian infrastructure projects. Manley & Chen (2017) emphasised that project organisations should invest heavily in collaborative learning capacity by strongly mobilising individual

learning routines into unified organisational learning systems. Collaborative learning is a special tool in human-centred infrastructure design and implementation. Yet, no conceptual model with human-centred variables currently exists to enable managers to understand how culture-mediated socio-cognitive learning is a soft competency that can complement the government's efforts in identifying what to change in its people-centred governance objectives and how to support them in mitigating emerging people-related infrastructure development risks. Essentially, infrastructure project management contributes to sovereign risk exposures within the implementation context when managerial and project performance fails to boost long-term economic growth and social development fundamentals, leading to this hypothesis:

***H16.** Human-centred infrastructure design and implementation practices mediate the dialectical relationship between sovereign risk and the infrastructure development system.*

This study addressed this hypothesis using the activity theory framework to examine the behavioural pooling effect of variables characterising cultural and formal infrastructure governance. The proposed cultural hypotheses were tested across the three infrastructure management themes to identify category herding based on a binary dependent variable where renewable energy was coded as 1 and transportation as 0. Herding behaviour and its potential causation in terms of price formation in global financial markets were tested using secondary data analysis to triangulate the survey research findings. In the secondary data model, cultural distance between Kenya and its lenders' countries of origin interacted with sovereign bond spreads to control price effects. The study employed mediation and moderation analysis to evaluate how culture influences the relationship between sovereign risk and infrastructure development. Finally, using a case study and thematic analysis, the study explored contradictions as defensive culture-mediated socio-cognitive learning. This mixed-method research combines theoretical elaboration with empirical evidence to propose a human-centred infrastructure design and implementation framework. It confirms the hypothesis of a dialectical relationship between sovereign risk and infrastructure development system mediated by managerial herding to cope with risk, uncertainty and ambiguity in project environments.

3.8. Chapter summary

This chapter has demonstrated that the integration of CHAT with cultural psychology, affordances, and herding theories overcomes the weaknesses of each theory. Integrating the four theories enables researchers to consider the interaction between cognitive and social factors in proposing a human-centred infrastructure design and implementation framework. Chapter Four outlines the methodology for empirically testing the proposed conceptual framework.

Chapter Four: Research Methodology

4.1. Introduction

This chapter discusses the research philosophy, design, population, sampling, size, data collection, analysis, instruments, validity, reliability, and ethics.

4.1.1. Research philosophy

Saunders *et al.* (2015) define research philosophy as a system of beliefs and assumptions about knowledge development. It aligns the research paradigm, ontology, and epistemology.

4.1.2. Research paradigm

A research paradigm is a foundational framework shaping a researcher's perspective, including their beliefs about reality, knowledge, and the research approach (Guba & Lincoln, 1994). A pragmatic paradigm guides this study's design and strategy and is one of the five paradigms:

- A positivist paradigm is grounded in the belief that objective reality can be observed and measured. Positivists employ quantitative methods to establish causal relationships and aim for objectivity and generalisability (Guba & Lincoln, 1994).
- A realist paradigm opposes idealism, asserting that an independent reality exists beyond the mind (Crotty, 1998).
- A constructivist/interpretivist paradigm focuses on understanding subjective meanings and social constructions of reality, emphasising engagement with participants' perspectives using qualitative methods (Saunders *et al.*, 2015).
- A critical paradigm aims to uncover and challenge power structures, social inequalities, and oppressive systems, advocating for social justice and change through critical discourse analysis (Guba & Lincoln, 1994).
- A pragmatic paradigm combines various paradigms, prioritising practicality and problem-solving, allowing researchers to choose methods that best address their research questions (Saunders *et al.*, 2015).

Hodgkinson *et al.* (2001) propose a four-fold taxonomy to bridge the gap between theory and practice, focusing on managerial knowledge: pedantic, popularist, puerile, and pragmatic science. Pedantic science emphasises methodological rigour over relevance, while popular science prioritises relevance at the expense of rigour. Puerile science lacks rigour and practical relevance, and pragmatic science combines theoretical and methodological rigour with practical relevance. Pragmatic science, which values theoretical and methodological rigour as well as practical relevance, was chosen for this study to enhance infrastructure

policy design and implementation by considering managerial experiences in Kenya. Pragmatism enables the integration of elements from the positivist and constructivist paradigms in the entire research process, including method selection, data collection, analysis techniques, and interpretation of interdisciplinary findings – finance and management. This paradigm aligns with the study’s aim to achieve theoretical rigour while maintaining the practical applicability of the study to infrastructure project finance and management.

4.1.3. Ontology

Ontology, a philosophical study of existence and reality, is pivotal in shaping researchers’ perspectives on reality. It influences the conceptualisation, design, and methodology of their research. Researchers align their ontological perspectives with research paradigms. Guba & Lincoln (1994) propose that this alignment can be categorised into four main stances:

- Objectivism, associated with the positivist paradigm, asserts an independent, objective reality that can be empirically observed and measured.
- Critical realism, linked with the postpositivist paradigm, recognises an imperfectly apprehensible reality, prompting a critical examination.
- Historical realism, aligned with the critical paradigm, acknowledges the impact of social, political, cultural, economic, ethnic, and gender values on reality.
- Relativism, corresponding to the constructivist paradigm, views reality as socially constructed, context-dependent, and subject to multiple interpretations.

This study adopted a relativist ontology, positing that infrastructure development risks partly emerge from the subjective perception of sovereign risk. This relationship is dialectical. Therefore, the rising component of sovereign risk attributed to the infrastructure development system can only be described as the outcome of the practices of subjects (policymakers and practitioners) within the Kenyan infrastructure development system. This perspective conceptualises infrastructure risk as a culture-mediated socio-cognitive response to evolving phenomena in the specific sovereign’s large infrastructure development context. This chosen ontological stance informs the epistemology, methodology, data collection and interpretation processes.

4.1.4. Epistemology

Epistemology is the fundamental branch of philosophy that explores the nature of knowledge and how it is acquired, influencing researchers’ approaches to research design and methodology. Researchers align their epistemological perspectives with research paradigms, leading to different beliefs about what constitutes knowledge and how it can be obtained. Key epistemological positions include:

- Dualism/objectivism is aligned with the positivist paradigm, emphasising empiricism, sensory experience, direct observation, measurement, and establishing causal relationships and general laws through empirical testing (Scotland, 2012).
- Modified dualism/objectivism is associated with a postpositivist paradigm. It acknowledges external guardians of objectivity and recognises that while replicated findings may be true, they remain subject to falsification (Guba & Lincoln, 1994).
- Subjectivism/transactional epistemology is linked to the relativist ontology and critical paradigm. It emphasises the interactive relationship between researchers and their subjects and acknowledges the influence of values, context, and subjectivity on knowledge (Guba & Lincoln, 1994).
- Constructivism aligns with the constructivist paradigm, blurring the distinction between ontology and epistemology (Guba & Lincoln, 1994).
- Pragmatism is focused on practical consequences and usefulness and emphasises testing ideas and theories in real-world situations and evaluating their practical outcomes (Kelly & Cordeiro, 2020).

This study adopts a pragmatic epistemology, aligning with its practical nature and emphasising actionable insights (Robey *et al.*, 2018). Pragmatism accommodates interdisciplinary perspectives and iterative knowledge-building because it fosters reflexivity, adaptability, and participant collaboration. Hence, it supports a mixed-method research approach, specifically a sequential explanatory research method where quantitative findings inform the qualitative research phase. This approach recognises knowledge-building as an evolving process (Morgan, 2014) which suits the current research's practical orientation, enabling context-specific insights on culture-mediated socio-cognitive learning as a moderator of the relationship between sovereign risk and infrastructure development through managerial herding behaviour.

4.2. Logic of inquiry

The research uses various logical approaches to guide inquiry and knowledge generation (Qutoshi, 2018). Saunders *et al.* (2015) propose that logic is a framework for structuring thinking, making connections, and drawing conclusions based on evidence. It includes the following:

- Deductive logic starts with general principles or theories and moves to specific observations or predictions. It is structured and often used in quantitative research to test and generalise theories or hypotheses (Blaikie, 2009).
- Inductive logic begins with specific observations or data, leading to broader generalisations or theories. It is prevalent in qualitative research, where data analysis generates concepts or theories from observed patterns (Easterby-Smith *et al.*, 2004).

- Abductive reasoning seeks the best explanation based on available evidence, combining deduction and induction. Researchers propose hypotheses or explanations while recognising alternative interpretations (Van Maanen *et al.*, 2007).
- Transductive logic draws conclusions based on observed patterns in specific datasets, often used in case studies for in-depth understanding (Winch, 2014).
- Retroductive logic, like abduction, traces effects or observations to potential causes or explanations suitable for exploratory research (Brierley, 2017).

This study combines deductive and inductive logic, following a pragmatic approach. Deductive logic develops causal relationships, identifying sovereign risk, debt-side governance, project management, macroeconomics, and culture perceptions and their culture-mediated relationships. Inductive logic is used in the qualitative phase for exploration and theory generation from observed data. Integrating quantitative and qualitative findings blends deductive and inductive logic, enabling robust theoretical and practical insights. A pragmatic approach, merging inquiry logic approaches, offers a comprehensive understanding of culture-mediated socio-cognitive learning as a moderator of the relationship between sovereign risk and infrastructure development through managerial herding. It emphasises theoretical insights and practical relevance in designing a human-centred infrastructure design and implementation framework.

4.3. Research design

Research design is a comprehensive strategy that logically integrates various study components to address the research problem (Creswell, 2014). It outlines the data collection, measurement, and analysis plan. Babbie (2008) outlines that social science research has three purposes: exploratory, descriptive, and explanatory.

- Exploratory research aims to gain initial insights into a research problem or topic. It is conducted when little is known about the subject, generating ideas and hypotheses for further investigation. It involves literature reviews, pilot studies, and qualitative interviews.
- Descriptive research uses surveys, observations, and case studies to report a phenomenon or situation, focusing on observing and documenting traits, behaviours, or relationships.
- Explanatory research delves into causal relationships and underlying mechanisms between variables or phenomena. It offers a deeper understanding of why certain events occur, contributing to theoretical advancements and guiding policy decisions. It often uses mixed methods to explore complex research questions.

Given the aim of examining culture-mediated socio-cognitive learning as a moderator of the relationship between sovereign risk and infrastructure development that emerges through managerial herding motives,

the pragmatic paradigm allowed for a mixed-method research design. It began with a quantitative phase to gain a broad understanding of the sociocultural context, followed by a qualitative phase to explore the theoretical motives of managerial herding deeply. This flexibility accommodated the complexity of the research question and its multifaceted components.

4.4. Research strategy

Research strategy encompasses the comprehensive approach guiding a study's execution, ensuring systematic and rigorous research (Creswell, 2014). It provides the roadmap for addressing research objectives. Common strategies include:

- An experimental strategy involves controlled manipulation of variables to establish cause-and-effect relationships; it is primarily used in natural and social sciences (Hakim, 2012).
- A survey strategy utilises questionnaires or structured interviews to gather data from a sample of individuals; it is commonly employed in social sciences and market research (Saunders *et al.*, 2015).
- An archival strategy analyses existing records and documents from organisational archives or repositories, which is beneficial for studying historical events and social phenomena (Saunders *et al.*, 2015).
- A case study strategy involves an in-depth examination of single or multiple cases within their real-life context, aiming to understand complex phenomena (Yin, 2003).
- An ethnographic strategy entails the researcher immersing themselves in a social setting or culture to comprehend better people's beliefs and experiences (Saunders *et al.*, 2015).
- An action research strategy involves collaboration between researchers and practitioners to address practical problems in real-world settings, emphasising participatory problem-solving (Brierley, 2017).
- Grounded theory entails developing theories based on collected data; it is used predominantly in qualitative research (Suddaby, 2006).
- A narrative inquiry strategy explores individuals' stories and experiences to understand how they construct meaning (Eriksson & Kovalainen, 2008).

These strategies vary in their compatibility with quantitative or qualitative research. Experiments and surveys are quantitative, while archival research and case studies can be mixed methods. Ethnography, action research, grounded theory, and narrative inquiry are primarily qualitative. Given the study's pragmatic philosophy, it adopts a mixed-method design, adapting quantitative and qualitative approaches to suit research questions and objectives. The survey strategy is quantitative, while the case study strategy

is qualitative. This explanatory sequential mixed-method design combines a survey and case study to comprehensively investigate culture-mediated socio-cognitive learning as a moderator of the relationship between sovereign risk and infrastructure development through managerial herding behaviour.

4.5. Research methods adopted

Research methods encompass data collection and analysis techniques, tools, and procedures (Teddle & Tashakkori, 2009). Selection depends on the research topic, design, resources, and data type (Creswell, 2014). Methods include quantitative, qualitative, and mixed-method research.

4.5.1. Quantitative research method

Creswell (2014) defines quantitative research as involving the use of mathematically based methods to explain phenomena through numerical data, allowing researchers to answer questions or test hypotheses. Common methods include:

- Surveys employ questionnaires or structured interviews to collect respondent data and use descriptive and inferential statistics for analysis (Saunders *et al.*, 2015).
- Experiments manipulate variables in controlled environments, randomly assigning participants to different conditions and employing statistical tests like t-tests or analysis of variance to assess effects (Hakim, 2012).
- Observational research methods entail systematically observing and recording behaviours or phenomena in natural settings, often involving coding schemes or checklists for quantitative analysis (Delbridge & Kirkpatrick, 1994).
- Secondary data analysis entails analysing existing datasets, such as government surveys or organisational records, for research questions (Bulmer *et al.*, 2009).
- Content analysis involves quantitatively analysing textual or visual data to generate frequency counts or percentages to describe and compare content (Berelson, 1952).
- Statistical modelling tests relationships between variables and makes predictions through regression and factor analyses (Saunders *et al.*, 2015).
- Meta-analysis synthesises data from multiple studies to provide a quantitative summary of findings (Glass, 1977).

In this study, survey and secondary data collection provided reliable data for statistical analysis. Statistical modelling (factor and regression analysis) was used to triangulate cross-sectional and longitudinal data, helping explain how slow-to-change culture-mediated socio-cognitive learning methods moderate the relationship between sovereign risk and infrastructure development.

4.5.2. Qualitative research method

As Creswell (2014) describes, qualitative research methods collect and analyse non-numerical data to understand social phenomena from participants' perspectives and unravel the richness of context and meaning. Key qualitative research methods utilised in various disciplines include:

- Interviews entail engaging participants in structured, semi-structured, or unstructured discussions, followed by qualitative analysis through coding and interpretation (Saunders *et al.*, 2015).
- Focus groups involve organising small groups to discuss topics, enabling interaction and thematic analysis of discussions (Carson *et al.*, 2001).
- Observational methods entail systematically observing behaviours, interactions, and contexts, leading to thematic analysis of detailed field notes (Babbie, 2008).
- In an ethnographic method, the researcher immerses themselves in a culture or social group, combining participant observation, interviews, and artefact analysis to comprehend cultural context (Denzin & Lincoln, 2005).
- Case studies involve in-depth analysis of individuals, groups, or events using multiple data sources for rich narrative understanding (Yin, 2009).
- The narrative analysis explores and interprets personal stories to reveal recurring themes and meanings (Denzin & Lincoln, 1994).
- Phenomenology aims to understand subjective experiences through interviews and reflective exercises (Creswell, 2014).
- Grounded theory methods develop theories grounded in empirical observations through systematic qualitative data analysis (Walsh *et al.*, 2015).
- Content analysis involves systematically analysing textual or visual data to derive insights by identifying themes and patterns (Berelson, 1952).
- Discourse analysis examines language and social interactions within specific contexts to explore power dynamics and social constructions of reality (Phillips & Hardy, 2002).

Structured/semi-structured interviews were chosen to elicit how a manager constructs a culture-mediated socio-cognitive learning identity in the Kenyan infrastructure development context. This approach aligns with symbolic interactionism, offering insights into how managers interact with information structures, influencing their risk management knowledge:

“In symbolic interactionism, the individual derives a sense of identity from interaction and communication with others. Through this process of interaction and communication the individual responds to others and adjusts his or her understandings and behaviour as a shared sense of order

and reality is ‘negotiated’ with others. Central to this process is the notion that people continually change in the light of the social circumstances in which they find themselves. The transition from full-time student to career employee is one example of this. (How often have you heard people say, ‘she’s so different since she’s worked at that new place’?) The individual’s sense of identity is constantly being constructed and reconstructed as he or she moves through differing social contexts and encounters different situations and different people” (Saunders *et al.*., 2015, p. 342)

The researcher also adopted the observer role as a participant to allow interaction with participants during the interviews and to collect observational data about managerial roles. The researcher’s identity and the purpose of the study were made clear to foster discussions with the policymakers and key informants.

4.5.3. Mixed-method research

Mixed research methods, or mixed-method research, is an approach that fuses qualitative and quantitative research methods within a single study (Tashakkori *et al.*, 2021). This integration enriches the understanding of the research topic, especially in how the infrastructure development system influences sovereign risk in Kenya. Researchers can employ mixed methods in various ways:

- Integration: qualitative and quantitative data collection and analysis are utilised at different stages, such as data collection, analysis, or interpretation, often involving merging datasets or triangulating results.
- Sequential or concurrent design: research can be carried out sequentially, with one method informing the other in separate phases, or concurrently, collecting and analysing both data types simultaneously.
- Complementary design: quantitative methods offer statistical analysis and generalisation, while qualitative methods provide in-depth insights and rich contextual information, complementing each other.
- Triangulation: multiple sources, methods, or researchers validate and strengthen research findings, enhancing reliability.
- Expansion or exploration: researchers can delve deeper into findings, with qualitative data explaining or providing context for quantitative results, and vice versa.
- Practical and applied research: mixed methods are valuable for practical research where both approaches are needed for decision-making or intervention evaluation.
- Methodological flexibility: researchers can adapt methods to the research question, context, and available resources, enhancing the study’s comprehensiveness.

This study employs a sequential explanatory mixed method. The quantitative phase provided an initial broad understanding of the research context, which informed the qualitative phase. This sequence fostered the deeper exploration of culture-mediated socio-cognitive learning as a moderator of the relationship between sovereign risk and infrastructure development through managerial herding to strengthen the findings' validity and reliability.

4.6. The explanatory sequential mixed-method research adopted for this study

This research adopted a sequential explanatory research design, commencing with quantitative methods (Tashakkori *et al.*, 2021). The two distinct phases are detailed in Sections 4.7 and 4.8.

Phase one: The initial phase employed quantitative techniques to gather and analyse data from a sample of Kenyan infrastructure project managers. A survey questionnaire – constructed around established constructs and measurement scales covering sovereign risk, debt-side governance, infrastructure project management, macroeconomic risk, and cultural dimensions – facilitated data collection. Statistical methods, including correlation and regression analyses, were applied to discern relationships and associations among variables.

Phase two: The quantitative results guided the qualitative phase. Several knowledgeable participants underwent in-depth interviews, offering deeper insights into the cultural forces driving managerial proclivity to herd and their mediated effect on sovereign risk susceptibility. Thematic analysis and coding techniques were used to unearth emergent themes and patterns in the qualitative data.

Integration: The final research phase involved merging quantitative and qualitative data findings. This integration allowed the application of cultural-historical activity theory (CHAT) to comprehensively elucidate how culture-mediated socio-cognitive learning moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviour.

The sequential explanatory approach offered a holistic view, with quantitative data providing a broad overview and qualitative data offering nuanced insights and contextual understanding. The study's outcomes hold significance theoretically by advancing the CHAT theory's applicability in explaining how culture-mediated socio-cognitive learning may moderate the relationship between sovereign risk and infrastructure development through managerial herding behaviour. This interdisciplinary perspective offers valuable insights for policymakers, managers, and stakeholders on leveraging human-centred variables to form collaborative learning environments, ultimately reducing sovereign risk exposures by improving the governance and performance of managers in infrastructure development projects.

4.7. Phase one: Quantitative research method

The survey strategy was selected for phase one to achieve the research objective effectively. The survey aimed to gather insights into respondents' perceptions of sovereign risk, debt-side governance, project management, macroeconomic conditions, and culture in Kenya's infrastructure development system. Creswell and Plano Clark (2018) outline several advantages that justify this choice:

- Large-scale data collection: a survey offered the potential for gathering data from many respondents, providing a broad representation of managers within the Kenyan infrastructure development system. This diverse input gave a broad understanding of the determinants of sovereign risk, debt-side governance, project management, macroeconomic conditions, and culture and their relationships.
- Standardised data collection: the structured survey approach ensured consistency in question formulation and response recording, enhancing comparability during data analysis, which is crucial for capturing herding behaviour patterns.
- Cost-effectiveness: a survey was efficient and cost-effective, especially when administered online and in-person, offering a relatively quick data collection method compared to more resource-intensive approaches like interviews or observations.
- Anonymity and confidentiality: the anonymous and confidential survey encouraged honest and unbiased responses, particularly important for sensitive topics such as cultural determinants and risk perception.
- Statistical generalisability: quantitative data generated by surveys allowed for statistical analysis and generalisation to a larger population, facilitating broader insights into the influence of debt governance, project management, macroeconomic conditions, and cultural perception on sovereign risk perception in diverse Kenyan infrastructure project contexts.
- Identifying patterns and relationships: surveys enabled the identification of culture-mediated managerial socio-cognitive learning patterns, correlations, and relationships among variables, deepening the understanding of the research topic.
- Longitudinal studies: a survey could be administered multiple times, making it suitable for future longitudinal studies, tracking changes and trends in similar cultural dimensions and risk perception within the Kenyan infrastructure development system, thus providing valuable insights into its dynamics and evolution.

4.7.1. Primary data collection

The questionnaire served as the primary data collection tool. It was administered to a substantial sample of managers within the Kenyan infrastructure development system to investigate the culture-mediated relationship between sovereign risk and infrastructure development through managerial herding behaviour. The following disadvantages of survey research (Saunders *et al.*, 2015) were carefully considered to mitigate biases and enhance the questionnaire's effectiveness:

- Limited detailed response opportunities due to closed-ended questions and predetermined options; surveys restrict respondents from providing in-depth or nuanced responses.
- Respondents may exhibit biases like social desirability or acquiescence, potentially compromising response validity.
- Self-reported data in surveys can introduce errors or inaccuracies.
- Surveys provide less control over data collection than laboratory experiments, raising concerns about data quality.
- Careful sample selection is necessary to ensure representativeness and the generalisability of findings.
- Surveys may not capture the depth or context-specific details of complex phenomena.

Hence, open-ended questions were included to encourage respondents to share private information, addressing this limitation – this strategic questionnaire design aimed to harness the advantages of survey research while reducing susceptibility to the identified disadvantages.

4.7.1.1. Questionnaire design and structure

The questionnaire involved various questions evaluating sociocultural factors, debt-side governance, project management, and macroeconomic opinions.

Selection of respondents: Senior practitioners from Kenyan infrastructure contexts were selected. Their roles encompassed the management of budgets, project schedules, risk, and quality, thereby providing valuable insights into infrastructure lifecycle and sovereign risk management.

Questionnaire structure

- **Part I: Introduction:** this section briefly introduced the research topic's significance, assured respondents of response confidentiality and anonymity, and clarified the questionnaire's purpose and relevance to the study.

- **Part II: Demographic information:** managers provided demographic details, including age, gender, education level, professional background, and years of infrastructure project management experience.
- **Part III: Perception of risk:** Likert scale items assessed respondents' perception of debt-side governance, project management, and macroeconomic risk, identifying opinion convergence and divergence – open-ended questions fostered new insights and salient information sources.
- **Part IV: Cultural dimensions:** Likert scale items measured participants' agreement with statements on ambiguity tolerance (Budner, 1962) and cultural dimensions (Hofstede, 2013), pinpointing culture-mediated psychological dependence on social groups.

4.7.1.2. Scale development process

The scale development process systematically creates and validates measurement scales or instruments for assessing specific research constructs or variables. Measuring abstract constructs in questionnaires is challenging, risking research validity. Hinkin (1995) highlights this difficulty and the importance of rigorous measurement. Barry *et al.* (2011) developed a scale development decision tree to guide the process. Developing a reliable and valid scale follows a multi-step process, outlined in Figure 4-1, to ensure research measures are robust and aligned with constructs.

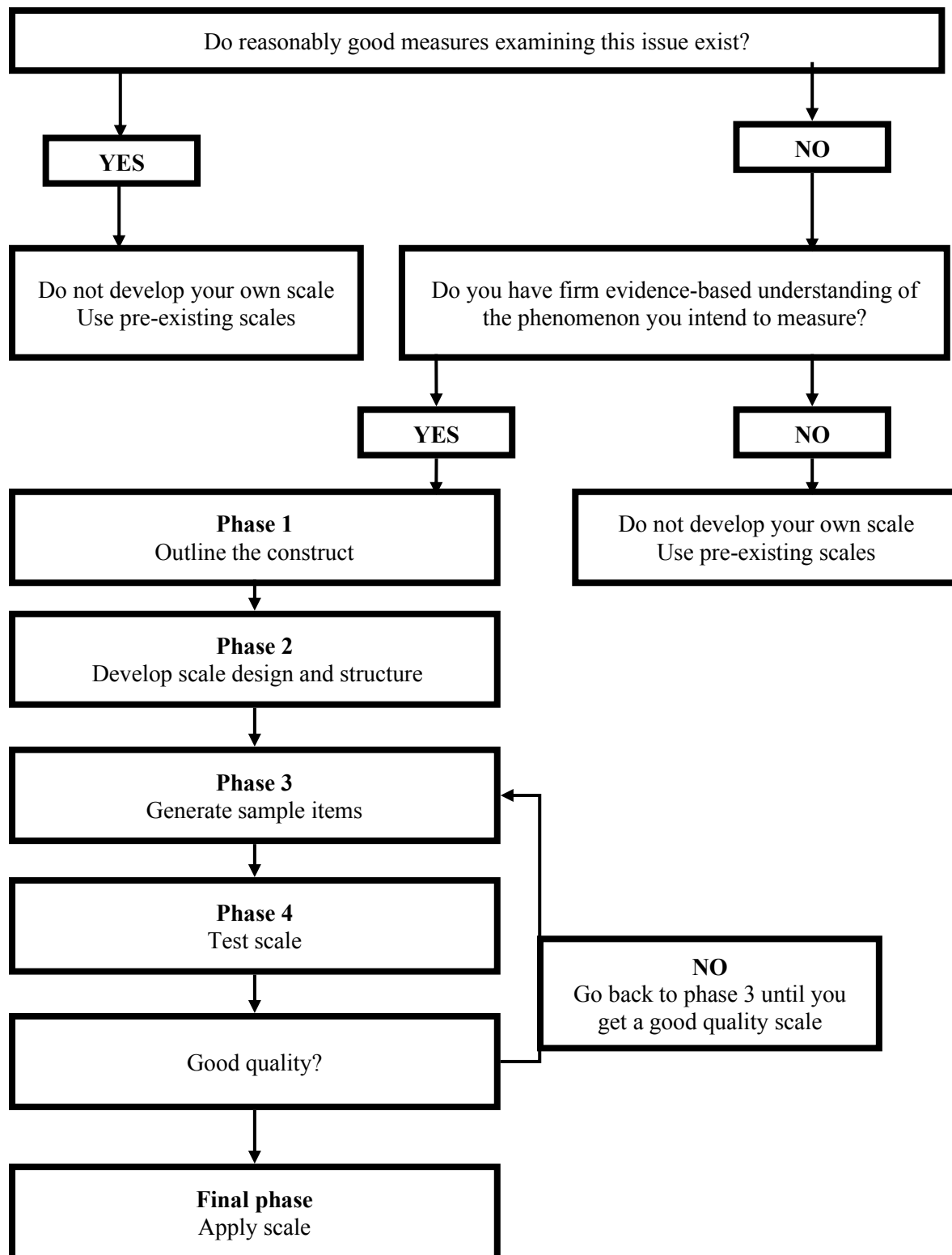


Figure 4-1: Scale development decision tree

Source: Barry *et al.* (2011)

Step 1: Defining the constructs

The purpose and context of the constructs were defined based on existing literature.

Step 2: Scale design and structure

The literature emphasises the prevalent use of Likert scales in empirical cross-cultural psychology studies for measuring cultural dimensions due to their alignment with attitudinal research studies (Barry *et al.*, 2011). Comrey (1988) recommends using multiple-choice formats when a dichotomous scale is insufficient, advocating for the reliability, stability, and quality of scales produced. An ideal Likert-type response scale consisting of seven choices (**7 = *always*, 6 = *very frequently*, 5 = *frequently*, 4 = *occasionally*, 3 = *rarely*, 2 = *very rarely*, and 1 = *never***) was selected for this within-nation analysis to capture ambiguity tolerance and sociocultural aspects (Hofstede, 1980; Stanley Budner, 1962). The seven-point Likert scale offered versatility and compatibility with existing scales for robust data analysis. Scale development involved meticulous item format consideration, response conditions, and scoring procedures. Items were refined based on respondents' ability to distinguish between options, ensuring a logical question flow by grouping related content to prevent unnecessary topic transitions. This approach aimed to enhance respondents' comprehension and engagement.

Step 3: Generating sample items

Developing high-quality questionnaire items is essential in scale development, as highlighted by Barry *et al.* (2011). Several recommendations were followed to ensure item clarity, precision, and willingness to answer:

- Simplicity: items were phrased in straightforward language appropriate for respondents' educational levels.
- Conciseness: succinct wording was used, employing as few words as necessary.
- Completeness: questions were presented as complete sentences.
- Avoiding negatives: multiple negatives were avoided in the question design to prevent confusion.
- Avoiding colloquialisms: expressions at risk of becoming outdated were not used.
- Avoiding ambiguity: for clarity, questions did not combine multiple facets or constructs.
- Reliability: questions aimed to elicit reliable and truthful responses from respondents.

DeVellis (2012) recommends an initial item pool with broad coverage, understanding that further psychometric analyses might identify and remove redundant items without sacrificing predictive power. While the number of items needed for scale validity varies, it was acknowledged that more than twenty items are rarely necessary (Comrey, 1988). Hair *et al.* (2010) suggest that even three items could provide sufficient coverage of a construct's theoretical domain, and constructs with many items could still exhibit high internal consistency reliability supported by statistical tests. The final scale comprised items with three

or more constructs. Pre-testing and pilot studies involving management professionals helped refine the initial item pool, ensuring the questionnaire's effectiveness and clarity.

Step 4: Pre-test the scale

Barry *et al.* (2011) emphasise the importance of testing the quality of the scale before it is applied in the research. The study implemented the following checks and balances.

a) Assessment of evidence based on test content

Three experienced managers in renewable energy, road, and rail projects contributed to item appropriateness and content coverage, enhancing scale development (DeVellis, 2012). They also suggested alternative measurements for unaddressed phenomena.

b) Assessment of cognitive and motivational qualities

Cognitive interviewing determines if respondents understand each item as intended and can answer questions accurately. Dillman *et al.* (2014) propose considering the following insights into the questions:

- Are all the words understood?
- Are all the questions interpreted similarly by all respondents?
- Do all the questions have an answer that every respondent can mark?

Cognitive interviewing entailed a potential respondent reading the scale in the interviewer's presence while thinking aloud, e.g. "I am not sure how to answer this question" or "These questions do not apply to me". The interviewer probed the respondents to understand how they interpreted each question and whether its intent was realised. This phase was split into two sub-phases. First, two experts reviewed the initial survey items to evaluate readability and general intelligibility. After implementing minor wording changes, the reworked questionnaire was tested with five respondents.

Step 5: A final check

The final check ensured that no issues were overlooked during the previous stages by involving three colleagues who had not participated in the scale development process to review the instrument and attempt to answer all items.

Step 6: Evaluation of the items

Evaluation is the last step in evaluating a newly developed scale to evaluate scale items and decide which items should form the final scale. DeVellis (2012) calls this phase "the heart of the scale development process". To consider the robustness of the scale review process, this step was accomplished by conducting three statistical tests on the pilot study data, namely, item normality (skewness and kurtosis), item-scale correlations, and factor analysis.

4.7.1.3. Pilot study

Based on the scale development phase feedback, the most promising question items were carefully selected and subjected to a pilot study involving infrastructure project managers. This pilot study aimed to emulate the intended data collection procedures and address several critical aspects:

- Procedure evaluation allowed for testing proposed data collection procedures as a valuable opportunity to identify and rectify any procedural difficulties in the main study.
- Response patterns analysis examined respondent behaviour, particularly regarding question clustering and frequently unanswered questions. Patterns in missing data were explored and addressed to enhance data completeness.
- Scale validation assessed whether the scales within the theoretical framework effectively measured the intended factors. This step helped determine whether any items should be discarded before final testing.

The pilot study pre-tested the survey instrument with a purposive sample of 12 academic and management professionals in the infrastructure context. These respondents met specific criteria:

- They were qualified faculty and industry participants with over 2 years of experience.
- They had proficiency in financial risks and infrastructure project management.
- They are strongly interested in advancing sustainable infrastructure financing and supporting the successful delivery of large infrastructure projects.

The questionnaire was sent to these respondents, and their responses were used to refine it, making it more robust. Importantly, the pilot study adopted the same sampling and recruitment procedures as the main study, ensuring it reflected the target population. The findings from the pilot study informed procedural adjustments to enhance the overall effectiveness of the research process, particularly in the areas of identification, enrolment, and interview procedures. This meticulous pilot study ensured that the research instrument and procedures were well-prepared and refined before their application in the main study, contributing to the overall quality and reliability of the research (Dillman *et al.*, 2014).

4.7.1.4. Unit of analysis

The unit of analysis refers to the specific entity or element that is the focus of analysis in a research study (Creswell, 2014). It is important to carefully define the unit of analysis in a research study, as it determines the scope and boundaries of data collection and analysis (Saunders *et al.*, 2015). The choice of the unit of analysis should align with the research objectives, research questions, the research design, and the available data and theoretical frameworks guiding the study (Yin, 2003). Typically, the unit of analysis is the level

at which data is collected, analysed, and interpreted to answer research questions or test hypotheses. In social science research, at the macro-level, the most referenced unit of analysis considered social is the state/polity, i.e. country. At the meso-level, common observation units are groups, organisations, institutions, and individual people are at the micro-level. The research distinction from Creswell (2014), Yin (2003), and Saunders *et al.* (2015) describes the selection of an embedded unit of analysis based on the following analysis levels:

- **Individual:** the unit of analysis is the person. Data is collected and analysed at the level of individual participants, and findings are reported concerning individuals' characteristics, behaviours, or outcomes.
- **Group or organisation:** the unit of analysis is a group or organisation, like a team, department, company, or institution. Data is collected and analysed collectively, focusing on group dynamics, organisational structures, and outcomes.
- **Geographic area:** the unit of analysis is a specific geographic area, like a country, region, city, or neighbourhood. Data is collected and analysed to understand patterns, trends, or characteristics related to the geographical context.
- **Event or case:** the unit of analysis is a specific event or case. Researchers examine events, incidents, or phenomena to understand broader generalisable concepts.
- **Text or document:** the unit of analysis is a written or recorded text, document, or artefact. Researchers analyse text content, themes, or discourse to explore meanings or patterns.
- **Time:** the unit of analysis is time. Researchers examine changes, trends, or patterns over time, using longitudinal or time-series data to understand temporal dynamics or effects.
- **Social interaction:** the unit of analysis is the social interaction between individuals or groups. Researchers focus on communication patterns, social relationships, or dynamics within the social network of interactions.

Yin's (2003) embedded unit of analysis theory offers direction in summarising the unit of analysis based on the CHAT conceptual framework. In CHAT, the unit of analysis is always the activity. The primary unit of analysis in the case study consists of individual managerial perceptions and the broader sociocultural context in which these perceptions are made, including beliefs, values, and historical factors informing risk perceptions. Hence, the socio-cognitive learning entity, the manager, is the focus of inquiry since managers interact with other individuals, groups, organisations, geographic areas, events or cases, text or documents, and time. The embedded unit of analysis has three critical socio-cognitive learning dimensions influenced by cultural-historical theory within each managerial perception:

- **Managerial herding behaviour:** this dimension examines how historical patterns, cultural norms, and shared experiences influence managers' behaviours. It explores how managers may conform to established cultural practices or norms within the infrastructure investment domain.
- **Information cascade:** this aspect delves into the role of cultural-historical factors in shaping the flow of information and knowledge among managers. It investigates how historical contexts and shared cultural backgrounds impact information dissemination and reception as cascade effects.
- **Sovereign risk:** within this dimension, the study analyses how the historical relationship between the Kenyan government and foreign investors, shaped by cultural-historical events, influences the relationship between sovereign risk and infrastructure development. It explores how sovereign risk premiums are linked to historical precedents and cultural expectations.

By employing cultural-historical theory as the foundation for analysis, this approach integrates social and cognitive dimensions into examining the relationship between the elevated sovereign risk and managerial practices within the infrastructure development system. It allows for a comprehensive understanding of how these embedded units of analysis are shaped by and interact with cultural factors. Since the cultural context in the activity systems theory is not some external outer shell but is within internationalised multi-agent decision-making systems, the study conceptualised an individual analysis level where the object of managerial herding is embedded in the sovereign risk outcomes. The concrete human-centred entity is the focus of inquiry, as summarised in Figure 4-2.



Figure 4-2: Embedded unity of analysis

Source: Yin (2003)

Cross-case analysis was achieved by involving multiple cross-border infrastructure projects within Kenya to compare findings across historical and cultural contexts to identify commonalities and variations in how cultural-historical factors influence embedded units of analysis.

4.7.1.5. Target population and sampling methods

The initial stage in the sampling process involves defining the target population, which refers to the people involved in the phenomenon under investigation (Creswell, 2014). This study employed a six-step sampling strategy, utilising a census approach with the purposive exclusion of non-economically motivated projects above US\$100 million in Kenya to observe variations in debt-side governance and project management structures over time.

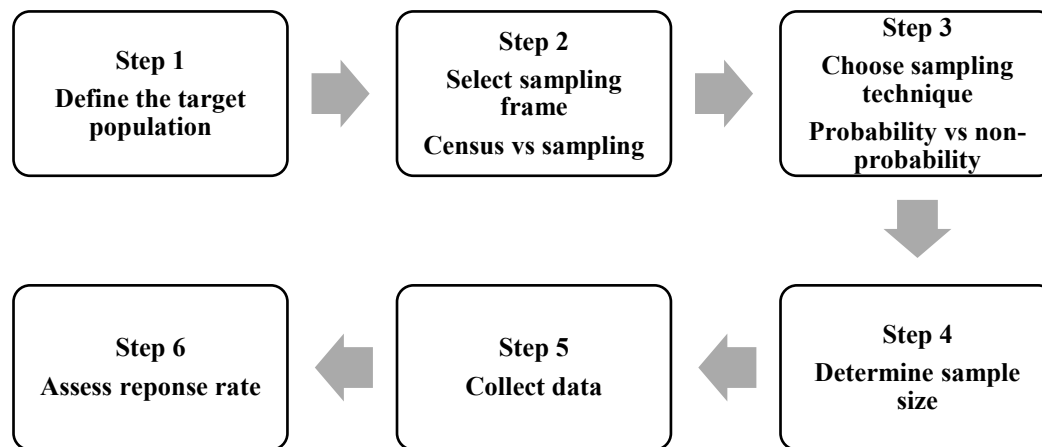


Figure 4-3: Sampling strategy

Source: Taherdoost (2016)

The respondents were from Kenya's rail, road, and renewable energy infrastructure sectors.

Table 4-1: Target population

Project	Sector	Target population	Total investment	Foreign debt size
Standard Gauge Railway	Rail	120	\$4.70 billion	90%
LAPSSET	Road	102	\$24.0 billion	70%
Nairobi Expressway	Road	80	\$5.80 billion	100%
Thika Superhighway	Road	124	\$3.60 billion	70%
Lake Turkana Wind Power Plant	Renewable energy	96	\$0.81 billion	70%
Geothermal Power Projects	Renewable energy	224	\$3.65 billion	70%
KenGen wind power project	Renewable energy	48	\$0.30 billion	70%
Total		794	42.86 billion	

Source: Author (2023)

4.7.1.6. Sampling frame and technique

The second stage involved selecting a sampling frame – a critical decision in research. The options were between a census, which analyses the entire target population, and sampling, which examines a subset. A census, while advantageous in providing highly representative results, poses resource challenges such as time and cost, meaning sampling is more commonly used. The infrastructure sector comprises at least 794 practitioners at the managerial level as the target population. Due to the voluntary nature of survey participation, it was impractical to analyse the entire population's preferences. Hence, a proper sampling method had to be defined. Unlike non-probability sampling, probability sampling offered each population unit an equal and known chance of selection, enabling the generalisation of results from the sample to the population (Saunders *et al.*, 2015). Thus, probability sampling was the most suitable approach, and the four main probability sampling approaches are discussed in Table 4-2.

Table 4-2: Probability sampling

Technique	Description
Simple random sampling	Every population case has an equal inclusion probability in the sample. Its disadvantages include (i) The need to obtain a complete list of all units in the population, (ii) Sample data collection costs can be high if the units are geographically widely scattered in surveys by personal interviews, and (iii) Standard errors of estimators can be high.
Systematic random sampling	Every <i>n</i> th case after a random start is selected. i.e., every fifth manager may be selected from the sample. Its simplicity makes it preferred in some studies.
Stratified random sampling	The population is divided into strata (or subgroups), and a random sample is taken from each subgroup, usually a natural item set that could be based on company size, gender, or occupation. It is often used where there is significant variation within a population to ensure that every stratum is represented.
Cluster random sampling	The whole population is divided into clusters or groups and a random sample is taken from these clusters and used in the final sample: (i) Choose cluster groupings for sampling frames like type of company or geographical region; (ii) Number each of the clusters; and (iii) Select sample using random sampling. It is advantageous for researchers whose subjects are fragmented over large geographical areas as it saves time and money.
Multi-stage sampling	Moves from a broad to a narrow sample using a step-by-step process. Its main purpose is to select samples concentrated in a few geographical regions to save data collection time and money.

Source: Ackoff (1973)

The study applied stratified random sampling to form mutually exclusive management groups. Figure 4-3 provides the step-by-step stratified sampling procedure.

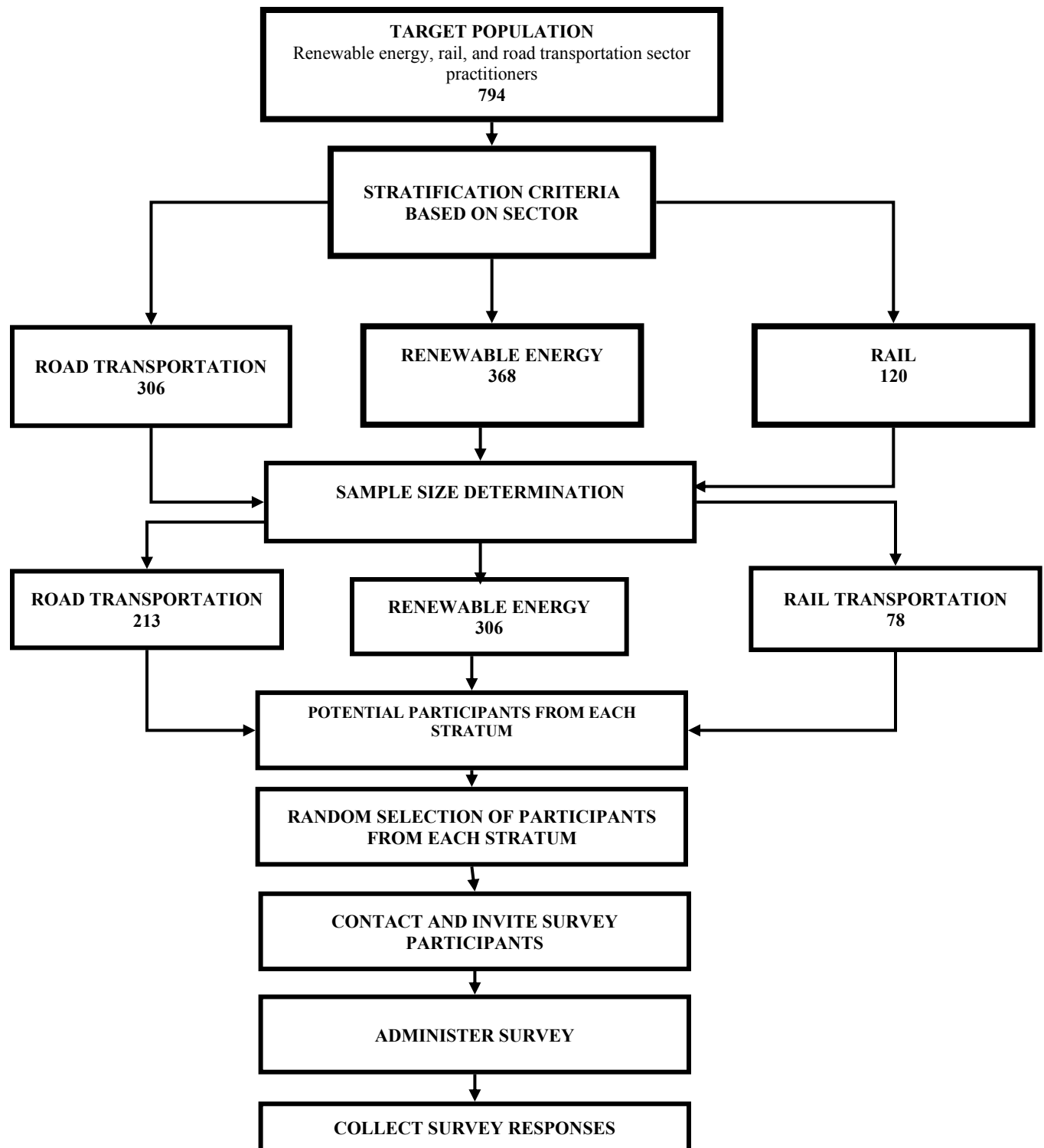


Figure 4-4: Stratified random sampling steps to identify survey respondents

Source: Author (2023)

4.7.1.7. Sample size

This last step entailed calculating the sample size. Determining an appropriate sample size is crucial in research, influenced by factors like research design, the precision needed, population variability, and practical considerations. It ensures reliable and generalisable findings. Various methods inform sample size determination, including power analysis, statistical formulas, prior research, and practical constraints (Saunders *et al.*, 2015). For this study, prior research and practical constraints guided the sample size determination. Hair *et al.* (2010) recommend a sample size of 200–400, while Nunnally (1978) suggests 300–400 for statistically significant results. Hofstede (2011) emphasises having at least 20 respondents per country in cross-cultural studies. Based on these guidelines and considering a typical 20% management survey response rate, the study aimed for a statistically sound and feasible sample size.

Odhiambo *et al.* (2020) used Yamane’s formula to draw 263 respondents from the Kenya National Generating Company Limited from a target population of 769 to study how macroeconomic factors affect the performance of PPPs using evidence from geothermal renewable energy projects. Daniel and Muchelule (2023) investigated the influence of project sponsorship on road construction project performance in Kenya, where the overall sample size was determined using Krejcie and Morgan’s (1970) formula, resulting in 222 respondents and stratified random sampling applied for national government road project representation. While the studies show that there are many formulas to calculate sample size, the current study used Yamane’s formula to benchmark these recent studies:

$$n = \frac{N}{1 + N(\varepsilon^2)} \quad (1)$$

The variables in this formula are:

n = the sample size

N = the population of the study

ε = the margin error in the calculation

Yamane’s formula assumes a 95% confidence level and a 50% response distribution. Based on the target population of 794 in Table 4-1, using Yamane’s formula means that 266 respondents are a sufficient sample size.

$$266 = \frac{794}{1 + (794(5\% * 5\%))} \quad (2)$$

The study gathered 597 analysable responses, aligning with the recommended sample size range of 200 to 500 for rigorous statistical analyses. Fixed costs for questionnaire design and sampling frame development justified this size. Stratified random sampling was employed to ensure representation of rail, road, and

renewable energy infrastructure projects. The subdivision of the population into distinct groups allowed the research to understand subpopulation variances. Creswell (2014) suggests that a small sample size of 30% could provide sufficient information. Given the small number of single infrastructure systems above \$100 million in Kenya, a census strategy was adopted based on Odhiambo *et al.* (2020). This approach aimed to attain a desirable level of precision, eliminate sampling error, and include all individuals in the subpopulations.

4.7.1.8. Data collection and response rate interventions

The survey administration approach prioritised contacting potential respondents at convenient times. Soft and hard copy self-administered questionnaires were distributed to gather data from managers in seven Kenyan infrastructure contexts characterised by significant foreign debt and multicultural dynamics. Data collection spanned five months, with a longer window for quantitative data collection to ensure managers received and responded to the survey. Follow-up calls were made to address confidentiality concerns. As stated in the scale development process, the study used a Likert scale to collect managerial opinions (*1 = strongly disagree, 2 = moderately disagree, 3 = slightly disagree, 4 = neither agree nor disagree, 5 = slightly agree, 6 = moderately agree, and 7 = strongly agree*).

A random sample of 200 practitioners from each infrastructure sector was initially invited with the aim of collecting a minimum of 400 responses to allow for declining survey response rates. The survey achieved a high 80.45% response rate, with 639 practitioners participating out of the 794 targeted. The study adopted an inclusive approach, recognising the individual and group aspects of culture. It engaged individuals across diverse urban, peri-urban, and rural settings to grasp the multifaceted nature of cultural values. This individual-level analysis aligned with Hofstede's recommendation about the significance of individual cultural values in determining population/societal-level outcomes. Measures were taken to optimise survey responses, as outlined in Table 4-3, ensuring a robust empirical foundation for quantitative analysis.

Table 4-3: Implemented measures to increase the survey response rate

Measure	Implementation strategy
Sender	All surveys were scheduled weekly. An invitation was sent out on Monday afternoon to collect responses on Friday. The response rate was evaluated, and two reminders were sent.
Sender reputation	All invitations were sent in the researcher's name.
Pre-contacts	An organisational representative informed practitioners in advance about the purpose and duration of the survey via email and memos.
University logo	All invitations and the survey had Strathmore University's logo. The invitation stated that the data would be used for scientific purposes.
Deadline	All invitation emails had a clear statement about the survey deadline.
Questionnaire length	The researcher designed a scale that delivered valid results in 45 minutes. Surveys that take less than 15 minutes are short.

Source: Author (2023)

4.7.1.9. Advantages and disadvantages of the survey

The study employed a semi-structured survey methodology, strategically integrating cultural-historical theory and Hofstede's cultural dimensions to investigate managerial herding in Kenyan infrastructure projects. Recognising the advantages and disadvantages of surveys is vital for credibility and effectiveness.

Advantages of survey methodology:

- The survey efficiently gathered diverse sovereign risk, debt-side governance, project management, macroeconomic risk, and culture perspectives among Kenyan renewable energy and transportation project managers, enabling comprehensive examinations of their cultural backgrounds and organisational roles.
- Anonymity encouraged candid responses, particularly on sensitive topics like sovereign risk.
- Standardised survey questions enabled consistent data collection and structured comparisons across hierarchical and sociocultural group dimensions, aligning with the study's aims.
- The flexibility in question types allowed for comprehensive culture-based exploration.
- The survey proved cost-effective and produced quantifiable data for statistical analyses.

Mitigation of survey disadvantages:

- The stratified sampling strategy curbed bias and ensured diverse cultural group representation to identify culture-mediated herding towards in-group consensus.

- Culturally sensitive questionnaire design and qualitative validation mitigated response bias.
- Open-ended questions provided qualitative insights into the topic.
- Supplementary qualitative methods compensated for the likely lack of contextual richness of the primary and secondary data models.
- Non-response bias concerns were acknowledged by ensuring an adequate sample size.
- The study employed secondary and longitudinal data analysis to elicit causal mechanisms to overcome the survey data weakness of failing to capture trends across time and economic states.

A survey was chosen to integrate cultural-historical and cultural psychology to ensure methodological rigour in addressing their limitations.

4.7.2. Secondary data collection

In addition to primary data collection methods, the research supplemented its findings with secondary data sources to enhance the comprehensiveness and robustness of its study. Secondary data collected by other institutions for different purposes were utilised from various reputable sources, providing valuable insights and context for the research. Sources of secondary data included:

- Document review: quantitative data was extracted from public records, economic indicators, policy documents, and industry reports on infrastructure project development. This review enriched the primary data collected and complemented the research.
- Academic journals and research articles: peer-reviewed academic journals and research articles in various fields, including infrastructure management, renewable energy, transportation, cultural studies, education, and psychology, were explored. These sources offered theoretical frameworks and empirical insights relevant to the study.
- International organisations: reports and publications from international organisations such as the World Bank and the International Energy Agency (IEA) were consulted. These organisations often publish reports on infrastructure systems in different regions, providing global perspectives and data.
- Government publications: publications from government agencies, ministries, and departments responsible for infrastructure development, especially in the energy and transportation sectors, were reviewed. These sources provided information on policies, trends, and indicators.
- Consulting firms: industry reports and market research studies from reputable firms like McKinsey and PricewaterhouseCoopers were analysed. These reports offered insights into project management practices, data, and industry trends.

- Case studies: case studies from databases such as the African Development Bank and China Development Agency provided practical insights into sovereign debt and infrastructure project management in diverse contexts.
- Cultural dimensions database: Hofstede's cultural dimensions database contributed insights into management across different countries, aligning with the study's cultural focus.
- Kenya National Bureau of Statistics: data from the Kenya National Bureau of Statistics supplied trends/indicators relevant to the impact of infrastructure development in the country.

The secondary data sources were rigorously evaluated for quality, relevance, and reliability to ensure alignment with the research objectives and provide accurate and valid information. The study strengthened its findings by triangulating secondary data with primary data.

4.7.3. Data analysis

4.7.3.1. Primary data analysis

4.7.3.1.1. Data screening and editing

Examining missing values in collected data is crucial for research validity (Pallant, 2020). Randomly distributed missing values imply no bias, while non-random ones may affect the generalisability of the result (Tabachnick & Fidell, 2007). After data collection, screening and editing were initiated. Completed questionnaires were reviewed, revealing unanswered questions beyond age, gender, and ambiguity tolerance. Incomplete questionnaires were excluded to maintain result generalisability.

4.7.3.1.2. Data coding

After screening and editing data, quantitative data was generated from close-ended questions and Likert scale questions. Data coding entailed assigning responses to variables in a Stata 17 data file.

4.7.3.1.3. Treating open-ended questions

The study used inductive content analysis for open-ended questions. Firstly, the analytic stage involved reading each response several times to get familiar with the dataset. The second stage was coding the respondents' answers. Finally, the list of preliminary codes generated was collated and labelled. Overlapping codes were grouped under higher-order categories.

4.7.3.1.4. Outlier detection

Outliers were identified as cases deviating significantly from the mean in normally distributed data (Pallant, 2020). Detecting and addressing outliers was essential to maintain data validity and reliability. While some advocate for outlier removal, others suggest transforming extreme values to make them less extreme (Tabachnick & Fidell, 2007). In this study, outliers were excluded.

4.7.3.1.5. Descriptive statistics of the survey data

Descriptive statistics analysis was conducted to examine various parameters within the responses of senior managers in renewable energy, road, and rail infrastructure projects. This analysis aided in understanding dataset characteristics, identifying patterns, detecting outliers, and making informed decisions. The central tendency was measured using mean and median values, while the range of agreement among respondents was determined by examining maximum and minimum values. Variance in survey data was assessed through the average squared deviation from the mean, while standard deviation indicated data spread around the mean. Skewness measured data distribution asymmetry, with positive skewness indicating a longer right tail and negative skewness indicating a longer left tail. Additionally, kurtosis assessed data distribution flatness. A kurtosis of 3 means normal distribution. When the kurtosis is greater than 3, the data displays a distribution of heavy- or fat-tailed (leptokurtic) (Pallant, 2020).

4.7.3.1.6. Factor analysis

The Kaiser-Meyer-Olkin (KMO) measure assessed data suitability for factor analysis, with values closer to 1 indicating appropriateness. Principal component analysis (PCA) reduced variables while preserving variance, this process was guided by eigenvalues, which reveal the amount of variance explained by each principal component. Factors were retained if loadings were significant (0.30 and above). The resulting factor items, loading above 0.30, formed covariates capturing the most significant variables in the analysis (Cerny & Kaiser, 1977).

Retaining the original variable specification even after conducting factor analysis to preserve rich descriptions and enhance findings interpretation is a perspective associated with some researchers and theorists in the field of factor analysis and psychometrics. These researchers argue in favour of maintaining the original variables for various reasons, such as maintaining the interpretability of the results or retaining the theoretical underpinnings of the study. Thurstone (1934) emphasises the importance of retaining the original variables in factor analysis to ensure that the derived factors have clear and meaningful interpretations. Guttman and Levy (1994) argue that maintaining the original variables in factor analysis is essential for preserving the detailed information and capturing the nuances of the underlying constructs. Bartholomew (1984) advocates retaining the original variables when they have theoretical and substantive meaning. This approach is sometimes referred to as “intermediate-level theory”. While some theorists and researchers recommend retaining the original variables, others argue that factor analysis is designed to identify underlying latent factors and that reducing data complexity by working with factors can enhance interpretability and statistical power. Retaining the original variables was informed by the research question, which focused on eliciting managerial herding within the infrastructure development system and

sovereign risk as embedded outcomes due to shared cultures, data characteristics, risk analysis and uncertainty management goals.

4.7.3.1.7. Correlation analysis

Correlation analysis examines the strength and direction of linear relationships between variables but does not imply causation (Pallant, 2020). Correlations range from -1 to +1, with positive values indicating both variables tend to increase together, negative values indicating one tends to decrease as the other increases, and values closer to 0 indicating a weaker correlation.

4.7.3.1.8. Multicollinearity testing

Multicollinearity, the high correlation among independent variables in regression analysis, can lead to unstable parameter estimates and reduced predictive power (Pallant, 2020). The study examined the correlation matrix, estimated variance inflation factors (VIFs), checked eigenvalues and condition numbers, including visual inspections to detect multicollinearity. A high VIF (>5 or 10) indicates multicollinearity, while tolerance values close to 1 suggest low multicollinearity. Detected multicollinearity was addressed through variable removal, transformation, combination, or principal component analysis (PCA) to reduce dimensionality and enhance the reliability of regression results (Tabachnick & Fidell, 2007).

4.7.3.1.9. Hypothesis testing

The study conducted data screening to ensure normal distribution for regression analysis. It aimed to test the hypothesis that culture influences herding behaviour and sovereign risk perception among managers in infrastructure projects. Quantitative analysis involved t-tests, chi-square tests, and regression coefficients to assess relationships in the conceptual framework. Regression coefficients were analysed to evaluate the relationship between dependent (sovereign risk) and independent variables (debt-side governance, project management, macroeconomic and cultural dimensions). If baseline coefficients changed by adding cultural variables, then cultural mediation of the relationship manifests as a herding instinct (OLS regression).

The measurement model

The study adopted the methodology proposed by Chiang and Zheng (2010) and Chang and Lin (2015). It developed two measurement models to capture cross-sectional and category herding:

- The cross-sectional measure of herd instinct was constructed using responses to the cultural questions to identify herding patterns within the infrastructure project management context.
- The category measure of herd instinct is the number of respondents in the renewable energy and transportation sector as the proxy for the degree of herding relating to career selection risks.

The econometric estimation model

- The estimation model measured the cross-sectional absolute deviation of opinions to test culture-mediated socio-cognitive learning in the Kenyan infrastructure development contexts as herding. The hypothesis is that acquired psychological dependence on social groups to avoid evaluating risk and uncertainty causes managers to follow the market or culturally constructed social consensus. Shared norms reinforce their inclination to ignore their prior knowledge especially during extreme conditions, which violates the linear and increasing relationship between dispersion and outcomes. The empirical models build on this idea to test the accuracy and reliability of the assessment of the relationship between sovereign risk and infrastructure development. From a herding perspective, a positive coefficient denotes obedience to the linear relationship where managers align their risk sentiments with the market consensus. In contrast, a negative coefficient signifies no linearity depicting disagreeing with the market consists.
- The study used a binary outcome variable to rank the infrastructure categories based on the number of respondents in the renewable energy and transportation infrastructure context. A binomial logit regression analysis was used to test the hypothesis by comparing the cultural determinants of herding instincts and sovereign risk in the two sectors as a robustness check for the OLS models. A logit model was suitable for modelling the likelihood of infrastructure project managers choosing careers in renewable energy versus transportation infrastructure development projects due to its appropriateness for binary outcomes, interpretability, robustness to outliers compared to probit models, and common usage in behavioural studies looking into sovereign risk spillover effects to other contexts and the assumptions underlying collective decision-making processes.

Survey data analysis is cross-sectional research with limitations because it focuses on a population snapshot at a given time (Saunders *et al.*., 2015). It may not capture the dynamic nature of the sovereign risk premium and infrastructure lifecycle management behaviour due to the following:

- It lacks a temporal relationship, hindering the establishment of causality
- It does not capture developmental processes or changes over time
- Susceptibility to biases, such as selection, response, and confounding bias
- Inability to determine causality or account for confounding variables
- Limited representation of population diversity due to single-point data collection
- Reliance on self-reported data, prone to recall bias

A longitudinal approach was recommended to address these limitations and objectively analyse culture's role in shaping the relationship between sovereign risk premiums and infrastructure lifecycle development

in Kenya, as suggested by Saunders *et al.* (2015). This involved utilising secondary data to provide insights into how culture influences these dynamics over time.

4.7.3.2. Secondary data analysis

Longitudinal analysis using secondary data provided a valuable stochastic data analysis approach for understanding how the relationship between the dependent and independent variables in the sampled infrastructure development population changed and evolved over an extended period. It allowed the examination of trends and patterns at multiple time points to account for seasonality.

4.7.3.2.1. Descriptive statistics of the dataset

A descriptive analysis summarised the dataset characteristics by calculating summary statistics for the means, medians, standard deviations, or proportions.

4.7.3.2.2. Factor analysis

Factor analysis identified significant determinants of debt-side governance, project management, macroeconomic risk and cultural values. The Kaiser-Meyer-Olkin (KMO) measure was used to assess the sampling adequacy.

4.7.3.2.3. Correlation analysis

Correlation measures the strength and direction of the relationship between variables. Correlation analysis and the variance inflation factor (VIF) measures between the control variables were used to test multicollinearity before hypothesis testing.

4.7.3.2.4. Hypothesis testing

The sovereign risk premium is not linear and can be influenced by external factors like global economic conditions, monetary policy, geopolitics, and cultural distance (Borensztein *et al.*, 2013; Dang & Partington, 2020; Ho *et al.*, 2023; Morsy & Moustafa, 2020). It will have a unique trajectory. A panel data regression tested the hypothesis that culture moderates the relationship between infrastructure project risk premiums and cultural variables. Debt-side governance, infrastructure project management, and macroeconomic variables were included in the model as control variables to pin down the role of culture.

The measurement model

- The cultural distance between Kenya and each lender country within each infrastructure project finance syndicate was estimated to standardise the cross-sectional data and make it comparable across time and world economic states. The econometric hypothesis is that shared values dampen cultural distance in assessing management quality. The net result of each syndicate's negative and

positive cultural distances was the residual disequilibrium in shared values about risk between managers and international debt providers in Kenya.

- The risk premium is the additional yield investors require to invest in a Kenyan infrastructure project compared to a risk-free international asset – the USD 10-year bond, which varies across time and economic states.

The econometric estimation model

The estimation model measured the cross-sectional absolute deviation (CSAD) of premiums to test culture-mediated herding in infrastructure project development. The hypothesis is that shared cultural values and norms moderate the preference for certain lenders over others due to certain managerial covenants. Hence, a positive and significant coefficient suggests that a higher level of cultural alignment leads to a stronger tendency for individuals to follow the group consensus (herding towards market consensus about sovereign risk). In contrast, a negative and significant coefficient suggests the opposite (herding away from the market consensus about sovereign risk). The following equation estimates the CSAD.

$$CSAD_j = \frac{1}{N} \sum_{i=1}^N |X_i - \bar{X}|$$

Where

N is the number of managers who responded to the survey.

$|X_i - \bar{X}|$ represents the absolute difference between the response of each manager and the mean. The term $\bar{X}$ is the mean response, computed as

$$\bar{X} = \frac{1}{N} \sum_{i=1}^N X_i$$

$\bar{X}$ gives you the mean perception of sovereign risk among the managers, and the cross-sectional absolute deviation offers insight into how individual perceptions deviate from the mean perception.

4.7.4. Validity and reliability

Validity and reliability are crucial to quantitative research, ensuring the accuracy, consistency, and generalisability of findings (Creswell, 2014). Several types of validity and reliability were considered as outlined in the following sections:

4.8.4.1 Validity

- External validity assesses whether findings can be generalised across different populations, contexts, and timeframes. Established sampling methods, audited data, and reliable government publications enhanced external validity. Data triangulation within the explanatory sequential mixed method also improved external validity.

- Internal validity pertains to the study's design and procedures in establishing cause-and-effect relationships between variables. It involves controlling for confounding factors and ensuring that the outcomes resulted from the manipulated independent variable. Hypothesis testing and statistical procedures ensured internal validity in the current study.
- Construct validity examines how measurements accurately represent theoretical constructs. It assesses whether operationalised variables truly reflect underlying concepts.
- Content validity ensures that study items adequately cover the entire domain of a measured construct. It evaluates whether the items comprehensively represent relevant aspects of the construct.
- Criterion validity determines how well a measure correlates with an established criterion or gold standard.

4.8.4.2 Reliability

Reliability reflects the consistency, stability, and repeatability of measurements and results. It ensures that data collection instruments and procedures yield consistent outcomes. Reliability tests included:

- Inter-rater reliability, which assessed the consistency of measurements involving different observers.
- Internal consistency reliability, evaluated using Cronbach's alpha, measured the extent to which items within a scale or questionnaire measured the same underlying construct.

The researcher carefully designed the study to enhance validity and reliability, employed valid and reliable measurement instruments, and used appropriate data collection and analysis techniques. A representative sample was ensured to minimise sources of bias. The research procedure was meticulously documented, including research methods, design, flowcharts, variable measures, sampling procedures, and data sources. These efforts contributed to its rigour and trustworthiness.

4.8. Phase two: Qualitative research method

The study aimed to evaluate how culture-mediated socio-cognitive learning moderates the relationship between sovereign risk and infrastructure development through managerial herding behaviours within Kenya to propose a human-centred infrastructure policy design and implementation framework. In the qualitative phase, a case study strategy was employed to explore contextual factors influencing the perception of sovereign risk and infrastructure development among infrastructure management experts (Yin, 2003). The case study contributes to theory development by offering insights into how cultural factors pool managerial behaviours, information flow, and risk perceptions. The case boundaries are defined by

specific cross-border-funded infrastructure projects in Kenya's renewable energy, road, and rail sub-sectors. Theoretical elaboration focuses on the cultural dimensions of Kenya to compare findings across different project contexts. This cross-case analysis helps identify commonalities and variations in how cultural-historical factors influence the embedded unit of analysis (*see Figure 4-3*) through managerial behaviour. This theoretical rigour enabled the findings from the case study to be generalised to offer broader insights into the influence of cultural-historical factors on decision-makers in cross-border-funded infrastructure projects, not only in Kenya but also in similar cultural contexts worldwide.

4.8.1. Primary data collection

4.8.1.1. In-depth interview

The in-depth interview is a qualitative data collection technique used to gather detailed and rich information from participants, allowing in-depth exploration of their thoughts, beliefs, and emotions. Creswell (2014) recommends that in-depth interviews are suitable when:

- The study's questions are a "how" and "why", which tend to be more explanatory.
- Examining contemporary (rather than historical) events, the researcher cannot manipulate actor behaviour. The boundaries between phenomena and contexts are not evident; therefore, methodologies that control variables, such as experiments, may not be feasible.
- There is a need to investigate a phenomenon within its natural setting, but an understanding can be reached by considering the important contextual conditions.

4.8.1.2. In-depth interview guide

The qualitative phase of the study employed single-instrument interviews, following a typical case selection approach recommended by Yin (2003). The study used a single interview guide for multiple subjects to comprehensively elicit their socio-cognitive learning motives, allowing for generalisation based on cultural psychology theory. Interviewees were selected to represent each participating infrastructure context due to resource constraints. The interview guide comprised semi-structured and open-ended main questions, follow-ups, and probes to facilitate in-depth discussions (Creswell, 2014). It was designed using elements of the cultural-historical activity theory. It focused on capturing cultural norms, beliefs, and practices in the context of infrastructure risk management. Questions delved into the diverse managerial roles, reasons, and timing of individuals' involvement in risk management, emphasising community and division of labour aspects within projects and between project organisations and the sovereign governance systems.

Additionally, questions explored participants' professional knowledge of external sovereign risk, debt-side governance, project management, and macroeconomic risk determinants. The mediation principle was

applied to assess how cultural artefacts might influence managerial herding motives and sovereign risk as embedded outcomes. The study inquired about participants' interactions and the use of public information aggregation tools. Governance breakdown and information aggregation complexity were probed to understand challenges when interacting with peers. The interview guide was reviewed by experienced qualitative researchers and subject matter experts, and pilot interviews were conducted to ensure its effectiveness. The study used a carefully designed interview guide to gather rich qualitative data to uncover the cultural dimensions of the relationship between sovereign risk and infrastructure lifecycle development attributed to managerial herding motives of mitigating personal risk exposures.

4.8.1.3. Cultural settings selection

The study aimed for national representativeness by selecting infrastructure projects across Kenya's rural, urban, and peri-urban cultural settings. It recognised that culture encompasses the likely reactions of individuals with common mental programming within a society, which may vary within the professional context (Hofstede *et al.*, 2010). Cultural layers can be likened to an onion, with the innermost values denoting a deeper, unchanging culture level. The study acknowledged the potential for varied practices influenced by personality differences and other cultural layers like religious and social norms. The research chose to elicit cultural factors at the individual level to address this complexity while acknowledging it as the deep, unchanging culture level. Straub *et al.* (2002) argue that analysing culture at an individual level is reasonable because "culture can only manifest itself through the individual". Hence, it was not necessary to focus on specific ethnic groups but on participants with knowledge across rural, urban, and peri-urban contexts to gain a broader perspective while minimising the impact of ethnicity. This approach used a value-based definition of culture, enabling the study to examine the degree of similarity in values that may mediate managerial herding motives among managers within the large-scale infrastructure development population or group. By considering the individual unit of analysis for culture, the study aimed to capture the nuances of cultural influences on infrastructure management practices in Kenya's diverse cultural landscape.

4.8.1.4. Participant selection

In qualitative research, the primary goal is to select information-rich cases. To triangulate the perception of infrastructure development objectives, rules, institutional tools, a community of practice and division of labour by the subjects, the population for this study comprised the following:

- Policymakers, regulators, and other individuals in governance positions who had key roles in infrastructure finance and project development
- Key informants who were involved in the implementation of infrastructure projects with external debt-side governance mechanisms and project management practices

4.8.1.5. Interviewee selection

The study used an eligibility criterion to select information-rich participants and ensure the sample's representativeness.

- Infrastructure management experience > 2 years
- Project size > \$100 million, funded with at least 60% or more external debt
- Level of education (bachelor's degree, master's degree, and other)

It identified that varying participants based on these attributes ensured heterogeneity. Sampling was progressive. The researcher enrolled participants and conducted interviews until they were confident that the data was sufficient because no new concepts were emerging.

4.8.1.6. Sampling strategy

Qualitative research is associated with non-probability sampling techniques to examine a real-life phenomenon. The objective is not to make statistical inferences concerning the wider population but to contribute to the theoretical explanation (Saunders *et al.*, 2015). A sample of participants does not need to be representative or random, but there must be a clear rationale for including some individuals rather than others. Table 4-4 briefly defines the non-probability sampling techniques.

Table 4-4: Non-probability sampling

Quota sampling	The investigator chooses participants based on predetermined characteristics so that the total sample will have the same distribution of characteristics as the wider population.
Snowball sampling	To increase the sample size, the investigator uses a few participants to recruit other participants to participate in the study. It applies to small populations that are difficult to access.
Convenience sampling	The investigator selects participants because they are often readily and easily available rather than targeting unknown individuals.
Purposive/judgemental sampling	The investigator deliberately selects settings, individuals, or events to provide rich information that other methods cannot obtain.

Source: Author (2023)

The study used purposive, or judgemental, sampling to select participants with relevant expertise and knowledge, aiming to capture information-rich cases (Patton, 2015). Initial subjects were identified through their organisations, academics, consultants and industry professionals. Subsequently, snowball sampling allowed the researcher to access more insights through trusted referrals from the initial subjects, which ensured the validity and reliability of the data. The process is summarised in Figure 4-5.

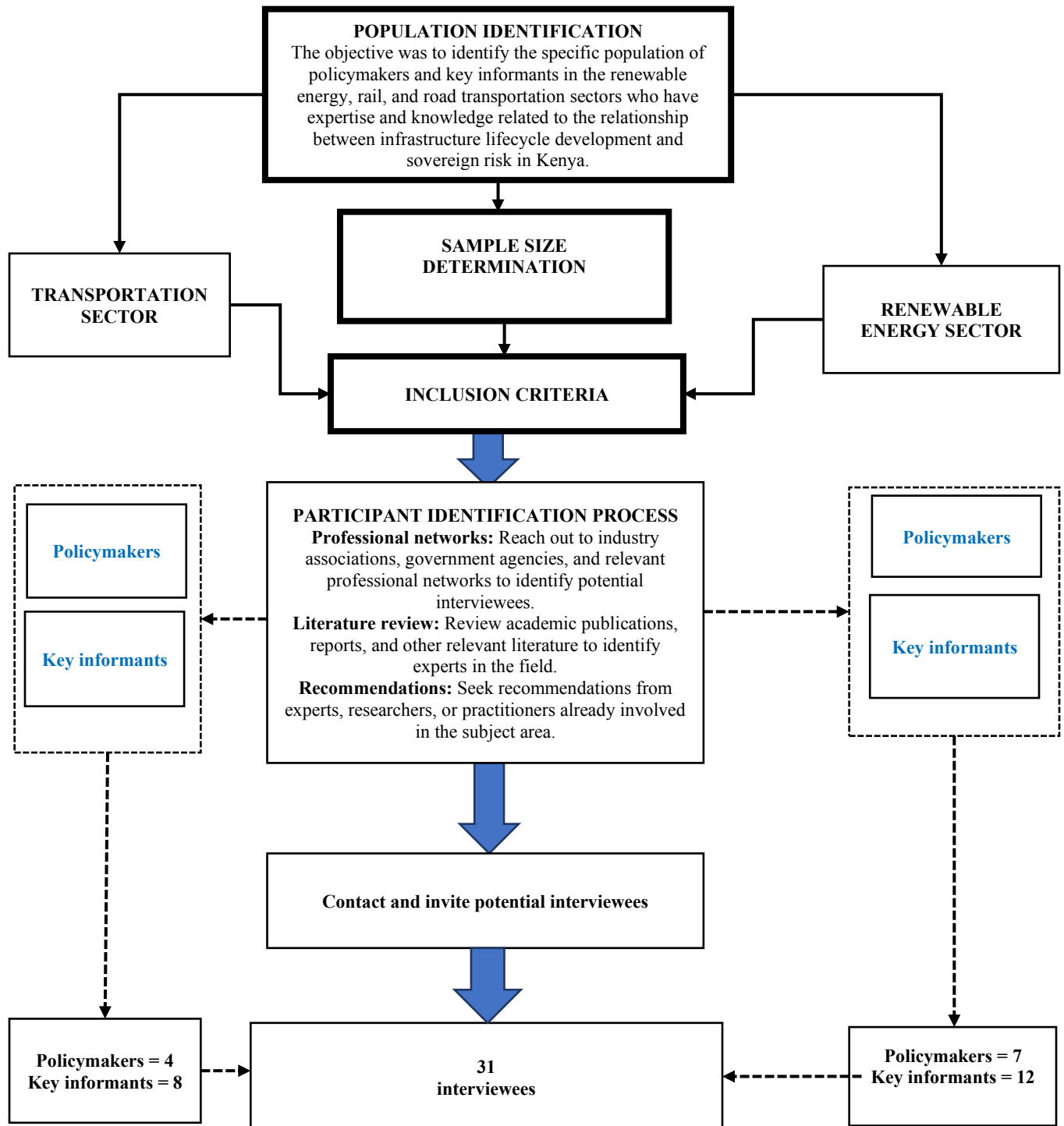


Figure 4-5: Purposive interviewee sampling strategy

Source: Author (2023)

Figure 4-5 illustrates the step-by-step sampling strategy used for the qualitative phase, where purposive sampling ensured representativeness and resulted in a sample of 31 interviewees, including policymakers and key informants. Creswell and Poth (2018) emphasise that qualitative research sampling aims to illuminate the phenomenon under study, not to achieve empirical generalisations. Hence, the focus was on understanding how culture-mediated socio-cognitive learning moderates the relationship between sovereign risk and the infrastructure development system that operates through managerial herding motives. This approach sought in-depth insights and understanding rather than empirical generalisations.

4.8.1.7. Participant profiles

The selection of participants for the qualitative research phase targeted diverse perspectives, experiences, knowledge, and specific demographic characteristics relevant to the research topic. These include age, gender, education, and professional background. This diverse participant profile aligned with the research objectives, enriching data collection and resulting in comprehensive answers to research questions. Ensuring diversity within the profile enabled a broad range of insights. Feasibility considerations, such as geographic location and availability, influenced participant selection. Ethical standards were maintained, ensuring informed consent, confidentiality, and anonymity. Recruitment evolved iteratively, allowing for adjustments based on emerging insights. The insights from Creswell and Poth (2018) supported the choice of 31 interviews, reaching the data saturation point, contributing significantly to emerging themes and fulfilling research objectives.

4.8.1.8. Interviewee recruitment procedures

Participants were initially contacted through their respective organisations and via phone calls. The researcher introduced the study's purpose and inquired about their willingness to participate. If they expressed interest, further screening and potential interviews were arranged. Any questions or concerns raised by potential participants were addressed. The researcher, being Kenyan, utilised county affiliations to establish sociocultural connections without discrimination. Eligible individuals were allowed to proceed with the interview immediately or schedule it for a later time. Those ready for the interview were provided with informed consent (*Appendix D.1.*) and asked for permission to record the interview. Referrals by participants followed the same procedure.

4.8.1.9. The semi-structured interview process

Semi-structured interviews served as a comprehensive method for exploring the nuances of how culture-mediated socio-cognitive learning may moderate the relationship between sovereign risk and infrastructure development as managerial herding motives. The interviews maintained a structured core while offering flexibility. Informed consent was obtained, and interviews were conducted in locations chosen by

participants, were conducted in English, and lasted approximately 45–60 minutes. This approach was chosen to align with cultural-historical theory and Hofstede’s cultural dimensions, aiming to uncover cognitive processes and social influences on decision-making and risk perception. In line with the study’s theoretical foundations, in-depth interviews allowed a deeper understanding of participants’ experiences and cultural contexts. This method captured rich, contextual insights, shedding light on cultural norms and values that might be overlooked in surveys.

Advantages of in-depth interviews

The advantages of in-depth interviews utilised in this study were:

- In-depth interviews allowed a detailed exploration of participants’ perspectives, uncovering rich qualitative insights from their thoughts, experiences, and decision-making processes.
- In-depth interviews captured cultural and contextual nuances that shape herding motives, risk perception, and decision-making, aligning well with the emphasis on cultural dimensions.
- In-depth interviews allowed for flexibility in probing, follow-up questions, and adapting the interview guide to each participant for a comprehensive exploration of complex topics.
- By engaging participants in open dialogue, the method respected their local cultural norms and encouraged participants to express their viewpoints in a culturally appropriate manner.
- In-depth interviews empowered participants to share their narratives, potentially revealing unexpected insights and governance perspectives unique to infrastructure projects.
- This method was well-suited for investigating complex relationships and contextual factors contributing to the relationship between sovereign risk and infrastructure development as managerial herding motivators to construct new knowledge through open-ended interaction with participants.

Disadvantages of in-depth interviews

The disadvantages of in-depth interviews were:

- Each in-depth interviewing lasted 45–60 minutes, making it time-intensive for the researcher and participants and potentially limiting the sample size and scope of the study.
- Researchers’ biases and interpretations could have influenced data analysis. Hence, the study used careful reflexivity and triangulation to mitigate bias.
- Due to the small sample size and context-specific insights, findings from in-depth interviews might not be easily generalised beyond the Kenyan participants context.
- Conducting interviews, transcribing, and analysing qualitative data were resource-intensive in terms of time, personnel, and costs.

- Qualitative data analysis was subjective and open to interpretation, requiring rigorous theory, methodology, and inter-coder reliability. A cultural-historical activity framework elements guided interpretation.
- Selecting policymakers and key informant participants from different sociocultural settings allowed a representative range of perspectives and experiences to avoid selection bias.

Incorporating in-depth interviews and participant observation into the research design for this study acknowledged the complexities of cultural influences on the dialectical relationship between sovereign risk and infrastructure development that could emerge from managerial herding. Despite the potential disadvantages, the strengths of this method aligned with the study's theoretical framework and research objectives, offering a robust approach to exploring the nuanced interplay between culture, decision-making, and risk perception in the context of Kenyan infrastructure projects.

4.8.2. Secondary data collection

Administrative records and documents were the principal data sources because they are a product of day-to-day activities (Hakim, 2012). They were part of the culture-based approaches to social construction of shared meaning about sovereign risk and infrastructure development in Kenya that allowed focusing on the past and changes over time to answer the primary research question.

4.8.3. Use of researcher's personal experience

Pragmatism is founded on the assumption that the research question guides the inquiry. The qualitative method recognises that the researcher's subjectivity is intimately involved in scientific inquiry as a resource, not a threat to knowledge production. Some researchers' reflections aided the understanding and interpretation of empirical observations. Patton (2015) suggests that where this was the case, the reflection should be made plain to make any potential biases explicit.

4.8.4. Data analysis

4.8.4.1. Thematic analysis

Thematic analysis was used to analyse the in-depth interview data systematically. This entailed examining the narratives to elicit cultural dimensions underpinning managerial behaviour. The researcher ensured the interpretive methods elicited individual constructions of meaning from culture that were refined hermeneutically and dialectically to generate a few constructions with a substantial consensus. Thematic text analysis and open coding were consistent with the inquiry criteria for data analysis. Braun and Clarke (2006) define thematic analysis as identifying, analysing, and reporting patterns (themes) within data; they offer guidelines for conducting thematic analysis, summarised in Table 4-5.

Table 4-5: Thematic analysis steps

Analysis step	How it was applied in the study
Step 1: Become familiar with the data	Reading and re-reading the transcripts
Step 2: Generate initial codes	Theoretical thematic analysis as per activity theory
Step 3: Search for themes	Patterns that captured cultural dimensions
Step 4: Review themes	Re-reading the data associated with each theme
Step 5: Define themes	Refining themes and identifying sub-themes
Step 6: Write-up	Writing the qualitative data analysis chapter

Source: Braun & Clarke (2006)

Thematic analysis involved structured qualitative data analysis phases using NVivo 12.4.0. Theoretical elaboration is vital to advance the theory that human-centred infrastructure design, and implementation practices moderate the relationship between sovereign risk and infrastructure development through managerial culture-mediated defensive socio-cognitive learning motives. Hence the study employed the grounded theoretical method outlined by Gioia (2021) conducting concurrent data analysis alongside interviews in three steps: (i) transcript coding involved creating analytic codes and categories and organising them into a data structure with 1st-order codes (informant-centred depiction of understanding their work) and 2nd-order themes (cultural theoretic depiction of informants' work understanding) along with aggregate dimensions (culture-mediated herding motives based on informants' work understanding); (ii) development of a grounded theoretical model through constant data comparison over time and across informants under activity system themes; (iii) presentation of findings using a detailed, data-led narrative based on 2nd-order themes and aggregated dimensions, with frequent reference to informants' 1st-order quotations to identify patterns between activity system themes and emerging cultural themes in contrasting cultural orientations of herding. While shared cultural norms are expected to have a strong socio-cognitive effect on participants' beliefs that certain infrastructure development practices and sovereign debt management practices elevated sovereign risk, the study captured constructs contrasting the majority belief. Theoretical elaboration of participant vocabulary was employed to correlate majority and minority views as group polarisation shifts via thematic analysis using Nvivo for data coding.

In the initial phase, thematic analysis and open coding were conducted to deconstruct transcripts into key concepts at each activity system element, resulting in a comprehensive array of participant perspectives. Concurrently, emerging concepts and their cultural sub-themes were identified through a similar process. Subsequently, codes were categorised into relevant concepts and cultural sub-themes based on interviewees' verbs, positions and context, following Corbin & Strauss (2015). The second coding phase adopted a more inductive approach, adhering to grounded theory principles and allowing cultural dimensions to emerge organically. As the number of interviewees increased, potential group polarisation

was identified based on majority and minority cultural sub-themes, categorised into Hofstede's six dimensions as defensive socio-cognitive learning mediators to enrich the dataset. In the final step, codes and categories were connected iteratively to elicit 31 defensive socio-cognitive learning themes, using Hofstede's framework for theoretical elaboration of culture-mediated socio-cognitive learning to identify herding as a dependence on group norms. Culture-mediated group dependence was framed as a potential obstacle to expansive learning because herding leverages reliance on social proof to reduce the risk of being blamed for poor decisions instead of innovating or challenging norms. Creswell & Poth (2018) described the validity of qualitative studies for trustworthy findings based on three perspectives. Multiple data collection facilitated the methodological triangulation of data to establish the rigour and validity of this qualitative study. Theoretical triangulation was established along with methodological triangulation by adapting multiple theories, specifically the activity theory of expansive learning at the workplace (Engeström, 2001) and cultural psychology (Hofstede *et al.*, 2010b), to elicit defensive socio-cognition learning motives and the affordance theory to elucidate the managerial perception of action possibilities. The triangulation entailed cross-checking participant responses with various secondary data sources reflecting findings in other contexts to mitigate biased interpretation. Data were grouped, summarised, and analysed to identify emerging themes, considering rival explanations to ensure robust interpretations. The analysis involved iterative cycles, moving back and forth to refine emerging themes and select pertinent quotations that encapsulated essential cultural aspects, particularly those related to managerial herd instincts (Patton, 2015). The insights on how culture mediates defensive socio-cognitive learning practices as an antecedent to herd were documented based on themes emerging in the seven activity nodes in the conceptual framework (*see Figure 8-3*).

4.8.5. Validity and reliability

In qualitative research, ensuring validity and reliability is paramount to establishing the credibility and trustworthiness of the findings. Validity pertains to the extent to which the findings accurately represent the phenomenon under study. To enhance validity:

- Multiple data sources, such as interviews, observations, and document analysis, were employed, enabling triangulation to strengthen the credibility of the findings.
- The researcher engaged in continuous reflexivity, acknowledging personal biases and values that might influence the research process and findings, thus enhancing validity.
- Data saturation was achieved, ensuring the data collection reached a point where no new or meaningful information emerged from the data, further strengthening credibility.

On the other hand, reliability concerns the consistency, dependability, and replicability of the research process and findings. Although qualitative research prioritises depth over replicability, steps were taken to enhance reliability:

- Thorough documentation of the research process, including design, data collection, and analysis procedures, ensured methodological coherence and transparency, facilitating potential replication by other researchers.
- Inter-coder reliability was established through two researchers' collaboration, training sessions, regular meetings, and ongoing discussions to ensure consistent coding and interpretation.
- A detailed audit trail was maintained, documenting decisions, data sources, and analysis steps, providing a transparent record of the research process for external verification and scrutiny.

4.9. Integration of quantitative and qualitative research findings

The integrated quantitative and qualitative research findings per the cultural-historical activity framework in Chapter Seven (*see Table 7-1*) and conceptual framework in Chapter Three (*see Figure 3-9*) explain how culture reflects innate psychological dependence on social groups that manifest as managerial herding behaviours that could moderate the relationship between sovereign risk and the infrastructure development system.

4.10. Ethical considerations

The researcher diligently adhered to ethical guidelines throughout the research process to ensure the rights and well-being of the participants. The study received approval from Strathmore University's Ethics Committee and acquired the necessary research permits and administrative consent. Participants were treated equitably and reminded of their voluntary participation, with the option to withdraw at any time. Legal considerations were considered for vulnerable populations. The researcher used various measures to maintain objectivity, anonymity, and confidentiality. Anonymity was ensured by not collecting personally identifying information, and data were kept confidential with password-protected access. Subjectivity was reduced by involving multiple raters for the variables. No financial sponsorship was given or received for the research. Participants were informed about the research's nature, purpose, methods, privacy rights, and confidentiality through a participant information and consent form. The researcher's contact information was provided for any queries or concerns. Voluntary participation was emphasised, and participants could skip uncomfortable questions. Ethical principles were upheld throughout the study to protect the privacy and confidentiality of all participants.

4.11. Research limitations

The explanatory sequential mixed-method research approach has both advantages and limitations. Despite these limitations, it was valuable for gaining a comprehensive understanding of the research question, incorporating diverse perspectives, and using data triangulation to improve the study's validity and reliability.

Methodological limitations

- The research focused on the multicultural infrastructure development context within Kenya, potentially limiting the generalisability of results to other Sub-Saharan African nations – the aim was to understand the managerial socio-cognitive learning complexities within the large Kenyan multicultural infrastructure project context, which could limit the generalisability of findings.
- Engaging infrastructure practitioners who had left Kenya could have enriched insights, but this was not feasible due to time and resource constraints.
- The explanatory sequential mixed-method approach was resource-intensive, requiring additional time, resources, data analysis tools, and expertise.
- There was a significant power imbalance among participants, with 96% being from the public sector, potentially affecting information disclosure.
- A time gap between the two research phases could have impacted data comparability and relevance.
- The sequential design may not have addressed all the CHAT framework's qualitative research questions or concepts about contradictions in managerial socio-cognitive learning objectives.
- The interpersonal nature of the survey could introduce reporting bias.
- Integrating data from different sources, including the survey, secondary databases and in-depth interview methods, posed sampling, measurement, and comparability challenges.
- Researchers' subjectivity in interpreting integrated data may introduce bias. Established cultural variables were used to mitigate discrepancies and ensure transparent reporting.
- Ethnography can offer deeper insights but was not feasible due to timing and scope constraints.

Theoretical limitations

- Integrating cultural-historical activity theory and Hofstede's cultural dimensions was complex in reporting mixed-method research findings.
- The integrated theoretical perspective emphasised the evolving nature of activities within the infrastructure project management system, adding complexity.

- The study chose a specific point for analysis (the embeddedness of herding, information cascade, and sovereign risk susceptibility in infrastructure projects), possibly due to complexity and the researchers' status as novice interdisciplinary researchers.
- The integrated approach allowed a nuanced theoretical understanding of culture-mediated financial and non-financial decision-making behaviour to emerge without over-specification.
- The study acknowledged the potential of other cultural frameworks beyond Hofstede's approach and encouraged future researchers to explore alternate cultural definitions.

4.12. Chapter summary

This chapter established the research's philosophical foundation, advocating for a pragmatic inquiry to gain insights from subjective opinions and objective data sources. It justified the use of an explanatory sequential mixed method, explaining the research design, population, sampling techniques, and unit of analysis. The data collection methods comprised a survey, in-depth interviews, observations, informal discussions, and a document review. The chapter discussed deductive and inductive data analysis approaches and addressed primary and secondary data trustworthiness. Ethical compliance steps for human participants were outlined, and chapter limitations were acknowledged. Chapter Five will present the findings of the quantitative data analysis.

Chapter Five: Quantitative Findings

5.1. Introduction

This chapter presents the findings from the quantitative data analysis of the research on how the Kenyan infrastructure lifecycle management system might influence sovereign risk due to inefficient managerial herding and information cascades. Section 5.2 presents the findings from the primary data collected using a questionnaire survey. It is part of the cross-sectional research design of the explanatory sequential mixed method used in the study. Descriptive, factor (PCA), correlation, and regression (OLS) analyses were conducted, and statistical outcomes were used to interpret the findings. These primary data findings are complemented by longitudinal secondary data analysis using panel data regressions in Section 5.3 to triangulate the subjective survey data with objective sovereign risk determinants.

5.2. Primary data analysis

5.2.1. Respondent demographic characteristics

5.2.1.1. Gender

Table 5-1 highlights a significant underrepresentation of women in senior decision-making roles in the infrastructure sector, with 25.6% of respondents as women. The gender gap exposes potential gender and inclusivity information loss in infrastructure project management teams. Policy initiatives encouraging and supporting gender diversity can enhance problem-solving and improve decision-making. Encouraging more women to participate in infrastructure projects and leadership roles can bring diverse risk perspectives to enhance project outcomes in addressing the observed ethnic and gender discrimination (Renkens, 2019). Efforts to promote gender equality in infrastructure roles should contribute to social equity and bolster the sector's people-centred governance objective by tapping into a talent pool that incorporates demographic diversity in project design, as noted by Ogallo and Jha (2017). Developing the infrastructure diversity index based on these insights can guide the implementation of the gender issue in Vision 2030 policies and initiatives to address the gender disparity in senior managerial roles within the Kenyan infrastructure sector for more inclusive and effective decision-making processes.

Table 5-1: Respondents' gender

Gender	Frequency	Percentage (%)
Female	153	25.6
Male	444	74.4
Total	597	100

Source: Author (2023)

5.2.1.2. Age and experience

The results in Table 5-2 show that respondents with over 6 years of experience accounted for 36% of the sample, demonstrating the significance of having seasoned professionals steering projects. The distribution of age and experience reveals a mix of experts and novices. Leveraging the experience of experienced professionals while providing mentorship and growth opportunities for younger managers can create a dynamic managerial learning environment and knowledge transfer mechanism. Policy guidelines should focus on mentoring, knowledge transfer, and continuous professional development to ensure a robust pipeline of skilled managers that can address the technical skills deficit that Ndiritu and Engola (2020) and Takase *et al.* (2021) found in Kenya. Encouraging partnerships between tertiary institutions, experienced practitioners and emerging talent can create a collaborative learning environment, fostering innovation and mitigating the risk of inadequate expertise due to weak governance of universities. This risk has led to poor quality programmes, as Colenbrander *et al.* (2015) observed in Sub-Saharan Africa. It is useful to encourage more professionals to obtain project management certification to enhance individual and collective technical skills capabilities, improving infrastructure project outcomes and standardised practices.

The international infrastructure management experience reveals the relevance of cross-cultural competence in an increasingly globalised infrastructure landscape. Encouraging international exposure and training can better equip project managers to navigate the globalised modern infrastructure contexts. The survey's finding that 13.4% of respondents had international management experience indicates the need to enhance global exposure among managers in the Kenyan infrastructure development context. A human-centred policy framework with interventions that bolster international collaborations, knowledge exchange, and cross-cultural experiences can infuse innovative practices into Kenya's infrastructure development activity. Encouraging professionals to engage with international best practices can enhance project execution, risk management and soft infrastructure development shortfall identified in East Africa (Kolstad & Wiig, 2011).

Table 5-2: Respondents' age and experience in years

	Frequency	Percentage (%)
Age in years		
30-35	94	15.7
36-40	183	30.7
41-45	176	29.5
46-50	104	17.4
51-55	30	5
56-60	6	1
61+	4	0.7
Total	597	100
Project management experience in years		
2-5	129	21.6
6-10	206	34.5
11-15	175	29.3
16-20	58	9.7
21-25	20	3.4

26+	9	1.5
Total	597	100
Project management certification	26	4.36
International management experience	80	13.40
Without international management experience	517	86.60
Total	597	100

Source: Author (2023)

5.2.1.3. Infrastructure funding sources and distribution into socioeconomic settings

The 96.6% public sector project funding in Table 5-3 signifies the government's dominant role in infrastructure development (Osiolo *et al.*, 2017). Aligning external debt management goals with regional infrastructure development priorities to utilise public funds equitably can drive successful project execution. A key finding from past managerial surveys was the lack of transparency and accountability (Onjala, 2018) and the poor contracting and governance issues Twesigye (2022) found in numerous infrastructure projects. These issues are traceable to the public sector due to the dominance of public sector project funding (96%) in the sample. Public governance must ensure transparency, efficient resource utilisation, accountability and public sector managerial learning. Clear financial management, public procurement, and reporting guidelines can mitigate corruption risk (Otele *et al.*, 2022) to enhance public trust in infrastructure projects.

The distribution between urban and rural projects highlights the need for contextually adaptive project management. Rampant land acquisition disputes in infrastructure development have been linked to social inequality (Dill *et al.*, 2018; Koissaba, 2018; Kong'ani *et al.*, 2021; Renkens, 2019; Yaffe & Segal-Klein, 2023). Enns (2019) showed that rural land users are differentiated by class, gender, generation, ethnicity, and nationality. Infrastructure project management in rural settings requires additional consideration of how cultural norms can influence site access, community engagement, and environmental impact assessments. The disparity between rural and urban settings holds implications for sovereign risk-sharing. Policymakers must consider crafting sustainability strategies in each context, and managers must acknowledge diverse challenges to enhance historical vs current infrastructure resilience. For implementation success, policies should improve infrastructure connectivity, skill development, and community engagement in rural areas while addressing congestion, pollution, and complex user dynamics in urban settings (Venter *et al.*, 2020).

Table 5-3: Infrastructure funding sources and distribution into socioeconomic settings

	Frequency	Percentage (%)
Public vs private funding		
Private sector	20	3.4
Public sector	577	96.6
Total	597	100
Socioeconomic settings		
Urban	244	40.9
Rural	353	59.1
	597	100

Source: Author (2023)

5.2.1.4. Job tenure and infrastructure project risk perceptions

Table 5-4 indicates that most managers (94.47%) had a job tenure of 2 years or more, with a significant portion (60.30%) having a job tenure of 4 years or above. It suggests a relatively stable workforce if one triangulates the survey data findings with descriptive statistics of secondary data in Table 5.4, showing that the average loan payment grace period was 7 years with a minimum of 3 and maximum of 10 to mimic construction time when projects do not generate cash inflow but demand large cash outflow. Low staff turnover during construction can bolster project execution, as they bring valuable insights and expertise. Even though a dismal portion (12.2%) of individuals express a propensity to leave an infrastructure project due to high risk, it highlights the importance of considering personal risk management strategies to retain skilled personnel and project phase continuity. Around 16.92% of individuals indicate a likelihood to abandon an infrastructure project due to concerns about limited funding. This emphasises the need for transparent external funding arrangements, resource allocation methods, and effective communication about the financial risk aspects of projects (Onjala, 2018). Adequate funding assurance can maintain commitment and motivation among project management teams by eliminating long-term job security risks.

Table 5-4: Respondents' job tenure and infrastructure project risk perceptions

	Frequency	Percentage (%)
Job tenure in years		
1-2 years	33	5.53
2-3 years	204	34.17
4 years and above	360	60.30
Total	597	100
Propensity to desert an infrastructure project due to high-risk	72	12.2
Propensity to desert an infrastructure project due to the perception of limited funding	101	16.92

Source: Author (2023)

5.2.1.5. Sector stratification

Table 5-5 presents the sectoral breakdown of respondents between renewable energy (51.3%) and transportation (48.7%), revealing a balanced platform for targeted evaluation of managerial behaviour to develop appropriate socio-cognitive learning policy interventions. With participants spread across energy and transportation sectors, acknowledging each sector's uniqueness is essential in tailoring hybrid project management approaches to sector-specific needs in order to enhance project lifecycle performance. Understanding the nuances of socio-cognitive learning strategies as managerial mechanisms of responding to risks in each sector can guide policymakers in tailoring risk management strategies. Kenyan policy guidelines must promote sector-specific research, skill development, and regulatory frameworks to address each sector's unique soft infrastructure development and institutional governance risks (Sergi *et al.*, 2018) based on KPIs for human capital development outcomes. These findings call for effective sectoral policies that optimise resource allocation, stimulate growth, and minimise cross-sectoral collaboration pitfalls

(Pueyo *et al.*, 2016). The propensity to abandon projects due to high risk or limited funding underscores the need to tailor sovereign risk and financial planning to specific sectors, including contingency risk planning.

Table 5-5: Sector stratification

Infrastructure sector stratification	Frequency	Percentage (%)
Energy	306	51.3
Transportation	291	48.7
Infrastructure sub-sector stratification	597	100
Energy	306	51.3
Road	213	35.7
Rail	78	13.1
Total	597	100

Source: Author (2023)

5.2.1.6. Board membership and managerial level

The survey attracted board members and managers as key decision-makers with distinct responsibilities, as shown in Table 5-6. While boards have the ultimate decision-making responsibilities, managers implement the day-to-day infrastructure development mandate and report to the board. Twesigye (2022) found that government officials interfered with contract management, suggesting a significant influence on the board that can cascade to management. Board opinions shed light on what constraints hierarchical communication and collaborative decision-making between board members and managers to align strategic national goals and operational execution since developing infrastructure systems is the cornerstone of Kenya's Vision 2030 economic growth. However, these initiatives are not without their challenges, with international, intergenerational, and intragenerational sovereign risk-bearing being a critical consideration in the moral hazards (Brautigam, 2022) perpetuated by decision-makers. In Kenya, where infrastructure development is a priority, understanding and effectively managing the elevated sovereign risk is paramount to addressing how unequal international, intergenerational, and intragenerational risk-bearing emerges.

Table 5-6: Board membership and managerial level

	Frequency	Percentage (%)
Project management certification	26	4.36
Managerial hierarchy		
Senior management	488	81.7
Middle management	109	18.3
Total	597	100
Board membership		
Non-board members	524	87.8
Board members	73	12.2
Total	597	100
Board membership affiliation		
Board member in other projects	43	7.2
Board member in the managed project	30	5
Non-board members	524	87.8
Total	597	100

Source: Author (2023)

In conclusion, the demographic results offer valuable insights into managing sovereign risk in Kenyan infrastructure development by aligning governance and management with human-centred development. To effectively capitalise on these insights, policymakers and practitioners must adopt multi-faceted approaches to address the gender disparity, nurture expertise, encourage international exposure, tailor risk-taking strategies to specific sectors, consider socioeconomic context (rural and urban), and promote transparency.

5.2.2. Frequency distribution and cross-tabulation of responses

Constructs of sovereign risk, debt-side governance, project management, macroeconomics, and culture were identified from the literature, based on which questions on key international infrastructure loan agreements were framed and presented to the respondents.

5.2.2.1. Sovereign risk determinants in Kenyan infrastructure projects

The response pattern to item 1 in Table 5-7 reveals that managers generally agree on the importance of various factors in pricing sovereign risks, such as inflation, public debt management, politics, corruption, economic stability, interest rates, exchange rates, and debt duration. However, some points of contention are related to political influence and the effects of green infrastructure development initiatives. These insights provide valuable information for policymakers, investors, and financial institutions better to understand the complex landscape of sovereign risk premiums.

5.2.2.2. The dynamics of debt-side governance in the Kenyan infrastructure projects

Table 5-7 shows a complex interplay of debt-side governance factors that shape the decisions that pave the way for sustainable development in infrastructure financing. Among the respondents, 36% to 41% believed that total investment significantly influences interest rates and debt inflow. This perspective underscores the acute awareness among managers regarding the crucial role of investment levels in determining cost efficiency. More intriguingly, this mindset illuminates a prudent approach to minimising high-risk debt investments, which are recognised as potential triggers for budget overruns that can strain fiscal resources (Pueyo, 2018). The survey's findings on the debt-to-equity ratio elicited a spectrum of responses, ranging from slight to strong agreement. Of particular interest, 39% of the participants expressed moderate agreement regarding the ratio's effect on interest rates and debt inflow. This nuanced perspective also revealed that an increase in risks could inversely impact debt inflow. A significant contingent, approximately 35%, strongly endorsed this viewpoint, highlighting the pertinence of maintaining a balanced debt-equity structure in optimising financial stability. The survey's exploration of maturity as a determinant of cross-border infrastructure debt interest rates unearthed a compelling insight.

Table 5-7 shows that 35% to 41% of respondents strongly agreed about the pivotal role of loan maturity. This underscores the acute recognition among managers of the challenges posed by limited access to long-

term debt (Pueyo, 2018). This problem over-shadows infrastructure delivery and economic growth prospects in many developing nations. By delving deeper into project failures, the survey probed bankruptcy risks – a phenomenon rooted in poor risk management and stakeholder engagement. An overwhelming 46% of respondents identified inadequate risk management as the prime culprit behind budget overruns and stalled projects, thus elevating the bankruptcy risk. This reinforces the significance of robust primary stakeholder risk mitigation strategies in averting financial disasters. The multifaceted compliance landscape with external debt covenants emerged as a crucial theme among managers. Approximately 45% of surveyed practitioners expressed a moderate agreement that renegotiating debt payment terms can impact cross-border infrastructure debt interest rates. This divergent perspective reflects respondents' priorities and concerns, underscoring the complexity of balancing compliance obligations with long-term financial risk optimisation. The survey focused on environmental, social, and governance (ESG) considerations in a rapidly evolving landscape where managers mediated government approaches to integrating ESG infrastructure implementation. Strikingly, the survey results conveyed a sense of optimism, with 28% attributing potential to the Green Bonds Programme and an equal 28% to the Green Economic Strategy and Implementation Plan in expanding low-cost infrastructure debt access. Green finance was hailed as a potential catalyst for sustainable infrastructure development, aligning financial decisions with environmental and social imperatives (Baimwera *et al.*, 2017).

Table 5-7: Debt-side governance in the Kenyan infrastructure context

	Sector	Renewable energy							Transportation sector							Full Sample									
	Agreement levels	N	1	2	3	4	5	6	7	N	1	2	3	4	5	6	7	N	1	2	3	4	5	6	7
1	Sovereign risk																								
	Inflation	306	2	10	12	5	21	113	143	291	2	5	6	2	28	109	139	597	4	15	18	7	49	222	282
	Public debt management policy	306	3	4	2	2	29	114	152	291	1	2	4	1	40	114	129	597	4	6	6	3	69	228	281
	The inability of politics to affect projects	306	0	5	2	2	21	108	168	291	2	1	6	3	31	98	150	597	2	6	8	5	52	206	318
	The ability of politics to affect projects	306	1	1	1	3	34	101	165	291	0	1	2	6	24	117	141	597	1	2	3	9	58	218	306
	Corruption	306	1	4	4	16	43	116	122	291	1	2	2	8	56	115	107	597	2	6	6	24	99	231	229
	Economic stability	306	6	14	13	14	32	97	130	291	4	5	17	6	39	93	127	597	10	19	30	20	71	190	257
	Sound debt management	306	2	2	4	10	38	124	126	291	1	2	6	7	66	120	89	597	3	4	10	17	104	244	215
	USD interest rate changes	306	1	8	13	26	38	114	106	291	1	8	11	51	69	107	44	597	2	16	24	77	107	221	150
	Exchange rate	306	2	8	6	34	47	104	105	291	3	6	8	58	71	101	44	597	5	14	14	92	118	205	149
	Long-term debt	306	4	5	7	5	30	138	117	291	4	8	3	5	43	128	100	597	8	13	10	10	73	266	217
	Short-term debt	306	190	46	25	6	6	7	26	291	159	71	28	5	6	12	10	597	349	117	53	11	12	19	36
	Commodity price changes	306	8	13	11	14	38	84	138	291	5	11	8	5	30	75	157	597	13	24	19	19	68	159	295
	Economic growth	306	4	7	5	19	46	104	121	291	1	9	9	13	34	105	120	597	5	16	14	32	80	209	241
	Green Bonds Program Kenya	306	139	78	30	17	12	22	8	291	133	66	17	10	18	44	3	597	272	144	47	27	30	66	11
	Green Economic Strategy Implementation Plan	306	74	45	47	32	36	63	9	291	92	40	38	18	24	71	8	597	166	85	85	50	60	134	17
2	Investment																								
	Ticket size affects the interest rate	306	8	7	9	14	40	114	114	291	2	2	3	16	37	109	122	597	10	9	12	30	77	223	236
	Ticket size affects debt inflow	306	5	8	2	15	36	114	126	291	2	0	1	5	21	121	141	597	7	8	3	20	57	235	267
3	Debt to equity ratio																								
	Debt-to-equity-ratio-based interest rate	306	7	12	5	22	31	130	99	291	0	2	1	7	41	126	114	597	7	14	6	29	72	256	213
	Debt-to-equity-ratio-based debt flow	306	6	7	4	18	41	127	103	291	1	1	1	5	44	119	120	597	7	8	5	23	85	246	223
	Debt-to-equity-ratio-based risk views	306	19	26	44	42	21	78	76	291	5	3	3	6	36	121	117	597	24	29	47	48	57	199	193
4	Maturity																								
	Maturity influences interest rate	306	2	8	9	10	32	98	147	291	1	0	16	2	42	99	131	597	3	8	25	12	74	197	278
	Maturity influences debt inflow	306	12	2	5	22	51	103	111	291	4	1	3	9	49	103	122	597	16	3	8	31	100	206	233
5	Bankruptcy																								
	Stalled project due to risk	306	1	2	0	2	34	106	161	291	0	3	2	0	34	106	146	597	1	5	2	2	68	212	307
	Stalled project due to covenant non-compliance	306	3	8	13	53	60	104	65	291	14	6	17	40	40	116	58	597	17	14	30	93	100	220	123
	Stalled project due to budget overrun	306	7	10	20	58	68	97	46	291	6	3	6	19	60	116	81	597	13	13	26	77	128	213	127
6	Compliance with debt covenants																								
	Covenant compliance	306	38	17	24	35	33	93	66	291	59	24	9	7	38	114	40	597	97	41	33	42	71	207	106
	Covenant litigation	306	76	53	33	52	16	50	26	291	50	35	25	65	28	67	21	597	126	88	58	117	44	117	47
	Payment renegotiation	306	3	2	3	15	49	134	100	291	3	0	4	15	33	133	103	597	6	2	7	30	82	267	203
	Carbon disclosure across the value chain	306	22	27	40	74	81	36	26	291	8	21	32	75	75	67	13	597	30	48	72	149	156	103	39
	Carbon emission reduction	306	4	4	6	47	56	82	107	291	5	9	25	39	56	102	55	597	9	13	31	86	112	184	162
	Staff pollution exposure penalty	306	69	85	58	61	8	11	14	291	77	57	40	56	15	25	21	597	146	142	98	117	23	36	35
	Politics-mediated schedule delay	306	21	31	30	11	34	77	102	291	4	4	7	9	33	110	124	597	25	35	37	20	67	187	226
7	Environmental, social governance																								
	Climate change limiting debt inflow	306	10	9	5	42	101	84	55	291	1	11	8	43	72	72	84	597	11	20	13	85	173	156	139
	Climate change influencing interest rates	306	6	9	6	32	105	86	62	291	1	9	9	39	96	71	66	597	7	18	15	71	201	157	128
	Rising avoidable carbon emission	306	37	12	11	77	60	59	50	291	8	17	31	54	58	87	36	597	45	29	42	131	118	146	86
	Green Bonds Program Kenya	306	4	2	4	29	51	110	106	291	2	4	15	39	53	113	65	597	6	6	19	68	104	223	171
	Green Economic Strategy Implementation Plan	306	1	7	7	23	57	110	101	291	0	4	16	38	72	91	70	597	1	11	23	61	129	201	171
	Community action due to pollution	306	71	66	54	51	28	21	15	291	69	31	39	40	50	38	24	597	140	97	93	91	78	59	39
	Customer pollution exposure penalty	306	91	64	48	64	16	8	15	291	65	44	48	50	34	27	23	597	156	108	96	114	50	35	38

Source: Author (2023)

5.2.2.3. Project management in the Kenyan infrastructure context

The results in Table 5-8 show respondents' prioritisation of lifecycle debt utilisation objectives. While the utility of external debt in the construction phase was strongly agreed upon by 44.72% (267/597) of respondents, it is worth noting that lender and local stakeholder support takes precedence during the development and construction phases (Lesutis, 2020). The scope is a check and balance attribute as managers guide governments in infrastructure planning. Further, 48% (287/597) of respondents agreed that upgrading existing infrastructure influences debt inflow. Nearly a third of respondents moderately agreed that schedule management affects external debt interest rates. Issues like limited capital (31%), counterparty challenges (28%), and management failures (27%) were identified as contributing to schedule delays. Table 5-8 indicates that from a cost management standpoint, 35.17% (210/597) of respondents acknowledged profitability shaping debt inflow, while 31.82% (190/597) believed it influences interest rates. Varied levels of agreement suggest differing viewpoints. Aligned with G20 quality infrastructure principles, sustainable growth, efficiency, environment, resilience, social considerations, and governance are involved.

About 26% of respondents strongly agreed that carbon emissions impact debt inflow, and 23% moderately agreed that management affects low-cost debt refinancing. Attention to resource management emerged as important to match cash flow and debt payments (41.20%, 246/597), focusing on liquidity risk and resource allocation. Approximately 32.9% (197/597) of respondents favoured communication and decision-support tools, highlighting a drive for ICT integration for transformative communication with all stakeholders. Respondents showed consensus on using procurement tools to minimise infrastructure debt costs, like interest rate swaps (44%), performance bonds (44%), fixed-price contracts (44%), and commodity prices (42%). Respondents agreed that the government is a major stakeholder in reducing cross-border infrastructure debt interest rates. Currency convertibility and transferability (38.35%) and regulatory changes (38.19%) guarantees are key risk mitigation tools. Respondents' moderate agreement emphasises the role of risk treatment in reducing infrastructure debt interest rates. Revenue diversification (38.89%) also emerges as a vital approach. Overall, the survey insights hold implications for Kenyan infrastructure projects. Policies should address stakeholder engagement, innovative communication tools, risk diversification, and quality standards. Efficient resource allocation, scope management, and strategic cost considerations are key. Furthermore, policies should reflect sector-specific nuances to ensure successful project lifecycles integration with cross-sectoral collaborators. Integrating these insights into policy frameworks can ultimately enhance managerial learning outcomes and the success of Kenya's large infrastructure endeavours.

Table 5-8: Project management in the Kenyan infrastructure context

Sector	Renewable energy							Transportation							Full Sample									
Project management opinions	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7			
Lifecycle integration																								
Development phase	306	7	12	13	26	52	113	83	291	11	13	14	20	39	100	94	597	18	25	27	46	91	213	177
Construction phase	306	6	6	14	30	50	85	115	291	4	3	3	7	45	77	152	597	10	9	17	37	95	162	267
Operations phase	306	10	14	20	32	70	108	52	291	3	9	12	22	86	104	55	597	13	23	32	54	156	212	107
Maintenance phase	306	17	23	22	39	65	87	53	291	18	18	39	31	74	87	24	597	35	41	61	70	139	174	77
Termination phase	306	20	19	22	62	62	84	37	291	17	17	46	28	65	81	37	597	37	36	68	90	127	165	74
Scope																								
Expansion or upgrade-oriented interest rate	306	2	4	13	15	37	117	118	291	3	3	6	5	47	113	114	597	5	7	19	20	84	230	232
Expansion or upgrade-oriented debt inflow	306	12	2	3	11	42	100	136	291	2	1	2	5	37	93	151	597	14	3	5	16	79	193	287
Management default litigation	306	73	58	22	27	23	70	33	291	42	39	27	52	38	70	23	597	115	97	49	79	61	140	56
Schedule management																								
Schedule delay due to limited capital	306	18	14	22	28	59	84	81	291	8	6	13	10	32	120	102	597	26	20	35	38	91	204	183
Schedule delay due to management	306	39	20	32	17	51	88	59	291	34	23	23	21	45	85	60	597	73	43	55	38	96	173	119
Schedule delay due to counterpart failures	306	40	11	38	17	33	98	69	291	44	14	23	17	37	95	61	597	84	25	61	34	70	193	130
Cost management																								
Profitability influences interest rate	306	15	14	4	16	22	124	111	291	7	7	13	21	80	84	79	597	22	21	17	37	102	208	190
Profitability influences debt inflow	306	13	5	3	22	38	100	125	291	6	7	8	12	79	94	85	597	19	12	11	34	117	194	210
Quality																								
Low-interest rate refinancing due to project management	306	23	20	19	31	50	79	84	291	53	21	27	27	63	67	33	597	76	41	46	58	113	146	117
Carbon emission influenced debt inflow	306	5	13	16	40	43	84	105	291	8	31	16	22	99	54	61	597	13	44	32	62	142	138	166
Resource management																								
Viability gap guarantees	306	2	2	5	30	47	115	105	291	0	2	5	31	67	128	58	597	2	4	10	61	114	243	163
Limited cash generation	306	4	3	1	18	29	115	136	291	1	1	6	18	44	111	110	597	5	4	7	36	73	226	246
Communication																								
Information-based market access	306	17	24	27	62	53	84	39	291	6	2	13	42	69	101	58	597	23	26	40	104	122	185	97
Well-documented risk management	306	29	23	14	43	45	96	56	291	48	20	13	20	47	109	34	597	77	43	27	63	92	205	90
Decision-making support tools	306	11	7	2	7	56	133	90	291	7	3	2	8	50	114	107	597	18	10	4	15	106	247	197
Procurement																								
Commodity price options	306	5	0	2	17	39	136	107	291	0	3	3	38	52	119	76	597	5	3	5	55	91	255	183
Fixed-price contracts	306	2	0	2	27	35	146	94	291	1	3	7	37	70	116	57	597	3	3	9	64	105	262	151
Forward contracts	306	2	3	7	35	60	132	67	291	0	3	4	46	65	101	72	597	2	6	11	81	125	233	139
Future contracts	306	2	3	29	36	55	113	68	291	1	8	5	41	65	105	66	597	3	11	34	77	120	218	134
Performance bonds	306	2	4	1	20	38	140	101	291	0	1	3	29	77	122	59	597	2	5	4	49	115	262	160
Interest rate swaps	306	0	2	2	19	41	149	93	291	1	3	5	37	50	117	78	597	1	5	7	56	91	266	171
Stakeholder																								
Utility off-take guarantee	306	1	4	4	16	32	153	96	291	0	2	1	17	50	123	98	597	1	6	5	33	82	276	194
Fuel supply guarantee	306	2	0	5	16	47	114	122	291	1	3	6	20	44	124	93	597	3	3	11	36	91	238	215
Currency convertibility and transferability guarantee	306	2	1	0	21	18	146	118	291	2	1	4	22	31	120	111	597	4	2	4	43	49	266	229
Law and regulatory changes guarantee	306	1	2	0	19	24	142	118	291	0	1	5	22	59	94	110	597	1	3	5	41	83	236	228
Debt repayment guarantee	306	2	0	1	10	32	122	139	291	1	2	8	13	46	115	106	597	3	2	9	23	78	237	245
Tariff rate guarantee	306	1	1	4	10	25	139	126	291	2	3	7	17	39	147	76	597	3	4	11	27	64	286	202
Revenue guarantee	306	3	1	4	12	22	130	134	291	0	1	5	22	53	129	81	597	3	2	9	34	75	259	215
Risk management																								
Insurance guarantee	306	1	1	2	17	51	119	115	291	0	2	4	32	58	103	92	597	1	3	6	49	109	222	207
Multilateral or bilateral partial risk guarantees	306	0	0	1	25	40	142	98	291	3	5	5	21	69	103	85	597	3	5	6	46	109	245	183
Risk transfer to a third party	306	2	3	0	18	23	131	129	291	4	2	5	42	34	130	74	597	6	5	5	60	57	261	203
Risk acceptance	306	2	1	2	20	46	133	102	291	0	4	3	43	52	108	81	597	2	5	5	63	98	241	183
Revenue diversification	306	2	7	3	19	36	125	114	291	2	1	3	20	47	100	118	597	4	8	6	39	83	225	232
Credit risk management policy	306	6	5	1	14	56	123	101	291	4	5	0	14	38	111	119	597	10	10	1	28	94	234	220
Financial risk management training	306	11	6	1	10	34	141	103	291	8	1	3	7	40	122	110	597	19	7	4	17	74	263	213

Source: Author (2023)

5.2.2.4. Macroeconomic risks in the Kenyan infrastructure context

Table 5-9 shows that 35% of participants moderately agree that the most significant risks revolve around behaviours like high national indebtedness and efficient macroeconomic risk management. Respondents moderately agreed that enhancing the management of exchange rates (43%) and interest rates (41%) and addressing underdeveloped capital markets (37%) contribute to this goal. Fluctuations in exchange and USD interest rates are particularly concerning in PPPs, impacting the attractiveness of cross-border talent and external debt flows in building local project management capabilities and organisational growth. Respondents supported aligning national policy, strategic management activities, and financial objectives in carbon risk management. Notably, 34% strongly agreed that registering an infrastructure development project as a clean development mechanism could influence debt inflow, and 41% moderately agreed that having a carbon risk management policy is beneficial. This signals that practitioners are divided regarding their role in lowering infrastructure debt costs by addressing carbon risks and other sustainability risks.

Table 5-9: Macroeconomic risks in the Kenyan infrastructure context

Sector	Renewable energy							Transportation							Full Sample									
Agreement level	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7			
Financial market development																								
Global interest rate fluctuations	306	4	1	3	11	29	124	134	291	0	2	5	16	54	119	95	597	4	3	8	27	83	243	229
Global exchange rate fluctuations	306	3	3	2	12	23	130	133	291	0	3	4	19	46	126	93	597	3	6	6	31	69	256	226
Limited financial market development	306	28	14	5	22	47	121	69	291	17	12	11	16	59	87	89	597	45	26	16	38	106	208	158
Under-developed capital market	306	29	13	8	16	41	120	79	291	17	8	4	12	63	98	89	597	46	21	12	28	104	218	168
Transparent reporting	306	3	4	7	13	33	125	121	291	1	1	5	6	43	113	122	597	4	5	12	19	76	238	243
Local currency exchange rate	306	0	0	0	2	25	125	154	291	0	1	1	5	47	103	134	597	0	1	1	7	72	228	288
USD interest rate changes	306	2	1	0	6	25	115	157	291	0	0	1	6	57	72	155	597	2	1	1	12	82	187	312
Commodity price changes	306	2	5	3	12	49	95	140	291	3	1	3	5	59	88	132	597	5	6	6	17	108	183	272
Public debt management																								
Inflation	306	0	0	1	3	19	134	149	291	0	1	2	3	43	117	125	597	0	1	3	6	62	251	274
A sufficient public debt management policy	306	43	39	38	42	39	70	35	291	55	26	14	18	29	115	34	597	98	65	52	60	68	185	69
Effective macroeconomic risk mitigation	306	36	30	62	55	50	59	14	291	58	29	32	30	46	83	13	597	94	59	94	85	96	142	27
National indebtedness limiting debt access	306	14	12	13	48	87	94	38	291	6	8	10	22	56	111	78	597	20	20	23	70	143	205	116
Sound public debt management practices	306	13	8	11	64	83	90	37	291	31	8	9	36	54	114	39	597	44	16	20	100	137	204	76
Long-term debt	306	1	5	0	7	19	106	168	291	0	0	1	4	35	95	156	597	1	5	1	11	54	201	324
Short-term debt	306	4	4	6	5	23	118	146	291	1	2	1	2	48	118	119	597	5	6	7	7	71	236	265
Economic growth	306	0	1	0	9	44	103	149	291	0	0	1	8	71	95	116	597	0	1	1	17	115	198	265
National debt management tools	306	3	2	5	16	23	111	146	291	4	1	6	2	48	96	134	597	7	3	11	18	71	207	280
Non-politics-led project failure	306	167	76	18	2	4	27	12	291	157	71	33	5	3	14	8	597	324	147	51	7	7	41	20
Economic stability and sustainability	306	144	72	36	11	15	19	9	291	147	48	17	11	25	38	5	597	291	120	53	22	40	57	14
Collaborative debt management	306	96	51	56	21	29	34	19	291	100	29	37	7	34	67	17	597	196	80	93	28	63	101	36
Corruption	306	5	4	4	14	66	97	116	291	6	3	11	3	43	85	140	597	11	7	15	17	109	182	256
Carbon risk																								
Carbon risk perception by the lender	306	10	9	21	61	72	68	65	291	3	6	8	75	84	68	47	597	13	15	29	136	156	136	112
Carbon risk perception by the public	306	17	22	23	49	84	76	35	291	13	18	16	50	90	75	29	597	30	40	39	99	174	151	64
Carbon adaptability mechanisms affect debt costs	306	6	9	19	45	77	87	63	291	4	14	31	22	63	103	54	597	10	23	50	67	140	190	117
Carbon credit prices affect debt costs	306	8	12	14	47	85	86	54	291	3	5	23	67	93	58	42	597	11	17	37	114	178	144	96
Clean development mechanism registration affects debt costs	306	4	11	3	53	58	83	94	291	1	1	8	30	86	87	78	597	5	12	11	83	144	170	172
Carbon risk perception by citizens	306	11	27	25	43	84	73	43	291	8	20	18	30	87	91	37	597	19	47	43	73	171	164	80
Carbon adaptability mechanisms affect debt inflow	306	5	7	16	29	85	89	75	291	1	4	12	21	100	77	76	597	6	11	28	50	185	166	151
Carbon credit prices affect debt inflow	306	5	8	10	32	109	90	52	291	3	7	24	41	85	82	49	597	8	15	34	73	194	172	101
Clean development mechanism registration shapes debt inflow	306	1	3	5	36	58	91	112	291	2	2	12	53	58	66	98	597	3	5	17	89	116	157	210
Carbon risk-based lender exits	306	63	60	38	29	36	35	45	291	87	41	30	18	25	61	29	597	150	101	68	47	61	96	74
Investment in carbon risk research and development	306	14	3	16	60	72	96	45	291	26	4	33	27	64	94	43	597	40	7	49	87	136	190	88
Aligning carbon policies with national sustainability policies	306	12	9	3	56	84	84	58	291	23	6	24	18	88	86	46	597	35	15	27	74	172	170	104
Carbon risk management policy	306	14	4	5	16	44	131	92	291	6	6	9	35	49	113	73	597	20	10	14	51	93	244	165

Source: Author (2023)

5.2.2.5. The cultural dimension of the Kenyan infrastructure development context

5.2.2.5.1. Ambiguity intolerance

The tolerance of ambiguity scale was adapted from Budner (1962). Table 5-10 shows that approximately 19% of respondents strongly agreed, 22% somewhat agreed, 16% remained neutral, and 18% disagreed to having the ability to confront ambiguity to varying degrees. The distribution is balanced regarding liking or disliking ambiguity, with 20% strongly disagreeing and 16% strongly agreeing. Around 19% strongly agreed with a preference for ambiguity, contrasting with 17% somewhat agreeing and 12% holding a neutral stance. Moreover, 22% strongly agreed they avoid ambiguity, while 18% somewhat agreed. While 28% strongly agreed that they are intolerant of ambiguity, only 6% strongly disagreed. The participants displayed preferences for familiarity and novelty, with 22% and 34% strongly agreeing. The findings suggest that participants find uncertain outcomes and multiperspective problems challenging, with 23% and 32% strongly agreeing. An inclination towards problem-solving and enjoyment of tackling ambiguous problems is evident, with 34% strongly agreeing with the latter statement. The mixed responses indicate a balanced ambiguity intolerance perspective, which could be advantageous in utilising traditional and innovative infrastructure management tools. The analysis of ambiguity intolerance can elaborate on how the slow adoption of innovative financial tools emerges, as seen in the low uptake of the innovative carbon finance instruments (Baimwera *et al.*, 2017), despite managers moderately agreeing (41%) that a carbon risk management policy is beneficial.

5.2.2.5.2. Power distance

Power distance perception is a significant cultural dimension in Hofstede's framework, reflecting how individuals in a society accept and expect unequal power distribution within institutions and organisations (Hofstede, 2013). As shown in Table 5-10, the overwhelmingly high agreement with the statement about the existence of "unequally distributed power" (9% slightly agreed, 38% moderately agreed, and 51% strongly agreed) indicates that a substantial majority of managers (98%) hold the perception that power is distributed unequally within their infrastructure projects. This could imply a hierarchical structure where decision-making authority is concentrated at the top, reflecting highly centralised institutional arrangements (Colenbrander *et al.*, 2015). The implication for management is that it is important to ensure effective communication channels to bridge the gap between higher-ups and the workforce and to promote transparency in decision-making processes. The high agreement with the statement "teaches practitioners how to manage risks" (11% slightly agreed, 37% moderately agreed, 49% strongly agreed) implies that most managers (97%) recognise the tension between experts and novice practitioners in managing risks. This aligns with a higher power distance perception, as centralised control often emphasises top-down risk

management strategies. Colenbrander *et al.* (2015) found that a lack of accountability led to low-impact research and that communication can be impaired due to poor physical infrastructure, e.g. internet access.

Ombagi *et al.* (2023) recommend focusing on training programmes that leverage individual managerial characteristics, making the understanding of power distance useful to understanding managerial socio-cognitive learning risks when addressing higher-ranking individuals in order to equip practitioners with the tools to manage power distance-mediated herding and information cascade risk effectively within the established power dynamics. Managers' agreement with the need to create individual risk control initiatives (11% slightly agreed, 38% moderately agreed, and 46% strongly agreed) corroborates their desire for empowerment at lower levels. This could imply that while centralised control is perceived, the majority of managers (95%) recognise the value of allowing individual vs collective knowledge integration to enhance ownership of managing risks at their respective levels. The decline in agreement with the statement "Accept and follow lender rules" from "strongly agree" to "moderately agree" (17% slightly agreed, 36% moderately agreed, 20% strongly agreed) demonstrates that while most managers (73%) may accept and follow lender rules, there is less enthusiasm among them. This could be due to the recognition of external authority imposing rules, which might contrast with a higher power distance perception. Some studies have linked debt-trap diplomacy claims to social influence, framing Chinese infrastructure investment as unviable in influencing public policy. Management should balance international loan compliance requirements with local autonomy to maintain employee engagement and motivation. Understanding power distance dynamics can enable the current study to propose socio-cognitive learning tools that can support managers to bridge power dynamics and encourage decentralised hybrid management practices while ensuring alignment with overarching organisational strategies.

The decline in agreement with the statement "replace existing decision-makers" (17% slightly agreed, 31% moderately agreed, 18% strongly agreed) indicates a reluctance of managers (66%) to replace existing decision-makers, even with a high power distance perception. This suggests a degree of attachment to current leadership structures that resonate with seeking stability over adaptability or familiarity over novelty preference. Management can capitalise on this sentiment by fostering leadership development and succession planning to balance stability vs adaptability as key agile, hybrid, or adaptive project management approaches without disrupting continuity. Considering the collective responses, Kenyan infrastructure project managers' overall power distance perception score falls on the higher end of the spectrum. A notable acceptance of unequal power distribution corroborates the separation of powers while decentralising national decision-making authority per the Constitution of Kenya 2010. However, implied central decision-making hinders effective coordination across government levels and capacity building, undermining informed decision-making and information aggregation efforts.

5.2.2.5.3. Individualism vs collectivism

Individualism vs collectivism in Hofstede's framework (2013) represents the degree to which individuals prioritise their own interests over group interests. Table 5-10 depicts a relatively high agreement with limited cross-sectoral collaboration (33% moderately agreed, 18% strongly agreed), suggesting that managers perceive a lack of extensive collaboration across sectors in infrastructure development projects (Pueyo *et al.*, 2016). This signals a trend towards individualism, where sub-sectors prioritise their own interests over collaborative learning, which could explain Kenya's deficit in transmission networking infrastructure relative to generation capacity (Pueyo, 2018) and Kenya's delay in electrifying the SGR infrastructure (Githaiga & Bing, 2019) to minimise reliance on expensive imported diesel (fossil fuels); this is despite power supply being over 92% from renewable energy, led by the significant investment in geothermal and wind power plants. Management should emphasise the benefits of cross-sectoral collaboration, as there is a gap in collaborative learning tools fostering cross-sectoral communication and knowledge sharing. This sector-specific loyalty is affirmed in the significant agreement with strictly following sub-sector rules (39% moderately agreed, 18% strongly agreed), indicating a tendency towards adhering to rules set by specific sub-sectors. It reflects individualistic tendencies, as different sectors can prioritise contradictory rules and practices and signal social practices that could elicit homogenous vs heterogeneous knowledge integration tensions. Management should aim to strike a balance between sub-sector autonomy and national guidelines to ensure consistent infrastructure project outcomes.

The agreement with the statement "rules compliance and age determine outstanding practitioners" (33% moderately agreed, 15% strongly agreed) suggests that managers may believe that rules compliance and seniority determine outstanding practitioners, reinforcing herding by conforming to rules and opinions from those perceived to be outstanding infrastructure project practitioners. This perception aligns with collectivist cultural values and norms, where age and adherence to established norms are considered important. Regardless of age or strict rule compliance, managers must recognise and reward outstanding performance based on individual contributions, skills, and merits. The strong agreement that it is immoral for the government not to guarantee payment (43% moderately agreed, 22% strongly agreed) reflects a collective perspective on infrastructure risk management. It suggests that managers prioritise collective responsibility, where the government is expected to ensure financial security by providing a sound policy and regulatory environment (Klein, 1997). However, managers must acknowledge that this expectation is collaborative and communicate transparently about the risk to sustain trust and collective commitment. Considering the collective responses, Kenyan infrastructure managers' individualism vs collectivism perception leans toward collectivism, implying significant in-group interests and shared responsibility.

5.2.2.5.4. Masculinity vs femininity

Masculinity vs femininity in Hofstede's cultural dimension framework reflects the degree to which a society values traditionally masculine traits (such as assertiveness and competition) versus feminine traits (such as collaboration and empathy) (Hofstede, 2013). As per Table 5-10, the relatively high agreement with empathy for failure and envy for success (33% moderately agreed, 26% strongly agreed) suggests a significant emphasis on feminine values such as empathy and collaboration. It is a collective approach where managers value support for colleagues in times of failure and may exhibit more understanding. Management should encourage and reward such empathetic behaviour as it fosters a supportive work environment. The strong agreement with being motivated by a relaxed and friendly environment (40% moderately agreed, 37% strongly agreed) indicates a preference for feminine values of collaboration and supportive relationships. This suggests managers are likely to work more effectively in an environment that encourages teamwork and interpersonal connections. Hence, to harness this motivation, management should prioritise creating a positive and inclusive workplace culture. The agreement with consensus decision-making (37% moderately agreed, 34% strongly agreed) reflects feminine values of collaboration and inclusivity and suggests a preference for involving multiple stakeholders in decision-making. Management should facilitate open communication channels and seek input from various team members to ensure collective decision-making participation. The strong agreement that benefits realisation should be equitable for men and women (37% moderately agreed, 48% strongly agreed) aligns with feminine values emphasising fairness and equality. This suggests a commitment to gender equality in the workplace that contradicts the observed low female representation and gender discrimination in land acquisition processes. There could be tension between formal and informal rules, suggesting management should ensure equal opportunities, rewards, and recognition for both genders to maintain a balanced and inclusive work environment. The high agreement with the importance of lenders' support during a financial crisis (42% moderately agreed, 40% strongly agreed) reflects a combination of feminine and masculine values, indicating the importance of external support in times of crisis. It suggests a pragmatic approach, valuing both collaboration and assertiveness. Management should foster strong relationships with lenders to ensure stability during challenging times. Kenyan infrastructure managers' masculinity vs femininity perception leans more towards femininity. It implies prioritising collaboration, empathy, and gender equality.

5.2.2.5.5. Uncertainty avoidance

Uncertainty avoidance in Hofstede's cultural framework measures how much a society tolerates ambiguity and uncertainty (Hofstede, 2013). Table 5-10 displays a significant agreement with the importance of being organised and avoiding ambiguity (35% moderately agreed, 48% strongly agreed), suggesting a strong preference for certainty or structure. This indicates a high level of uncertainty avoidance, emphasising the

need for clear guidelines and well-defined processes. Managers value structured frameworks and communication channels like policy guidelines (Eberhard *et al.*, 2017). The substantial agreement that high competence and expert leadership should be rewarded (40% moderately agreed, 47% strongly agreed) reflects a desire for clear hierarchies and recognition of expertise. It supports high uncertainty avoidance, emphasising the need for clearly defined roles and responsibilities to ensure transparent mechanisms for recognising and rewarding competence and leadership skills. The agreement with benefits sharing between lenders and borrowers (36% moderately agreed, 36% strongly agreed) indicates a balanced perspective on risk distribution and fairness. While it suggests some uncertainty avoidance, it signals a pragmatic approach to managing shared outcomes and valuing open communication between stakeholders to ensure equitable benefit distribution. The moderate agreement voicing that infrastructure failure is wrong (17% moderately agreed, 9% strongly agreed) implies a desire to avoid negative exposure and protect reputation, reflecting some uncertainty avoidance and a preference for maintaining a positive image. Managers may value an environment where identifying and addressing failures is seen as a constructive step towards improvement rather than a penalty. The agreement regarding project management rules and customs (40% moderately agreed, 34% strongly agreed) indicates a preference for established norms and guidelines. It suggests a degree of uncertainty avoidance, emphasising the importance of adhering to proven practices, training, and clear communication to ensure compliance with rules. Considering the collective responses, the overall uncertainty avoidance perception score for Kenyan infrastructure managers leans more towards a higher level of uncertainty avoidance. It reflects a system that values structure, expertise, and established practices.

5.2.2.5.6. Long-term vs short-term orientation

A long-term vs short-term orientation reflects the balance between prioritising immediate results and sustainable planning (Hofstede, 2013). According to Table 5-10, a significant agreement with the capacity to manage risks (40% moderately agreed, 31% strongly agreed) suggests a focus on long-term sustainability and planning. It implies a preference for comprehensive risk assessment and mitigation strategies, where managers prioritise building robust risk management frameworks that consider short-term challenges and long-term sustainability. The agreement with the ability to identify evolving risks (39% moderately agreed, 24% strongly agreed) indicates a recognition of the importance of adaptability and foresight. It reflects a balanced managerial orientation between short-term actions and long-term implications that could resonate with continuously monitoring emerging risks and implementing agile strategies. The substantial agreement that managers should be able to question board decisions (36% moderately agreed, 59% strongly agreed) highlights an orientation towards open communication and accountability in evaluating long-term decisions. It suggests a preference for a balanced approach where short-term decisions align with long-term strategic goals, fostering a culture that encourages constructive questioning and respectful dialogue.

Moreover, the agreement that boards influence management behaviour (45% moderately agreed, 38% strongly agreed) affirms the two-way communication perspective between the guidance of boards and the autonomy of management in supporting those responsible for decision-making. It suggests an orientation that values short-term execution and long-term strategic alignment with clear communication and collaboration between boards and management teams. This could explain how they confront the Vision 2030 politics of aspiration in infrastructure development projects (Müller-Mahn *et al.*, 2021). Besides, the moderate agreement that macroeconomic risk contributes to project failure (26% moderately agreed, 22% strongly agreed) underscores a recognition of the impact of external factors on long-term project outcomes as an interplay of short-term success and long-term sustainability risks. It calls for the consideration of diversified risk mitigation tools that address short-term vulnerabilities and long-term debt stability risks. Hence, considering the collective responses, infrastructure managers' overall long-term vs short-term orientation perception score leans toward a balanced orientation, emphasising shared governance and management responsibility for both short-term actions and long-term sovereign debt sustainability risks.

5.2.2.5.7. Indulgence vs restraint

The indulgence vs restraint orientation in Hofstede's cultural framework explores the balance between instant gratification and self-control (Hofstede, 2001). Table 5-10 indicates a moderate agreement with the preference for long-term vs short-term gratification (25% moderately agreed, 30% strongly agreed), reflecting a balanced approach between immediate indulgence and future restraint. This suggests that managers value both short-term rewards and long-term planning. They can blend short-term and long-term goal-setting to enhance motivation and strategic alignment. Furthermore, the agreement that time perception is important in decision-making (26% moderately agreed, 23% strongly agreed) reinforces the importance of temporal choices and a preference for weighing short-term advantages vs long-term consequences to promote decision-making frameworks accounting for immediate infrastructure development gains while aligning with long-term Vision 2030 objectives. The agreement with general time-oriented optimism in life (27% moderately agreed, 25% strongly agreed) suggests an overall positive outlook mirroring the attitude towards short-term and long-term outcomes. It reflects a balanced orientation between indulgence and restraint, considering present enjoyment alongside future planning, which can foster a culture that combines proactive optimism with a commitment to strategic foresight. The collective responses from Kenyan infrastructure managers' overall indulgence vs restraint orientation perception score lean toward a balanced orientation. It implies that managers value a blend of immediate gratification and self-control. These findings guide the study to explain why corruption and other moral hazards persist (Otele *et al.*, 2022).

Table 5-10: Sociocultural dimensions of the Kenyan infrastructure context

Sector	Renewable energy							Transportation							Full Sample									
Agreement levels	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7			
Ambiguity tolerance																								
Tolerant of ambiguity	306	47	56	29	21	27	69	57	291	64	39	33	24	35	62	34	597	111	95	62	45	62	131	91
Dislikes ambiguity	306	65	48	17	34	20	65	57	291	26	71	22	41	35	58	38	597	91	119	39	75	55	123	95
Ambiguity preference	306	35	45	63	47	44	45	27	291	39	44	43	55	67	41	2	597	74	89	106	102	111	86	29
Avoids ambiguity	306	65	47	36	16	47	58	37	291	68	43	42	17	49	51	21	597	133	90	78	33	96	109	58
Ambiguity intolerant	306	17	25	32	35	50	82	65	291	16	25	33	21	51	88	57	597	33	50	65	56	101	170	122
Familiarity preference	306	35	14	42	45	71	56	43	291	53	37	36	45	58	41	21	597	88	51	78	90	129	97	64
Novelty Preference	306	38	62	45	28	18	56	59	291	23	54	42	52	22	54	44	597	61	116	87	80	40	110	103
Finds uncertain outcomes difficult	306	71	71	27	21	20	67	29	291	59	68	40	20	34	45	25	597	130	139	67	41	54	112	54
Multiperspective problem avoidance	306	95	61	33	14	24	59	20	291	95	52	29	17	34	54	10	597	190	113	62	31	58	113	30
Non-clear solution avoidance	306	56	55	36	13	19	87	40	291	59	43	36	15	27	78	33	597	115	98	72	28	46	165	73
Finding multiperspective problems threatening	306	55	55	42	29	34	62	29	291	65	55	56	45	34	26	10	597	120	110	98	74	68	88	39
Complexity avoidance	306	93	50	38	17	16	70	22	291	79	65	37	8	32	58	12	597	172	115	75	25	48	128	34
Enjoys ambiguity	306	14	25	44	26	51	89	57	291	17	23	26	16	67	112	30	597	31	48	70	42	118	201	87
Power distance																								
Unequally distributed power	306	1	0	0	3	30	125	147	291	3	2	1	3	26	100	156	597	4	2	1	6	56	225	303
Teach practitioners how to manage risks	306	1	1	1	1	25	113	164	291	0	5	6	9	38	106	127	597	1	6	7	10	63	219	291
Create individual risk control initiatives	306	0	8	4	3	39	119	133	291	1	8	2	3	27	110	140	597	1	16	6	6	66	229	273
Accept and follow lender rules	306	22	16	27	15	50	99	77	291	44	14	16	9	51	115	42	597	66	30	43	24	101	214	119
Replace existing decision-makers	306	20	27	20	25	54	89	71	291	51	23	19	18	48	96	36	597	71	50	39	43	102	185	107
Individualism vs collectivism																								
Limited cross-sectoral collaboration	306	8	9	16	41	53	115	64	291	8	15	24	57	58	84	45	597	16	24	40	98	111	199	109
Strictly follow subsector rules	306	7	5	10	38	68	112	66	291	24	1	12	31	58	122	43	597	31	6	22	69	126	234	109
Rules compliance and age determine outstanding practitioners	306	19	19	13	47	65	91	52	291	41	16	16	26	48	105	39	597	60	35	29	73	113	196	91
Immoral for the government not to guarantee payment	306	23	6	2	19	73	118	65	291	27	9	5	16	30	137	67	597	50	15	7	35	103	255	132
Masculinity vs femininity																								
Empathy for failure and envy for success	306	21	22	30	16	42	91	84	291	14	10	33	25	34	104	71	597	35	32	63	41	76	195	155
Motivated by a relaxed and friendly environment	306	4	4	4	16	43	133	102	291	1	0	13	8	45	108	116	597	5	4	17	24	88	241	218
Consensus decision-making	306	11	4	5	5	45	110	126	291	44	0	7	15	39	112	74	597	55	4	12	20	84	222	200
Benefits realisation for men and women	306	1	0	1	2	38	118	146	291	4	1	2	3	40	102	139	597	5	1	3	5	78	220	285
Importance of lenders' support during a financial crisis	306	4	8	3	15	41	141	94	291	1	4	7	3	23	111	142	597	5	12	10	18	64	252	236
Uncertainty avoidance																								
Importance of being organised and avoiding ambiguity	306	0	3	11	6	38	114	134	291	0	4	4	8	27	94	154	597	0	7	15	14	65	208	288
The reward for high competence and expert leadership	306	4	1	0	2	37	134	128	291	1	1	4	3	28	102	152	597	5	2	4	5	65	236	280
Benefits sharing between lenders and borrowers	306	1	5	11	6	42	118	123	291	1	5	21	25	50	98	91	597	2	10	32	31	92	216	214
Voicing infrastructure failures publicly is wrong	306	110	77	29	13	19	32	26	291	64	44	41	16	29	68	29	597	174	121	70	29	48	100	55
Respect for project management rules and customs	306	11	2	12	28	55	116	82	291	9	1	2	8	29	120	122	597	20	3	14	36	84	236	204
Long-term vs short-term orientation																								
Capacity to manage risks	306	4	12	11	7	49	123	100	291	3	8	9	27	41	115	88	597	7	20	20	34	90	238	188
Ability to identify evolving risk	306	6	9	11	21	46	127	86	291	28	16	18	19	50	105	55	597	34	25	29	40	96	232	141
Ability to question board decisions	306	1	0	0	3	9	102	191	291	0	1	4	3	11	113	159	597	1	1	4	6	20	215	350
Board influence on management behavioural	306	1	2	3	14	30	143	113	291	3	2	5	4	35	126	116	597	4	4	8	18	65	269	229
Macroeconomic risk contribution to project failure	306	14	32	50	31	37	75	67	291	39	43	23	7	35	81	63	597	53	75	73	38	72	156	130
Indulgence vs restraint																								
Preference for long-term versus short-term gratification	306	5	14	19	63	25	90	90	291	11	29	22	57	21	62	89	597	16	43	41	120	46	152	179
Time perception's importance in decision-making	306	27	17	5	77	31	77	72	291	11	28	12	66	27	81	66	597	38	45	17	143	58	158	138
General time-oriented optimism in life	306	32	7	9	80	24	82	72	291	11	21	13	64	29	78	75	597	43	28	22	144	53	160	147

Source: Author (2023)

5.2.3. Descriptive statistics

Tables 5-11 to 5-14 outline the response patterns between the renewable energy and transportation sectors, with key differences between the variance analysis and t-test results. The results display variations in renewable energy vs transportation infrastructure that could be tied to policy disparities creating context-specific debt-side governance, project management, macroeconomic risk, and cultural dimensions. An important observation is that the responses exhibit negative skewness and positive kurtosis, suggesting skewed distributions toward agreement extremes. Negative skewness implies higher concentration at upper agreement levels, while positive kurtosis indicates extreme values. Combined, they impact the data analysis selection methods as follows:

- (i) The mean agreement might not be representative due to skewness and kurtosis; alternatives like median or mode are vital.
- (ii) Limited variability due to combined skewness and kurtosis suggests herding behaviour and information cascades, affecting statistical analysis method selection.
- (iii) Positive kurtosis signals outliers impacting analysis; assessing their authenticity is crucial.
- (iv) The study used statistical method triangulation and non-parametric tests to address the three previous concerns – (i), (ii) and (iii). Furthermore, it articulates shared norms and values as antecedents of herding. Hence, the convergence in opinions should be interpreted as a potential socio-cognitive learning dimension within managerial groups that share cultural norms and values as influencing the clustering of responses around the mean to arrive at common knowledge as a socio-cognitive learning phenomenon among Kenyan infrastructure project managers.

Table 5-11: Descriptive statistics of debt-side governance variables

	Sector	Renewable energy							Transportation						
		N	Mean	SD	Variance	Skewness	Kurtosis	t-values	N	Mean	SD	Variance	Skewness	Kurtosis	t-values
1	Interest rate														
	Inflation	306	6.09	1.28	1.64	-1.97	6.66	83.15	291	6.20	1.09	1.20	-2.24	9.23	96.44
	Public debt management policy	306	6.27	1.03	1.06	-2.53	11.77	106.38	291	6.21	0.93	0.87	-1.89	8.90	113.22
	The inability of politics to affect projects	306	6.38	0.91	0.82	-2.42	11.11	123.25	291	6.28	1.00	1.00	-2.17	9.61	106.68
	The ability of politics to affect projects	306	6.37	0.85	0.72	-1.98	9.97	131.40	291	6.33	0.81	0.66	-1.59	6.91	132.29
	Corruption	306	6.05	1.08	1.16	-1.55	6.12	98.26	291	6.06	0.96	0.93	-1.41	6.69	106.86
	Economic stability	306	5.82	1.51	2.29	-1.55	4.67	67.25	291	5.95	1.34	1.80	-1.66	5.52	75.39
	Sound debt management	306	6.12	1.02	1.04	-1.85	8.14	105.04	291	5.92	1.00	1.01	-1.30	6.01	100.45
	USD interest rate changes	306	5.80	1.29	1.66	-1.27	4.20	78.81	291	5.32	1.23	1.50	-0.74	3.33	73.86
	Exchange rate	306	5.77	1.29	1.65	-1.22	4.34	78.54	291	5.29	1.24	1.53	-0.76	3.70	72.72
	Long-term debt	306	6.05	1.16	1.34	-2.17	8.74	91.41	291	5.95	1.20	1.44	-2.03	8.04	84.49
	Short-term debt	306	2.08	1.86	3.45	1.79	4.90	19.53	291	1.98	1.56	2.42	1.95	6.02	21.70
	Commodity price changes	306	5.83	1.55	2.39	-1.56	4.75	65.89	291	6.08	1.41	1.99	-1.97	6.41	73.26
	Economic growth	306	5.92	1.28	1.63	-1.63	5.92	80.99	291	5.97	1.25	1.57	-1.62	5.49	80.99
	Green Bonds Program Kenya	306	2.29	1.69	2.86	1.36	3.74	23.71	291	2.51	1.91	3.64	0.99	2.40	22.46
	Green Economic Strategy Implementation Plan	306	3.44	1.96	3.83	0.17	1.61	30.80	291	3.30	2.09	4.36	0.28	1.49	27.00
2	Investment														
	Ticket size affects the interest rate	306	5.84	1.40	1.95	-1.74	5.95	73.13	291	6.09	1.07	1.14	-1.68	7.00	97.10
	Ticket size affects debt inflow	306	5.99	1.27	1.62	-1.93	7.16	82.42	291	6.33	0.85	0.72	-2.36	13.27	126.98
	Debt to equity ratio														
	Debt-to-equity-ratio-based interest rate	306	5.76	1.42	2.01	-1.66	5.49	71.10	291	6.17	0.86	0.75	-1.32	6.15	121.55
	Debt-to-equity-ratio-based debt flow	306	5.86	1.29	1.67	-1.79	6.61	79.40	291	6.19	0.88	0.77	-1.56	8.05	119.78
	Debt-to-equity-ratio-based risk views	306	4.82	1.92	3.70	-0.47	1.94	43.87	291	6.08	1.14	1.29	-2.24	9.66	90.91
3	Maturity														
	Maturity influences interest rate	306	6.09	1.25	1.56	-1.84	6.38	85.22	291	6.11	1.09	1.20	-1.58	5.73	95.76
	Maturity influences debt inflow	306	5.78	1.42	2.01	-1.70	6.09	71.37	291	6.08	1.10	1.20	-1.90	8.44	94.94
4	Bankruptcy														
	Stalled project due to risk	306	6.36	0.85	0.72	-2.11	11.05	130.85	291	6.32	0.86	0.74	-1.90	8.94	124.74
	Stalled project due to covenant non-compliance	306	5.39	1.33	1.78	-0.82	3.37	70.67	291	5.29	1.56	2.45	-1.15	3.78	57.53
	Stalled project due to budget overrun	306	5.11	1.42	2.02	-0.77	3.26	62.80	291	5.74	1.24	1.55	-1.57	6.27	78.47
5	Compliance with debt covenants														
	Covenant compliance	306	4.80	2.01	4.06	-0.71	2.20	41.70	291	4.52	2.21	4.86	-0.65	1.78	35.11
	Covenant litigation	306	3.44	2.05	4.20	0.32	1.75	29.32	291	3.93	1.95	3.79	-0.14	1.77	34.45
	Payment renegotiation	306	5.96	1.06	1.12	-1.70	7.63	98.44	291	6.05	1.03	1.06	-1.83	8.29	104.71
	Carbon disclosure across the value chain	306	4.23	1.61	2.59	-0.26	2.50	46.04	291	4.52	1.40	1.97	-0.47	2.74	54.76
	Carbon emission reduction	306	5.68	1.33	1.77	-1.01	3.89	74.83	291	5.26	1.44	2.08	-0.85	3.17	62.20
	Staff pollution exposure penalty	306	2.81	1.59	2.51	0.92	3.40	31.05	291	3.12	1.89	3.58	0.59	2.26	28.06
	Politics-mediated schedule delay	306	5.11	2.01	4.02	-0.79	2.20	44.54	291	6.06	1.20	1.45	-1.98	7.63	85.67
6	Environmental, social governance														
	Climate change limiting debt inflow	306	5.25	1.39	1.93	-1.08	4.44	66.05	291	5.50	1.35	1.82	-0.76	3.16	69.40
	Climate change influencing interest rates	306	5.38	1.31	1.72	-1.07	4.60	71.76	291	5.40	1.26	1.59	-0.66	3.36	72.83
	Rising avoidable carbon emission	306	4.60	1.84	3.38	-0.60	2.51	43.74	291	4.86	1.54	2.36	-0.59	2.62	53.87
	Green Bonds Program Kenya	306	5.86	1.19	1.43	-1.41	5.65	85.83	291	5.53	1.26	1.58	-0.93	3.60	74.86
	Green Economic Strategy Implementation Plan	306	5.82	1.20	1.44	-1.25	4.65	84.74	291	5.51	1.22	1.49	-0.62	2.79	76.84
	Community action due to pollution	306	3.07	1.76	3.08	0.59	2.40	30.60	291	3.62	2.00	4.00	0.08	1.73	30.86
	Customer pollution exposure penalty	306	2.78	1.67	2.80	0.79	2.97	29.11	291	3.40	1.91	3.63	0.33	2.00	30.35

Source: Author (2023)

Table 5-12: Descriptive statistics of project management opinions

	Sector	Renewable energy							Transportation						
	Descriptive statistics	N	Mean	SD	Variance	Skewness	Kurtosis	t-values	N	Mean	SD	Variance	Skewness	Kurtosis	t-values
1	Lifecycle integration														
	Cross-border development debt and talent demand	306	5.53	1.47	2.15	-1.27	4.19	65.98	291	5.54	1.62	2.62	-1.31	3.95	58.15
	Cross-border construction debt and talent demand	306	5.70	1.44	2.07	-1.24	4.16	69.41	291	6.18	1.16	1.35	-2.06	8.41	90.51
	Cross-border operational debt and talent demand	306	5.19	1.52	2.31	-1.02	3.50	59.79	291	5.44	1.27	1.61	-1.11	4.42	73.01
	Cross-border maintenance debt and talent demand	306	4.91	1.72	2.96	-0.76	2.66	49.95	291	4.66	1.65	2.71	-0.68	2.56	48.10
	Cross-border termination debt and talent demand	306	4.72	1.67	2.79	-0.66	2.68	49.50	291	4.71	1.70	2.90	-0.58	2.38	47.01
2	Scope														
	Expansion or upgrade-oriented interest rate	306	5.95	1.21	1.46	-1.55	5.50	86.20	291	6.04	1.11	1.23	-1.88	7.95	92.69
	Expansion or upgrade-oriented debt inflow	306	5.98	1.38	1.91	-2.09	7.71	75.84	291	6.29	0.96	0.92	-2.08	9.80	111.69
	Management default litigation	306	3.69	2.20	4.86	0.13	1.44	29.28	291	4.06	1.93	3.74	-0.21	1.77	35.69
3	Schedule management														
	Schedule delay due to limited capital	306	5.20	1.74	3.04	-0.96	3.03	52.16	291	5.82	1.41	1.99	-1.76	5.87	70.13
	Schedule delay due to management	306	4.70	2.02	4.09	-0.65	2.08	40.70	291	4.77	2.01	4.05	-0.69	2.14	40.33
	Schedule delay due to counterpart failures	306	4.84	2.04	4.18	-0.73	2.17	41.40	291	4.78	2.09	4.36	-0.75	2.14	38.94
4	Cost management														
	Profitability influences interest rate	306	5.72	1.63	2.65	-1.70	5.06	61.47	291	5.50	1.41	1.98	-1.17	4.36	66.47
	Profitability influences debt inflow	306	5.83	1.49	2.21	-1.77	5.96	68.62	291	5.66	1.33	1.76	-1.42	5.40	72.66
5	Quality														
	Low-interest rate refinancing due to project management	306	5.09	1.87	3.50	-0.86	2.63	47.54	291	4.23	2.03	4.14	-0.40	1.82	35.37
	Carbon emission influenced debt inflow	306	5.53	1.53	2.36	-1.01	3.27	63.07	291	4.99	1.65	2.73	-0.72	2.71	51.36
6	Resource management														
	Viability gap guarantees	306	5.89	1.14	1.30	-1.25	4.93	90.47	291	5.68	1.01	1.02	-0.75	3.53	95.58
	Limited cash generation	306	6.12	1.13	1.28	-2.03	8.44	94.67	291	6.01	1.05	1.11	-1.30	5.16	97.12
7	Communication														
	Information-based market access	306	4.69	1.69	2.85	-0.55	2.44	48.63	291	5.41	1.30	1.70	-1.00	4.23	71.10
	Well-documented risk management	306	4.84	1.88	3.55	-0.78	2.45	44.97	291	4.58	2.05	4.19	-0.73	2.07	38.39
	Decision-making support tools	306	5.78	1.36	1.85	-1.98	7.28	74.32	291	5.96	1.22	1.48	-2.06	8.53	83.37
8	Procurement														
	Commodity price options	306	6.01	1.08	1.17	-1.97	8.97	97.18	291	5.75	1.08	1.16	-0.82	3.40	90.70
	Fixed-price contracts	306	5.96	1.00	1.00	-1.41	6.30	104.40	291	5.57	1.11	1.23	-0.84	3.88	85.48
	Forward contracts	306	5.65	1.13	1.28	-1.10	4.63	87.32	291	5.63	1.12	1.26	-0.58	2.85	85.49
	Future contracts	306	5.45	1.32	1.75	-0.81	3.03	72.08	291	5.54	1.22	1.49	-0.91	3.79	77.18
	Performance bonds	306	5.98	1.06	1.12	-1.69	7.24	98.81	291	5.69	0.96	0.92	-0.55	3.14	100.74
	Interest rate swaps	306	6.00	0.92	0.85	-1.18	5.03	113.68	291	5.73	1.13	1.29	-0.98	4.00	86.03
9	Stakeholder														
	Utility off-take guarantee	306	6.00	1.02	1.04	-1.70	7.16	102.90	291	6.01	0.94	0.89	-1.04	4.51	112.38
	Fuel supply guarantee	306	6.06	1.04	1.07	-1.47	6.27	102.37	291	5.91	1.09	1.18	-1.35	5.34	93.18
	Currency convertibility and transferability guarantee	306	6.14	0.96	0.92	-1.88	8.74	112.23	291	6.03	1.07	1.14	-1.56	6.34	96.64
	Law and regulatory changes guarantee	306	6.14	0.94	0.88	-1.69	7.57	114.39	291	5.96	1.05	1.10	-0.86	3.27	97.52
	Debt repayment guarantee	306	6.24	0.91	0.83	-1.91	9.61	120.10	291	5.99	1.07	1.15	-1.41	5.58	96.50
	Tariff rate guarantee	306	6.20	0.92	0.84	-1.83	8.36	118.25	291	5.86	1.08	1.17	-1.62	6.63	92.83
	Revenue guarantee	306	6.19	1.03	1.05	-2.17	9.74	105.59	291	5.88	0.98	0.96	-0.90	3.76	102.71
10	Risk management														
	Insurance guarantee	306	6.05	0.98	0.96	-1.25	5.54	108.10	291	5.83	1.08	1.16	-0.78	3.18	92.42
	Multilateral or bilateral partial risk guarantees	306	6.02	0.90	0.81	-0.82	3.16	116.97	291	5.74	1.20	1.44	-1.30	5.33	81.34
	Risk transfer to a third party	306	6.16	1.02	1.03	-1.97	8.68	106.07	291	5.70	1.21	1.47	-1.29	5.05	79.95
	Risk acceptance	306	5.99	1.01	1.02	-1.46	6.64	103.56	291	5.72	1.13	1.29	-0.78	3.22	85.72
	Revenue diversification	306	5.98	1.17	1.36	-1.71	6.51	89.65	291	6.03	1.08	1.17	-1.41	5.84	95.15
	Credit risk management policy	306	5.88	1.21	1.47	-1.86	7.60	84.93	291	6.05	1.16	1.35	-1.98	8.16	88.39
	Financial risk management training	306	5.89	1.35	1.82	-2.17	8.05	76.52	291	6.01	1.21	1.45	-2.26	9.54	84.86

Source: Author (2023)

Table 5-13: Descriptive statistics of macroeconomic opinions

	Sector	Renewable energy							Transportation						
		N	Mean	SD	Variance	Skewness	Kurtosis	t-values	N	Mean	SD	Variance	Skewness	Kurtosis	t-values
1	Lifecycle integration														
	Cross-border development debt and talent demand	306	5.53	1.47	2.15	-1.27	4.19	65.98	291	5.54	1.62	2.62	-1.31	3.95	58.15
	Cross-border construction debt and talent demand	306	5.70	1.44	2.07	-1.24	4.16	69.41	291	6.18	1.16	1.35	-2.06	8.41	90.51
	Cross-border operational debt and talent demand	306	5.19	1.52	2.31	-1.02	3.50	59.79	291	5.44	1.27	1.61	-1.11	4.42	73.01
	Cross-border maintenance debt and talent demand	306	4.91	1.72	2.96	-0.76	2.66	49.95	291	4.66	1.65	2.71	-0.68	2.56	48.10
	Cross-border termination debt and talent demand	306	4.72	1.67	2.79	-0.66	2.68	49.50	291	4.71	1.70	2.90	-0.58	2.38	47.01
2	Scope														
	Expansion or upgrade-oriented interest rate	306	5.95	1.21	1.46	-1.55	5.50	86.20	291	6.04	1.11	1.23	-1.88	7.95	92.69
	Expansion or upgrade-oriented debt inflow	306	5.98	1.38	1.91	-2.09	7.71	75.84	291	6.29	0.96	0.92	-2.08	9.80	111.69
	Management default litigation	306	3.69	2.20	4.86	0.13	1.44	29.28	291	4.06	1.93	3.74	-0.21	1.77	35.69
3	Schedule management														
	Schedule delay due to limited capital	306	5.20	1.74	3.04	-0.96	3.03	52.16	291	5.82	1.41	1.99	-1.76	5.87	70.13
	Schedule delay due to management	306	4.70	2.02	4.09	-0.65	2.08	40.70	291	4.77	2.01	4.05	-0.69	2.14	40.33
	Schedule delay due to counterpart failures	306	4.84	2.04	4.18	-0.73	2.17	41.40	291	4.78	2.09	4.36	-0.75	2.14	38.94
4	Cost management														
	Profitability influences interest rate	306	5.72	1.63	2.65	-1.70	5.06	61.47	291	5.50	1.41	1.98	-1.17	4.36	66.47
	Profitability influences debt inflow	306	5.83	1.49	2.21	-1.77	5.96	68.62	291	5.66	1.33	1.76	-1.42	5.40	72.66
5	Quality														
	Low-interest rate refinancing due to project management	306	5.09	1.87	3.50	-0.86	2.63	47.54	291	4.23	2.03	4.14	-0.40	1.82	35.37
	Carbon emission influenced debt inflow	306	5.53	1.53	2.36	-1.01	3.27	63.07	291	4.99	1.65	2.73	-0.72	2.71	51.36
6	Resource management														
	Viability gap guarantees	306	5.89	1.14	1.30	-1.25	4.93	90.47	291	5.68	1.01	1.02	-0.75	3.53	95.58
	Limited cash generation	306	6.12	1.13	1.28	-2.03	8.44	94.67	291	6.01	1.05	1.11	-1.30	5.16	97.12
7	Communication														
	Information-based market access	306	4.69	1.69	2.85	-0.55	2.44	48.63	291	5.41	1.30	1.70	-1.00	4.23	71.10
	Well-documented risk management	306	4.84	1.88	3.55	-0.78	2.45	44.97	291	4.58	2.05	4.19	-0.73	2.07	38.39
	Decision-making support tools	306	5.78	1.36	1.85	-1.98	7.28	74.32	291	5.96	1.22	1.48	-2.06	8.53	83.37
8	Procurement														
	Commodity price options	306	6.01	1.08	1.17	-1.97	8.97	97.18	291	5.75	1.08	1.16	-0.82	3.40	90.70
	Fixed-price contracts	306	5.96	1.00	1.00	-1.41	6.30	104.40	291	5.57	1.11	1.23	-0.84	3.88	85.48
	Forward contracts	306	5.65	1.13	1.28	-1.10	4.63	87.32	291	5.63	1.12	1.26	-0.58	2.85	85.49
	Future contracts	306	5.45	1.32	1.75	-0.81	3.03	72.08	291	5.54	1.22	1.49	-0.91	3.79	77.18
	Performance bonds	306	5.98	1.06	1.12	-1.69	7.24	98.81	291	5.69	0.96	0.92	-0.55	3.14	100.74
	Interest rate swaps	306	6.00	0.92	0.85	-1.18	5.03	113.68	291	5.73	1.13	1.29	-0.98	4.00	86.03
9	Stakeholder														
	Utility off-take guarantee	306	6.00	1.02	1.04	-1.70	7.16	102.90	291	6.01	0.94	0.89	-1.04	4.51	112.38
	Fuel supply guarantee	306	6.06	1.04	1.07	-1.47	6.27	102.37	291	5.91	1.09	1.18	-1.35	5.34	93.18
	Currency convertibility and transferability guarantee	306	6.14	0.96	0.92	-1.88	8.74	112.23	291	6.03	1.07	1.14	-1.56	6.34	96.64
	Law and regulatory changes guarantee	306	6.14	0.94	0.88	-1.69	7.57	114.39	291	5.96	1.05	1.10	-0.86	3.27	97.52
	Debt repayment guarantee	306	6.24	0.91	0.83	-1.91	9.61	120.10	291	5.99	1.07	1.15	-1.41	5.58	96.50
	Tariff rate guarantee	306	6.20	0.92	0.84	-1.83	8.36	118.25	291	5.86	1.08	1.17	-1.62	6.63	92.83
	Revenue guarantee	306	6.19	1.03	1.05	-2.17	9.74	105.59	291	5.88	0.98	0.96	-0.90	3.76	102.71
10	Risk management														
	Insurance guarantee	306	6.05	0.98	0.96	-1.25	5.54	108.10	291	5.83	1.08	1.16	-0.78	3.18	92.42
	Multilateral or bilateral partial risk guarantees	306	6.02	0.90	0.81	-0.82	3.16	116.97	291	5.74	1.20	1.44	-1.30	5.33	81.34
	Risk transfer to a third party	306	6.16	1.02	1.03	-1.97	8.68	106.07	291	5.70	1.21	1.47	-1.29	5.05	79.95
	Risk acceptance	306	5.99	1.01	1.02	-1.46	6.64	103.56	291	5.72	1.13	1.29	-0.78	3.22	85.72
	Revenue diversification	306	5.98	1.17	1.36	-1.71	6.51	89.65	291	6.03	1.08	1.17	-1.41	5.84	95.15
	Credit risk management policy	306	5.88	1.21	1.47	-1.86	7.60	84.93	291	6.05	1.16	1.35	-1.98	8.16	88.39
	Financial risk management training	306	5.89	1.35	1.82	-2.17	8.05	76.52	291	6.01	1.21	1.45	-2.26	9.54	84.86

Source: Author (2023)

Table 5-14: Descriptive statistics of the sociocultural dimensions

	Sector	Renewable energy							Transportation						
	Descriptive statistics	N	Mean	SD	Variance	Skewness	Kurtosis	t-values	N	Mean	SD	Variance	Skewness	Kurtosis	t-values
1	Ambiguity tolerance														
	Tolerant of ambiguity	306	4.18	2.21	4.86	-0.13	1.46	33.14	290	3.87	2.15	4.64	-0.02	1.51	30.57
	Dislikes ambiguity	306	4.04	2.28	5.20	-0.08	1.43	31.01	291	4.08	1.99	3.96	-0.02	1.61	34.92
	Ambiguity preference	306	3.86	1.83	3.34	0.11	1.93	36.94	291	3.68	1.65	2.72	-0.18	1.87	37.92
	Avoids ambiguity	306	3.83	2.15	4.63	0.02	1.51	31.16	291	3.60	2.05	4.21	0.12	1.58	29.81
	Ambiguity intolerant	306	4.90	1.81	3.28	-0.64	2.31	47.38	291	4.92	1.81	3.27	-0.70	2.34	46.28
	Familiarity preference	306	4.45	1.84	3.39	-0.44	2.23	42.26	291	3.77	1.91	3.65	-0.04	1.81	33.63
	Novelty Preference	306	4.08	2.15	4.61	0.05	1.50	33.23	291	4.15	1.94	3.77	0.03	1.72	36.59
	Finds uncertain outcomes difficult	306	3.54	2.17	4.70	0.27	1.50	28.55	291	3.47	2.04	4.14	0.35	1.70	29.07
	Multiperspective problem avoidance	306	3.22	2.13	4.55	0.45	1.64	26.43	291	3.16	2.05	4.22	0.40	1.61	26.22
	Non-clear solution avoidance	306	4.00	2.21	4.88	-0.05	1.40	31.66	291	3.94	2.18	4.74	-0.06	1.45	30.96
	Finds multiperspective problems threatening	306	3.77	2.05	4.21	0.10	1.59	32.11	291	3.16	1.75	3.04	0.43	2.17	30.93
	Complexity avoidance	306	3.36	2.18	4.74	0.34	1.53	27.03	291	3.24	2.05	4.19	0.41	1.62	27.08
	Enjoys ambiguity	306	4.86	1.78	3.16	-0.59	2.21	47.89	291	4.89	1.69	2.85	-0.93	2.80	49.25
2	Power distance														
	Unequally distributed power	306	6.35	0.76	0.58	-1.70	10.08	145.62	291	6.34	0.98	0.96	-2.65	13.16	110.66
	Teach practitioners how to manage risks	306	6.41	0.79	0.63	-2.24	12.66	141.31	291	6.11	1.07	1.14	-1.64	6.13	97.25
	Create individual risk control initiatives	306	6.14	1.06	1.12	-1.93	7.74	101.54	291	6.22	1.08	1.16	-2.29	9.49	98.27
	Accept and follow lender rules	306	5.16	1.83	3.34	-0.99	2.86	49.37	291	4.79	2.01	4.05	-0.91	2.40	40.54
	Replace existing decision-makers	306	5.02	1.85	3.41	-0.83	2.54	47.50	291	4.45	2.09	4.37	-0.57	1.85	36.14
3	Individualism vs collectivism														
	Limited cross-sectoral collaboration	306	5.36	1.45	2.11	-1.08	3.81	64.52	291	4.97	1.53	2.34	-0.64	2.79	55.69
	Strictly follow subsector rules	306	5.47	1.34	1.78	-1.18	4.58	71.60	291	5.19	1.62	2.61	-1.35	4.24	54.65
	Rules compliance and age determine outstanding practitioners	306	4.96	1.69	2.86	-0.87	2.97	51.34	291	4.70	1.97	3.88	-0.80	2.32	40.61
	Immoral for the government not to guarantee payment	306	5.38	1.60	2.57	-1.54	4.89	58.66	291	5.38	1.77	3.15	-1.49	4.12	51.56
4	Masculinity vs femininity														
	Empathy for failure and envy for success	306	5.11	1.89	3.59	-0.86	2.50	47.19	291	5.24	1.71	2.91	-0.97	2.96	52.46
	Motivated by a relaxed and friendly environment	306	5.93	1.16	1.34	-1.81	7.38	89.76	291	6.04	1.07	1.15	-1.41	5.31	97.08
	Consensus decision-making	306	5.95	1.37	1.88	-2.09	7.63	75.87	291	5.19	1.99	3.95	-1.25	3.24	44.39
	Benefits realisation for men and women	306	6.31	0.80	0.64	-1.62	8.95	137.82	291	6.22	1.04	1.07	-2.32	11.12	102.93
	Importance of lenders' support during a financial crisis	306	5.88	1.21	1.46	-1.85	7.15	85.07	291	6.24	1.04	1.08	-2.19	9.01	104.36
5	Uncertainty avoidance														
	Importance of being organised and avoiding ambiguity	306	6.13	1.05	1.11	-1.61	5.85	101.82	291	6.29	1.00	1.00	-1.93	7.47	110.81
	The reward for high competence and expert leadership	306	6.21	0.95	0.91	-2.53	13.77	114.11	291	6.33	0.90	0.82	-2.08	9.69	119.23
	Benefits sharing between lenders and borrowers	306	6.04	1.14	1.29	-1.69	6.28	93.06	291	5.67	1.32	1.73	-1.00	3.38	74.34
	Voicing infrastructure failures publicly is wrong	306	2.85	2.07	4.27	0.87	2.28	24.12	291	3.76	2.15	4.62	0.07	1.48	29.86
	Respect for project management rules and customs	306	5.58	1.42	2.00	-1.43	5.11	69.02	291	6.08	1.23	1.52	-2.43	10.06	86.64
6	Long-term vs short-term orientation														
	Capacity to manage risks	306	5.79	1.35	1.82	-1.63	5.53	75.12	291	5.72	1.31	1.72	-1.34	4.69	74.49
	Ability to identify evolving risk	306	5.67	1.37	1.89	-1.48	5.07	72.20	291	5.00	1.86	3.48	-0.98	2.79	45.65
	Ability to question board decisions	306	6.56	0.68	0.46	-2.68	17.65	168.48	291	6.43	0.79	0.62	-2.16	10.07	139.11
	Board influence on management behavioural	306	6.11	0.96	0.92	-1.70	7.54	111.62	291	6.12	1.04	1.09	-2.15	9.74	99.94
	Macroeconomic risk contribution to project failure	306	4.76	1.87	3.50	-0.40	1.88	44.48	291	4.55	2.19	4.77	-0.45	1.64	35.66
7	Indulgence vs restraint														
	Preference for long-term versus short-term gratification	306	5.35	1.58	2.48	-0.76	2.68	59.38	291	5.03	1.86	3.45	-0.56	2.09	46.02
	Time perception's importance in decision-making	306	4.92	1.85	3.43	-0.72	2.57	46.48	291	4.98	1.75	3.06	-0.63	2.37	48.44
	General time-oriented optimism in life	306	4.93	1.86	3.47	-0.77	2.66	46.28	291	5.11	1.72	2.95	-0.71	2.56	50.53

Source: Author (2023)

5.2.4. Factor analysis to meet objective 1: Identify the determinants of sovereign risk, debt-side governance, project management, macroeconomic risks, and culture in large Kenyan renewable energy and transportation infrastructure projects

Principal component analysis of the factors with varimax (orthogonal) rotation was conducted to achieve objective 1. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy closer to 1 with a minimum of 0.5 suggests that the data is suitable for factor analysis, according to Cerny and Kaiser (1977). Bartlett's test checks the null hypothesis that the correlation matrix is an identity matrix (variables are unrelated). A significant p-value (close to 0) indicates the variables are correlated enough for factor analysis. The principal component matrix for total variance based on eigenvalues of 1 and above was retained and reported since they explain the largest proportion and cumulative variance. The variable correlation matrix reflects the relationship between variables and components. At least 0.30 or higher correlated items were retained as determinants of sovereign risk, debt-side governance, project management, macroeconomic risk, and culture in large Kenyan renewable energy and transportation infrastructure projects. The following sub-sections present the results for each.

5.2.4.1. Theme 1: Sovereign risk determinants in infrastructure projects

As per Table 5-15, the KMO measure of 0.755 indicates strong sampling adequacy and a significant Bartlett's test of sphericity indicates that the data is suitable for factor analysis.

Table 5-15: Factor analysis for sovereign debt interest rate determinants

CODE	Kaiser-Meyer-Olkin measure of sampling adequacy		0.755		
	Bartlett's test of sphericity	chi-square	2646.85		
		df	105		
		p-value	0.000		
	The principal component matrix for total variance	Eigenvalue	Difference	Proportion	Cumulative
	Comp1	3.3468	1.6041	0.5807	0.5807
	Comp2	1.7428	0.8509	0.3024	0.8831
	Variable correlation matrix	Comp1	Comp2		
IR1	Inflation	0.6395	-0.1707		
IR2	Public debt management policy	0.5644	-0.1410		
IR3	The inability of politics to affect projects	0.6097	-0.0583		
IR4	The ability of politics to affect projects	0.6294	0.0194		
IR5	Corruption	0.6006	0.1090		
IR6	Economic stability	0.5237	0.0634		
IR7	Sound debt management	0.3203	0.4414		
IR8	USD interest rate changes	0.2164	0.7851		
IR9	Exchange rate	0.1667	0.7705		
IR10	Long-term debt	0.4302	0.2154		
IR11	Short-term debt	-0.2329	0.1946		
IR12	Commodity price changes	0.4002	-0.1857		
IR13	Economic growth	0.4942	-0.1823		
IR14	Green Bonds Programme Kenya	-0.4424	0.1771		
IR15	Green Economic Strategy and Implementation Plan	-0.4470	0.2929		

Source: Author (2023)

Eigenvalues show that the first two factors explain 88.31% variance, which implies that the complexity of the dataset could be considerably reduced with an 11.69% loss of information. With correlations above 0.3, Hypothesis **H1** was supported, indicating that inflation, public debt management policy, the inability of politics to affect projects, the ability of politics to affect projects, corruption, economic stability, sound debt management, long-term debt, commodity price changes, and economic growth

have relatively strong positive loadings on Component 1. This component shows that economic and political stability affect sovereign risk premiums. The negative loading on the Green Bonds Programme Kenya and Green Economic Strategy and Implementation Plan implies that the presence of these policy programmes is associated with lower values of Component 1, suggesting that sustainable development programmes might contribute to decreasing the sovereign risk premium from the economic stability and political risk factors represented by Component 1. USD interest rate changes and exchange rates have strong positive loadings on Component 2. Component 2 represents international market risk factors influencing sovereign risk premiums, particularly exchange rates and interest rate changes. Sound debt management, long-term debt, economic growth, the Green Bonds Programme Kenya, and the Green Economic Strategy and Implementation Plan have strong positive loadings on Component 2. This component captures factors related to debt management strategies and economic growth contributing to sovereign risk premiums.

Overall, the factor analysis shows that managers in Kenyan infrastructure development projects corroborate the findings in international studies emphasising that sound debt management, monitoring interest rate fluctuations, exchange rate stability, and commitment to sustainable development play pivotal roles in shaping macroeconomic policies and economic development trajectories (Carmody *et al.*, 2022). Inflation, investor confidence and public debt management were emphasised, as is the role of politics on projects. Corruption and the role of economic stability in infrastructure investment decisions are emphasised, consistent with Onjala's (2018) and Ferchen and Perera's (2019) view that corrupt leaders actively participate in unsound infrastructure project selection and implementation. Sound debt management, debt structure and commodity price fluctuations stress the importance of sequencing borrowing alongside macroeconomic conditions. USD interest rate fluctuations and the implications of exchange rate dynamics on borrowing costs, fiscal budgets, and economic stability are noted. The Green Bonds and Economic Strategy's positive effects on economic stability and debt management are acknowledged. As a result, the study retained the initial variable groupings to allow the association of managerial learning complexity to knowledge groups.

5.2.4.2. Theme 2: Debt-side governance determinants in infrastructure projects

Table 5-16 reveals that the KMO measure of sampling adequacy and Bartlett's test of sphericity confirm that the data are suitable for factor analysis, and Hypothesis *H2* was supported.

Table 5-16: Factor analysis for debt-side governance determinants

	KMO Measure of Sampling Adequacy	0.76		
	Bartlett test of sphericity			
	Chi-square	4768.452		
	df	276		
	p-value	0.000		
	Cumulative variance explained		0.8365	
	Eigenvalue	4.2153	2.4245	1.6909
	Variable correlation matrix	Factor1	Factor2	Factor3
INV1	Ticket size affects the interest rate	0.6276	-0.1265	0.0441
INV2	Ticket size affects debt inflow	0.6773	-0.2801	-0.0238
DER1	Debt-to-equity-ratio-based interest rate	0.7151	-0.0758	0.0227
DER2	Debt-to-equity-ratio-based debt flow	0.6810	-0.2921	-0.1166
DER3	Debt-to-equity-ratio-based risk views	0.4014	0.0937	-0.1937
MAT1	Maturity influences interest rate	0.6148	-0.1175	-0.0127
MAT2	Maturity influences debt inflow	0.6924	-0.2146	-0.0236
BAN1	Stalled project due to risk	0.4859	-0.0167	-0.0141
BAN2	Stalled project due to covenant non-compliance	0.1706	0.0457	0.2658
BAN3	Stalled project due to budget overrun	0.4741	-0.0581	-0.0698
COV1	Covenant compliance	-0.0634	-0.3844	0.3294
COV2	Covenant litigation	0.0712	0.5431	-0.0486
COV3	Payment renegotiation	0.2901	-0.0934	0.0828
COV4	Carbon disclosure across the value chain	-0.1758	0.2898	0.1821
COV5	Carbon emission reduction	-0.1462	-0.1398	0.3400
COV6	Staff pollution exposure penalty	0.1888	0.7532	0.0750
COV7	Politics-mediated schedule delay	0.2654	0.1386	-0.2478
ESG1	Climate change limiting debt inflow	0.3329	0.3309	0.0458
ESG2	Climate change influencing interest rates	0.5176	0.1932	0.0219
ESG3	Rising avoidable carbon emission	-0.0886	0.3085	0.2683
ESG4	Green Bonds Program Kenya	0.1290	-0.1013	0.7518
ESG5	Green Economic Strategy Implementation Plan	0.1731	-0.0417	0.7568
ESG6	Community action due to pollution	0.3480	0.6752	0.1101
ESG7	Customer pollution exposure penalty	0.2704	0.5597	0.0471

Source: Author (2023)

The first three factors with eigenvalues above 1 explained 83.65% of the variance. Factor 1 seems to represent a general view of debt governance considerations. It positively correlates with variables like ticket size, debt-to-equity ratio, and maturity as the interest rate and debt inflow determinants also noted in studies like those of Pueyo *et al.* (2016) and Klagge and Nweke-Eze (2020) as determinants of concessional and commercial debt costs. Factor 2 captures environmental, social, and governance (ESG). It is negatively related to some variables like covenant compliance and carbon disclosure across the value chain, while positively related to others, including covenant litigation, staff pollution exposure penalty, and community action due to pollution, indicating that it also represents issues related to employee working conditions. Factor 3 positively relates to green infrastructure policies, covenant compliance, and carbon risk reduction as management quality challenges and their impact on infrastructure monitoring costs through risk premiums (Ngwenya & Simatele, 2020). Based on the factor loading, the three factors represent underlying dimensions in managers' perceptions of debt governance in Kenya. Consequently, the six variable groups were retained to guide the study in interpreting how decision-makers in Kenya understand the multifaceted nature of external debt governance and its implications for managerial socio-cognitive learning to foster project management success and lower sovereign risk creation in infrastructure development contexts.

5.2.4.3. Theme 3: Project management determinants in infrastructure projects

The first column in Table 5-17 contains codes to identify ten infrastructure project management concepts: lifecycle integration (INT), scope (SCO), schedule (SCH), cost (COS), quality (QUA), resource (RES), communication (COM), procurement (PRO), stakeholder (STA), and risk treatment (RTR). Hypothesis H3 was supported across most of the proposed variables.

Table 5-17: Factor analysis for project management risk determinants

	KMO Measure of Sampling Adequacy	0.837					
	Bartlett test of sphericity						
	Chi-square	11105.9860					
	df	780					
	p-value	0.0000					
	Scale reliability (Cronbach alpha)	0.8888					
	Cumulative variance explained	0.8869					
	Eigenvalues above 1	8.18555	2.80057	2.31655	2.17336	1.67766	1.18334
	Retained factor loadings with eigenvalues above 1						
	Variables correlation matrix	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
INT1	Development debt and talent	0.0791	-0.2702	0.0908	0.1618	0.5214	-0.2355
INT2	Construction debt and talent	0.0996	-0.1969	-0.0136	0.0190	0.4899	-0.1261
INT3	Operational debt and talent	-0.1569	0.1152	0.1885	0.3494	0.3027	-0.0724
INT4	Maintenance debt and talent	-0.1362	0.0440	0.1247	0.2275	0.4516	-0.2140
INT5	Termination debt and talent	0.1312	0.0160	0.1378	0.0534	0.4590	-0.2291
SCO1	Expansion or upgrade-oriented interest rate	0.2130	-0.1450	0.1075	-0.4279	0.2752	0.2741
SCO2	Expansion or upgrade-oriented debt inflow	0.2576	0.0868	0.1047	-0.5646	0.2132	0.2034
SCO3	Litigation due to management default	-0.2175	0.2097	0.1603	0.3504	0.1881	0.1163
SCH1	Schedule delay due to limited capital	-0.0030	0.0580	0.0418	0.0928	0.3397	0.2199
SCH2	Schedule delay due to management	0.1470	0.5521	0.3427	0.3996	0.0974	0.3129
SCH3	Schedule delay due to counterpart failures	0.1579	0.5682	0.4152	0.2981	0.0860	0.3294
COS1	Profitability influences interest rate	0.3664	0.1777	0.2100	-0.5184	0.1550	0.0624
COS2	Profitability influences debt inflow	0.3619	0.0890	0.3012	-0.6278	0.1456	0.0864
QUA1	Low-interest rate refinancing due to project management	0.2994	0.2705	0.4436	-0.1539	0.0065	-0.1307
QUA2	Carbon emission influenced debt inflow	0.3732	-0.0686	0.3067	-0.0864	-0.1230	0.1556
RES1	Viability gap guarantees	0.6183	-0.0089	-0.0430	0.0129	-0.0415	-0.2318
RES2	Limited cash generation	0.5726	0.0971	-0.2890	-0.0608	0.1035	-0.0628
COM1	Information-based market access	0.0797	0.0490	-0.0354	-0.2884	0.2316	-0.0672
COM2	Well-documented risk management	0.3118	0.1870	0.1233	-0.1396	-0.2001	-0.0831
COM3	Decision-making support tools	0.4746	0.3496	-0.5582	0.0322	0.1451	0.1305
PRO1	Commodity price options	0.6992	0.0641	0.1017	-0.0212	-0.0685	-0.1528
PRO2	Fixed-price contracts	0.5776	0.1394	0.2524	0.0597	0.0177	-0.2016
PRO3	Forward contracts	0.5567	0.1098	0.1339	-0.0199	-0.0842	-0.2856
PRO4	Future contracts	0.4951	0.0671	0.1590	-0.0320	0.0003	-0.2633
PRO5	Performance bonds	0.6414	0.0681	0.0192	0.0560	-0.0976	0.0222
PRO6	Interest rate swaps	0.6733	0.1204	0.0464	0.1986	-0.1073	-0.1654
STA1	Utility off-take guarantee	0.3059	-0.3811	-0.1307	0.0499	0.1111	0.2562
STA2	Fuel supply guarantee	0.2944	-0.3511	0.1289	0.2325	-0.0044	0.2568
STA3	Currency convertibility and transferability guarantee	0.5871	-0.3873	0.0043	0.1639	0.0792	0.1493
STA4	Law and regulatory changes guarantee	0.5835	-0.4554	0.0651	0.0431	-0.0133	0.1750
STA5	Debt repayment guarantee	0.4681	-0.4934	0.1620	-0.0065	-0.0039	0.0652
STA6	Tariff rate guarantee	0.5213	-0.5010	0.0749	0.2352	-0.0302	0.0668
STA7	Revenue guarantee	0.4980	-0.5001	0.0908	0.1381	-0.0074	0.0071
RTR1	Insurance guarantee	0.6744	0.0669	0.0021	-0.0175	-0.1780	-0.1140
RTR2	Multilateral or bilateral partial risk guarantees	0.6922	0.0786	-0.0585	0.1647	-0.0431	-0.0505
RTR3	Risk transfer to a third party	0.6127	0.1588	0.0498	0.1479	-0.1606	0.0667
RTR4	Risk acceptance	0.6467	0.2034	0.1209	0.1423	-0.0949	0.1266
RTR5	Revenue diversification	0.6015	0.1119	-0.4768	-0.0611	0.1152	0.0632
RTR6	Credit risk management policy	0.4933	0.1247	-0.5518	0.0752	0.1800	0.0763
RTR7	Financial risk management training	0.4367	0.3850	-0.5559	0.0090	0.1277	0.0548

Source: Author (2023)

The KMO measure of sampling adequacy and Bartlett's test of sphericity confirm that the data are suitable for factor analysis. The six factors with eigenvalues above 1 explain 88.7% variance. Factor 1 captures most project management knowledge concepts like cost, quality, resources, procurement, communication, stakeholder management, and risk treatment. It indicates they could complement each

other or compete for sovereign risk sources in infrastructure lifecycles. For instance, the highest positive correlation with Factor 1 is from viability gap guarantees (0.618), risk transfer to a third party (0.613), and revenue diversification (0.602). This shows that infrastructure projects entail risk-sharing with external parties (Klagge & Nweke-Eze, 2020).

Although Eberhard *et al.* (2017) found that the responsibilities of renewable energy project planning, procurement, contracting, and permitting power generation capacity are well-defined, various studies identified poor procurement and resource allocation practices as leading cost overrun and fiscal deficit determinants. The main reason was that key decision-makers abandoned competitive bidding guidelines in the Public Procurement and Disposal Act to protect political interests by selecting and implementing unsustainable infrastructure projects (Ferchen & Perera, 2019). The large projects involve novel technologies generating scope management complexity due to limited local resources, thereby elevating costs and risks (Ndiritu & Engola, 2020). Factor 2 reflects schedule management and collaboration with counterparties, a gap prior studies identified by citing that the government failed to complete grid expansion projects in time, leading to penalties it paid using taxpayer money (Pueyo *et al.*, 2016). Factor 3 depicts financing risks from poor management behaviour. Factor 4 reflects operational lifecycle management and its association with scope management. Based on the coded data, a negative correlation between expansion or upgrade-oriented debt (0.565) with Factor 4 and a positive correlation between operational phase debt costs (0.349) with Factor 4 indicates that effective scope management practices can have a favourable impact on managing operational debt-related costs in infrastructure lifecycles. This emphasises the importance of proper project planning, control, and adherence to defined scope boundaries to ensure financial efficiency and minimise the impact of debt on ongoing operational expenses. The negative correlations could also suggest that project profitability in the operational phase and effective scope management may reduce operational failures and litigation. Factor 5 depicted lifecycle integration, focusing on the development phase and its association with the subsequent phases like construction, maintenance, and termination, including potential schedule delays due to limited capital. Factor 6 emphasises schedule management delays and their association with counterparty collaboration. Several studies found that projects completed ahead of their planned schedule had significant budget overruns, and presidents were actively involved in the project management process, revealing top-down communication methods and inadequate stakeholder collaboration (Wang, 2022). Quality was associated with projects failing to deliver the intended benefits. For instance, contrary to its technical specifications, the SGR was not electrified, and it failed to achieve its carbon emission reduction objectives because it relied on diesel fuel in its operational phase (Githaiga & Bing, 2019). This reveals cross-sectoral collaboration failures that could be linked to lifecycle integration failures within the infrastructure portfolio that will likely generate infrastructure obsolescence in the Kenyan renewable energy sector if plants cannot operate at their optimal capacity to distribute generated power capacity to operate the SGR. Hence, various studies have argued that the SGR was a political project

without intended socioeconomic benefits (Githaiga, 2021; Jiang, 2020; Sang *et al.*, 2022; Zhu *et al.*, 2022). The six factors were retained since they reflect all the variables in project management knowledge groups to guide the evaluation of how targeted interventions can aid decision-makers in comprehending managerial socio-cognitive learning complexity within the Kenyan project management context.

5.2.4.4. Theme 4: Macroeconomic risk determinants in infrastructure projects

Table 5-18 shows that the KMO measure of sampling adequacy and Bartlett's sphericity tests support factor analysis.

Table 5-18: Factor analysis for macroeconomic risk determinants

	KMO Measure of Sampling Adequacy	0.814				
	Bartlett test of sphericity					
	Chi-square	8373.1570				
	df	561				
	p-value	0.0000				
	Cumulative variance explained	0.8817				
	Scale reliability (Cronbach's alpha)	0.8031				
	Eigenvalues above 1	5.4657	4.0347	2.0165	1.7923	1.2024
	Retained factors with eigenvalues above 1					
	Variables correlation matrix	Factor1	Factor2	Factor3	Factor4	Factor5
fmd1	Global interest rate fluctuations	0.3790	0.3089	0.0520	0.2533	-0.0123
fmd2	Global exchange rate fluctuations	0.2672	0.3240	0.1369	0.2550	0.0826
fmd3	Limited financial market development	0.2782	-0.3457	0.3543	-0.3251	0.0860
fmd4	Under-developed capital market	0.2471	-0.2065	0.4309	-0.1669	0.3033
fmd5	Transparent reporting	0.4353	-0.1670	0.2418	-0.0243	-0.0527
fmd6	Local currency exchange rate	0.4908	-0.3032	0.1537	0.2725	-0.0511
fmd7	USD interest rate changes	0.5379	-0.2079	0.1187	0.3563	0.0918
fmd8	Commodity price changes	0.4646	-0.2771	0.3385	0.0847	0.0116
fmd9	Inflation	0.4464	-0.2568	-0.0365	0.3441	-0.0110
pdm1	A sufficient public debt management policy	-0.3096	0.5223	0.1574	0.0508	0.1200
pdm2	Effective macroeconomic risk mitigation	-0.2286	0.5277	0.2547	0.0253	0.0594
pdm3	National indebtedness limiting debt access	0.0129	0.0460	-0.0006	-0.0869	0.3984
pdm4	Sound public debt management practices	-0.1379	0.5640	0.1006	0.1121	0.2896
pdm5	Long-term debt	0.5372	-0.0272	-0.0295	0.3651	0.1241
pdm6	Short-term debt	0.5752	-0.0581	0.1680	0.1810	0.0997
pdm7	Economic growth	0.2022	0.1833	0.0913	0.4075	0.0534
pdm8	National debt management tools	0.4727	-0.0600	0.0687	0.2733	0.1095
pdm9	Non-politics-led project failure	-0.3407	0.1155	0.4024	0.0241	0.1709
pdm10	Economic stability and sustainability	-0.4653	0.2721	0.3646	-0.0735	0.1686
pdm11	Collaborative debt management	-0.4523	0.4105	0.2434	-0.0006	0.1792
pdm12	Corruption	0.3906	-0.2701	0.2696	-0.1335	-0.1397
crp1	Carbon risk perception by the lender	0.4948	0.5193	-0.1529	-0.1612	0.1916
crp2	Carbon risk perception by the public	0.5268	-0.0593	0.2434	-0.4544	0.0239
crp3	Carbon adaptability mechanisms affect debt costs	0.5934	0.3349	-0.2893	-0.2221	0.1293
crp4	Carbon credit prices affect debt costs	0.3451	0.4826	-0.0847	-0.3299	0.0936
crp5	Clean development mechanism registration affects debt costs	0.4484	0.3912	-0.3076	-0.1562	0.0462
crp6	Carbon risk perception by citizens	0.4675	0.0919	0.3890	-0.3995	-0.2364
crp7	Carbon adaptability mechanisms affect debt inflow	0.5770	0.4447	-0.1563	-0.0710	-0.0508
crp8	Carbon credit prices affect debt inflow	0.5096	0.5213	0.0476	-0.0995	-0.1757
crp9	Clean development mechanism registration shapes debt inflow	0.4249	0.3625	-0.3313	-0.0572	-0.1613
crp10	Carbon risk-based lender exits	0.0318	0.1751	0.4646	-0.1235	-0.3189
crp11	Investment in carbon risk research and development	-0.2150	0.4816	0.2318	0.1904	-0.4682
crp12	Aligning carbon policies with national sustainability policies	-0.0452	0.5612	0.1693	0.2640	-0.3535
crp13	Carbon risk management policy	0.0344	0.4079	0.2214	0.1845	0.2143

Source: Author (2023)

The eigenvalues above 1 show that the five retained factors explain 88.17% of the variance. Factor 1 captures variables related to sovereign risk premiums like macroeconomic fluctuations, transparent reporting, and commodity price changes, highlighting interconnected economic and interpersonal information transmission modes (transparent reporting) and moral hazards (corruption) that other

studies found to impact the international infrastructure debt landscape (Brautigam, 2022; Morsy & Moustafa, 2020; Onjala, 2018). Factor 2 captures variables representing carbon risk and its association with collaborative debt management, currency convertibility, clean development mechanisms (CDM), and macroeconomic policy stability (Zhou *et al.*, 2018). Factor 3 represents variables depicting a lender's carbon risk perspective and association with financial market development, management behaviour, commodity prices, economic stability, and sustainability. Factor 4 captures economic growth and its association with long-term debt, interest rate changes and inflation affecting infrastructure lifecycle performance (Mose, 2022; Odhiambo, Rambo, & Okello, 2020a; Rambo & Lucas, 2016). Factor 5 relates to public debt sustainability management and its association with under-developed capital markets (Pueyo *et al.*, 2016). The five factors led to the retaining of all items in their initial groups to provide insights into how managers perceive and prioritise different dimensions of macroeconomic risks in infrastructure lifecycles. Interpreting the evolving nature of these factors can guide decision-makers in understanding the diverse range of macroeconomic risks that influence infrastructure project lifecycle development in Kenya.

5.2.4.5. Theme 5: Cultural determinants of the infrastructure project context

The results in Table 5-19 show that the dataset's suitability for factor analysis is affirmed by the KMO value of 0.873, denoting interrelated variables for meaningful factor extraction. Bartlett's test's significant chi-square confirms variable correlation, justifying factor analysis.

Table 5-19: Factor analysis for ambiguity tolerance

KMO Measure of Sampling Adequacy	0.873				
Bartlett test of sphericity					
Chi-square	3362.1130				
df	78				
p-value	0.000				
Scale reliability (Cronbach's Alpha)	0.8656				
Average variance explained by five factors	0.7536				
Eigenvalues above 1	3.3906	3.2839	3.2606	2.1429	1.7307
Retained factors with eigenvalues above 1	Factor1	Factor2	Factor3	Factor4	Factor5
Variables correlation matrix	General ambiguity	Novelty	Uncertainty	Insolubility	Complexity
I am tolerant of ambiguous situations (G2)	0.1039	0.0381	0.6116	0.0806	-0.1046
I dislike ambiguous situations (G4)	0.1918	0.0428	0.1869	0.5783	0.0049
I prefer a situation in which there is some ambiguity (G5)	0.0662	0.0956	0.0018	-0.5831	0.1449
I try to avoid ambiguous situations (G3)	0.1035	0.1761	0.5116	0.1516	0.0026
I do not tolerate ambiguous situations (G1)	-0.0370	0.0027	-0.1122	0.0073	0.5857
I prefer familiar situations to new ones (N1)	0.6141	-0.2045	0.0523	-0.2783	-0.0450
I generally prefer novelty over familiarity (N2)	0.0670	0.5287	0.1454	0.2057	0.0177
I find it hard to make a choice when the outcome is uncertain (U1)	0.6842	0.0700	-0.0453	0.2961	0.0343
I avoid solving problems that must be viewed from different perspectives (I1)	0.4717	0.1223	0.3550	-0.0414	0.0495
I try to avoid problems that do not seem to have only one "best" solution (I3)	0.1418	0.6398	0.1086	-0.1433	-0.0651
Problems that cannot be considered from one point of view are threatening- (I2)	0.7387	0.0269	0.0522	-0.0377	0.0070
I avoid situations that are too complicated for me to understand easily (C1)	0.6046	0.3668	-0.1251	0.1031	-0.0454
I enjoy tackling problems that are complex enough to be ambiguous (C2)	0.0580	-0.0944	0.0207	-0.2680	0.4971

Source: Author (2023)

With Eigenvalues exceeding 1 cumulatively, Factors 1 and 2 explain 100.92% variance, sufficiently capturing data variability. Factor 1, ambiguity tolerance, relates to embracing ambiguity, solving

complex problems, and tolerating uncertainty, indicating higher ambiguity tolerance. Factor 2 captures the preference for familiarity vs novelty, favouring familiarity, simplicity, and disliking multiple perspectives, suggesting a preference for certainty. Managers scoring high in Factor 1 excel in ambiguity-rich tasks, while Factor 2 managers thrive in stable roles. Balancing these profiles benefits decision-making. By embracing creativity and stability, diverse managers enhance project management effectiveness. Recognising and addressing ambiguity tolerance differences can inform optimal team construction and decision-making strategies (Stanley Budner, 1962). Table 5-20 shows that the four extracted factors with eigenvalues above 1 offer insights into cultural perceptions and associations to align the Kenyan infrastructure development context findings with Hofstede’s cultural dimensions.

Table 5-20: Factor analysis of cultural dimensions adopted from Hofstede’s framework

	KMO Measure of Sampling Adequacy	0.7410			
	Bartlett test of sphericity				
	Chi-square	5365.5170			
	df	351			
	p-value	0.0000			
	Cumulative variance explained		0.8903		
	Eigenvalue	3.8304	2.6723	2.0095	1.4008
	Variable correlation matrix	Factor1	Factor2	Factor3	Factor4
PDI1	Unequally distributed power	0.2128	0.6066	0.2059	0.0226
PDI2	Teach practitioners how to manage projects	0.2799	0.4770	0.2130	0.0623
PDI3	Create individual risk control initiatives	0.1275	0.3493	0.2318	0.4845
PDI4	Accept and follow lender rules	0.5361	0.2197	0.1683	0.2693
PDI5	Replace existing decision-makers	0.6352	0.0586	0.2081	0.0474
IDV1	Limited cross-sectoral collaboration	0.3188	0.2179	0.1219	0.1641
IDV2	Strictly follow subsector rules	0.5912	0.1900	0.1098	0.0780
IDV3	Rules compliance and age determine outstanding practitioners	0.7405	0.0243	0.2259	0.0579
IDV4	Immoral for the government not to guarantee payment	0.4153	0.0403	0.1108	0.3117
MAS1	Empathy for failure and envy for success	0.3462	0.1292	0.1444	0.3254
MAS2	Motivated by a relaxed and friendly environment	0.1575	0.3207	0.1201	0.0599
MAS3	Consensus decision-making	0.6983	0.1459	0.0944	0.0359
MAS4	Benefits realisation for men and women	0.1636	0.3672	0.0937	0.2795
MAS5	Importance of lenders’ support during a financial crisis	0.0791	0.3915	0.0335	0.1452
UAI1	Importance of being organised and avoiding ambiguity	0.2734	0.4731	0.1603	0.0533
UAI2	The reward for high competence and expert leadership	0.1785	0.5109	0.0827	0.0062
UAI3	Benefits sharing between lenders and borrowers	0.3270	0.4531	0.0380	0.1850
UAI4	Voicing infrastructure failures publicly is wrong	0.2165	0.0461	0.0484	0.3286
UAI5	Respect for project management rules and customs	0.0006	0.2806	0.2158	0.5151
LTO1	Managers can manage risks	0.2978	0.2842	0.1687	0.3842
LTO2	Managers can identify evolving risk	0.5949	0.3071	0.1011	0.2166
LTO3	Managers should question board decisions	0.1882	0.4227	0.1304	0.0058
LTO4	The board influences management behavioural	0.0963	0.3538	0.0116	0.2403
LTO5	Macroeconomic risks contribute to project failure	0.0175	0.0867	0.3615	0.0500
IVR1	Preference for long-term versus short-term gratification influences project risk	0.3032	0.1365	0.5050	0.0664
IVR2	Time perception is important in infrastructure decision-making	0.4082	0.2493	0.7383	0.1737
IVR3	General time-oriented optimism in life is useful in decision-making	0.3948	0.2237	0.7633	0.2090

Source: Author (2023)

The dataset’s suitability for factor analysis is confirmed by the KMO measure of 0.873, and the Bartlett’s test’s significant chi-square signifies correlated variables, validating factor analysis. Eigenvalues above 1 reveal that the first four factors collectively capture 89.03% variance. These factors are used to interpret the findings by corroborating Hofstede’s dimensions: power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term orientation (LTO), and indulgence vs restraint (IVR).

Factor 1 encapsulates equitable power distribution (PDI1), limited cross-sector collaboration (IDV1), and consensus decision-making (MAS3). Factor 2 reflects long-term planning, adaptive risk identification, time-oriented optimism (IDV4, MAS2), uncertainty avoidance (UAI1), and long-term gratification (IVR1). Factor 3 involves risk management, benefits sharing, questioning decisions (UAI3, LTO3, IVR2), and recognising macroeconomic factors. Factor 4 emphasises individual values and competence-based leadership (PDI1, MAS1). These findings facilitate the understanding of cultural nuances within teams and projects, promoting effective communication, collaboration, and culturally aligned decision-making. The insights can guide project managers and organisations in navigating cultural dimensions in order to optimise stakeholder communication, collaboration, and decision-making in infrastructure projects.

5.2.5. Reliability statistics

The objective was to propose a human-centred infrastructure design and implementation framework based on investigating culture-mediated socio-cognitive learning as a moderator of the relationship between sovereign risk and infrastructure debt-side governance, project management, macroeconomic risk and culture as an antecedent of managerial herding. Retaining the original variables classification representing unique knowledge domains was relevant to examining how cultural norms moderate each area. Moreover, retaining the original variables classification retained the contextual relevance and interpretability of the data to meet the research objectives. The reliability of the retained variables was assessed. Cronbach's alpha ranges from 0 to 1, with higher values indicating greater internal consistency. A summary of the coefficients in Table 5-21 shows good reliability, measurement consistency, stability, and quality. The detailed analysis results of Table 5.21 are in Appendix E.

Table 5-21: Scale reliability test results

	Variable	Cronbach alpha
A.	Debt-side governance	
	Interest rate	0.78
	Investment	0.66
	Debt-to-equity ratio	0.64
	Maturity	0.78
	Bankruptcy	0.41
	Covenant compliance	0.43
	Environmental, social, and governance	0.60
B	Project management	
	Lifecycle integration	0.62
	Scope	0.52
	Schedule	0.65
	Cost	0.81
	Quality	0.42
	Resources	0.64
	Communication	0.25
	Procurement	0.83
	Stakeholder management	0.85
	Risk management	0.83
C.	Macroeconomic factors	
	Financial market development	0.71
	Public debt management	0.73
	Carbon risk management	0.80
D.	Sociocultural factors	
	Ambiguity tolerance	0.86
	General ambiguity tolerance	0.73
	Insolubility perception	0.73

	Perception of complexity	0.35
	Power distance	0.68
	Individualism vs collectivism	0.75
	Masculinity vs femininity	0.46
	Uncertainty avoidance	0.69
	Long-term vs short-term orientation	0.47
	Indulgence vs restraint	0.86

Source: Author (2023)

5.2.6. Spearman's rank correlation analysis

Table 5-22 provides the Spearman's rho correlation and associated significance levels between the sovereign risk premium (dependent variable) and the independent variables related to infrastructure management in Kenya with N = 597. A strong to moderately positive correlation exists between sovereign risk with debt-side governance, project management, and macroeconomic risk variables. It suggests that managers associate infrastructure project management proficiency with sovereign risk. Most culture variables show a moderate to weak statistically significant positive correlation with sovereign risk. This indicates that certain cultural dimensions in managing infrastructure projects in Kenya influence managerial risk perceptions. The one exception is the "indulgence" dimension, which has a weak and statistically insignificant correlation with the sovereign risk. It is important to note that Spearman's rho only measures the relationship's strength and direction, not its causation or specific form.

Table 5-22: Spearman's rho for rank correlation

Independent variables	Sovereign risk premium (dependent variable)	
	Correlations	Sig. (2-tailed)
Infrastructure debt-side governance	0.6628	0.000
Infrastructure project management	0.2929	0.000
Macroeconomic risk management	0.3586	0.000
Managerial culture variable		
Ambiguity tolerance	0.1641	0.000
Power distance	0.2857	0.000
Individualism vs collectivism	0.1957	0.000
Masculinity vs femininity	0.1599	0.001
Uncertainty avoidance	0.1530	0.002
Long-term vs short-term orientation	0.2096	0.000
Indulgence vs restraint	0.000	0.5411

Source: Author (2023)

5.2.7. Ordinary least square regression analysis to test hypotheses

The second and third objectives were addressed through regression analysis. Since the study retained the original variables to retain the richness and specificity of the data, it acknowledges that this decision could introduce multicollinearity among variables. It was useful to carefully consider the trade-offs between dimensionality reduction (using factors from PCA) and retaining the detailed information of the original variables by conducting a multicollinearity test.

5.2.7.1. Multicollinearity analysis

The first step investigated multicollinearity by testing tolerance and variance inflation (VIF). Table 5-23 shows that the VIF values are below 10, suggesting no multicollinearity among independent variables. VIFs above 5 or 10 would suggest a high level of multicollinearity.

Table 5-23: Multicollinearity analysis of survey data

	Variable	VIF	1/VIF
A.	Debt-side governance		
	Investment size	1.81	0.551893
	Debt-to-equity ratio	1.75	0.570215
	Loan maturity	1.54	0.647891
	Environmental and social governance	1.35	0.740064
	Compliance with debt covenants	1.31	0.764512
	Bankruptcy	1.3	0.768416
	Mean VIF of debt-side governance variables	1.51	
B.	Project management		
	Risk management	3.02	0.330884
	Procurement management	2.1	0.475451
	Resource management	1.96	0.510853
	Communication management	1.5	0.668879
	Stakeholder management	1.48	0.676358
	Quality management	1.43	0.700388
	Cost management	1.42	0.704452
	Schedule management	1.26	0.790937
	Scope management	1.23	0.813245
	Lifecycle management	1.06	0.944995
	Mean VIF of project management variables	1.65	
C.	Macroeconomic risk		
	Carbon risk management	1.12	0.889931
	Public debt management	1.07	0.93219
	Financial market development	1.07	0.938812
	Mean VIF of macroeconomic variables	1.09	
D.	Cultural dimensions		
	Power distance	1.63	0.613391
	Individualism vs collectivism	1.39	0.718292
	Masculinity vs femininity	1.33	0.749346
	Long-term vs short-term orientation	1.19	0.840939
	Uncertainty avoidance	1.17	0.853218
	Ambiguity tolerance	1.13	0.887971
	Indulgence vs restraint	1.1	0.912133
	Mean VIF of Cultural dimensions	1.28	

Source: Author (2023)

5.2.8. Objective 2: Examine the relationship between culture and managerial demographics in Kenyan renewable energy and transportation infrastructure contexts

Hypotheses *H6a* to *H6g* were tested to address objective 2.

$$\text{Model specification: } CD = \beta_0 + \beta_1 MD_i + \varepsilon \quad (1)$$

CD represents the dependent variables denoting cultural dimensions

MD is the independent variable (managerial demographics)

ε_{it} is the error term

Table 5-24 displays the regression results, indicating that most hypotheses from *H6a* to *H6g* were partially supported. The significant negative regression coefficients for the gender variable suggest that male managers (coded as 1) tend to exhibit lower levels of acceptance for power distance, lean more towards individualistic tendencies, and display lower masculinity than female managers (coded as 0),

which supports hypothesis *H6d*. The relationship between age and individualism vs collectivism indicates that older managers are more inclined towards collectivist values than younger managers.

The coefficients between experience in years and individualism vs collectivism, masculinity vs femininity, and long-term orientation vs short-term orientation indicate that as managers' years of experience increase, their tendencies toward certain cultural dimensions also increase. Managers with more experience associate more with collectivism, femininity, and a long-term orientation, reflecting a tendency to value adaptability, leadership development, and integration into the organisational culture. Moreover, the relationship between international experience and power distance, individualism vs collectivism, and masculinity vs femininity suggests that managers with more international experience tend to adopt cultural values that are less hierarchical, more individualistic, and less masculine. International exposure might encourage openness to diverse perspectives and a willingness to challenge traditional norms. On the other hand, the relationship between international experience and indulgence vs restraint implies that managers who have worked internationally are more inclined toward values associated with indulgence, such as being open to new experiences. This might reflect a broader perspective gained from exposure to diverse cultures.

The findings suggest that longer-tenured managers exhibit traits associated with masculinity and a lower aversion to uncertainty. The negative relationship between job tenure and masculinity vs femininity, combined with the sampled managers' tendency to lean towards femininity, suggests an intriguing dynamic. As managers accumulate more experience in their roles, they might exhibit a shift towards masculinity in terms of cultural traits. This shift could indicate a tendency for experienced managers to adopt traits traditionally associated with masculinity, such as assertiveness, competition, and ambition. This negative relationship between job tenure and uncertainty avoidance suggests that longer-tenured managers may exhibit lower levels of aversion to uncertainty. It could indicate that managers become more comfortable with ambiguity over time and are more willing to navigate uncertain situations.

The negative relationship between the propensity to desert a high-risk project and ambiguity tolerance, long-term vs short-term orientation, and indulgence vs restraint indicates several traits. Managers who are more tolerant of ambiguity and uncertainty are less likely to abandon projects when faced with high risks. Managers who focus on long-term outcomes may be more willing to weather short-term setbacks for the potential benefits that a project could yield over time rather than quit prematurely. Managers who balance indulgence and restraint are less inclined to desert high-risk projects if they are balanced decision-makers considering immediate rewards and potential long-term consequences, making them more likely to commit to projects despite challenges. These managers might be better equipped to navigate uncertain situations, adapt to changing conditions, and find solutions rather than give up.

The positive relationship between the propensity to desert projects due to limited funding and ambiguity intolerance suggests that managers less tolerant of ambiguity are more likely to consider abandoning

projects when faced with funding constraints. This could indicate that managers who are uncomfortable with uncertain situations may be quicker to recognise and act on the financial challenges of a project. The positive relationship with power distance implies that managers who perceive greater power distance, meaning they believe in centralised decision-making authority, are more prone to desert projects when funding is insufficient. In such hierarchical settings, managers might be less empowered to seek alternative solutions to funding challenges. The positive relationships with individualism vs collectivism and masculinity vs femininity suggest that managers leaning towards collectivism and femininity might be more inclined to desert projects due to limited funding. Collectivist and feminine cultural traits, prioritising cooperation and empathy, might lead managers to perceive limited funding as a non-inclusive resource allocation strategy and select alternative projects. Higher uncertainty avoidance could lead managers to perceive limited funding as a higher risk, prompting them to abandon projects to avoid potential losses. The negative relationship between the propensity to desert projects and indulgence vs restraint indicates that managers who lean towards indulgence, valuing instant gratification and spending, are less likely to abandon projects due to limited funding. These managers might be more open to finding creative solutions to sustain projects.

The negative relationship between professional certification and ambiguity intolerance, power distance, individualism vs collectivism, masculinity vs femininity, and long-term vs short-term orientation suggests that managers with professional certifications lean towards low power distance, individualism, and masculine and long-term orientation, attributed with a stronger inclination to contrarian behaviours. Professional certification could enhance self confidence about task mastery, which might enhance their confidence to express contrarian views. The positive relationship between professional certification and indulgence vs restraint implies that managers with certifications emphasise controlled decision-making and moderation. They might be cautious about excessive indulgence and immediate gratification and strive for disciplined, balanced choices. Professional certifications often uphold adherence to regulatory standards. Managers with professional certifications might be inclined to follow established guidelines and regulations, leading to lower ambiguity tolerance and valuing structured power dynamics.

The negative relationship between being a senior-level manager (coded as 1) and individualism vs collectivism suggests that senior managers exhibit more collectivism than middle-level managers (coded as 0). Senior managers – who likely hold departmental leadership roles and are responsible for strategic decisions – might prioritise collaboration, teamwork, and collective goals over individual goals. The negative relationship between board membership and long-term vs short-term orientation implies that managers who are part of the board of directors are inclined towards a long-term perspective. Board members – who significantly shape the organisation's strategic direction – often prioritise sustainable growth and long-term success over short-term gains.

The negative relationship between public sector funding (coded as 1) and power distance, as well as individualism vs collectivism, indicates that managers in the public sector might prefer flatter power structures and emphasise collective decision-making compared to private sector managers (coded as 0). Public sector organisational frameworks prioritise collaboration and participatory approaches. The negative relationship between the renewable energy sector (coded as 1) and ambiguity intolerance suggests that managers in this sector might have a higher tolerance for ambiguity than those in the transportation sector (coded as 0). Given the novelty and technical complexity nature of renewable energy projects, unclear guidelines and processes are common. The positive relationships between the renewable energy sector and power distance, masculinity vs femininity, and indulgence vs restraint imply that managers in this sector lean towards hierarchical power structures, more traditional gender roles, and a willingness to exploit new ideas and practices.

While managerial demographics influence culture, the findings on low female representation in Kenyan infrastructure projects indicate an implicitly suboptimal division of labour in the context. It is plausible that culture influences demographic trends in infrastructure organisations, creating a dialectical relationship between managerial demographics and cultural characteristics of the infrastructure project context. Tables 5-25 and 5-26 test this interpretation with each demographic variable as the dependent variable and cultural perception as the independent variable based on the following regression model:

$$DM = \beta_0 + \beta_1 CD_i + \varepsilon \quad (2)$$

Where

DM is the demographic

CD is the cultural dimension

The findings in Tables 5-25 and 5-26 show that cultural variables support the cross-sectional herding hypothesis to varying degrees, highlighting the importance of embracing diversity in decision-making, leveraging cultural norms to promote stakeholder collaboration and fostering independent risk analysis. These findings reinforce the robustness of the findings and the interpretation of the regression coefficients of the demographics data in Table 5-24.

Overall, the findings in Tables 5-24 and the robustness tests in Tables 5-25 and 5-26 corroborate the findings by Liu *et al.* (2015) and Meng *et al.* (2016) from the Asian and Middle East that project risks are perceived and managed differently globally. Liu *et al.* (2015) indicate that individualism vs collectivism and uncertainty avoidance are the foci of attention beyond the contributions of power distance, long-term vs short-term orientation, and masculinity vs femininity and that contractors' knowledge of the host country's national culture influences their risk management behaviours.

Table 5-24: Regression of managerial demographics on culture perceptions in infrastructure projects

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	AT	PDI	IDV	MAS	UAI	LTO	IVR
Gender	(0.128)	-0.120*	-0.271***	-0.139**	(0.021)	0.071	(0.013)
	(0.092)	(0.067)	(0.100)	(0.069)	(0.071)	(0.074)	(0.148)
Age	(0.040)	(0.034)	-0.141***	(0.001)	(0.021)	0.019	(0.018)
	(0.049)	(0.035)	(0.053)	(0.037)	(0.038)	(0.039)	(0.078)
Experience	0.028	0.061	0.246***	0.078**	0.031	0.088**	-0.041
	(0.052)	(0.038)	(0.057)	(0.040)	(0.040)	(0.042)	(0.084)
International experience	-0.107	-0.222**	-0.383***	-0.206**	0.037	-0.072	0.763***
	(0.132)	(0.096)	(0.143)	(0.099)	(0.102)	(0.106)	(0.212)
Tenure	(0.066)	(0.017)	(0.064)	-0.082**	-0.085**	0.019	0.115
	(0.051)	(0.037)	(0.056)	(0.039)	(0.040)	(0.041)	(0.082)
Propensity to desert a project due to high risk	-0.152*	0.053	0.069	-0.061	-0.028	-0.170**	-0.275*
	(0.090)	(0.065)	(0.097)	(0.068)	(0.069)	(0.072)	(0.145)
Propensity to desert a project due to limited funding	0.239**	0.301***	0.496***	0.166*	0.210**	0.039	-0.506***
	(0.118)	(0.086)	(0.128)	(0.089)	(0.091)	(0.095)	(0.190)
Professional certification	-0.331***	-0.527***	-0.989***	-0.298***	0.051	-0.398***	0.499***
	(0.105)	(0.076)	(0.114)	(0.079)	(0.081)	(0.084)	(0.169)
Management seniority	-0.073	-0.034	-0.202*	0.022	-0.026	-0.010	0.085
	(0.111)	(0.080)	(0.120)	(0.083)	(0.085)	(0.089)	(0.178)
Board membership	-0.007	-0.052	0.098	-0.037	-0.108	-0.334***	-0.199
	(0.142)	(0.103)	(0.154)	(0.107)	(0.109)	(0.114)	(0.228)
Public vs private funding	-0.223	-0.285*	-0.470*	0.079	-0.199	0.086	0.417
	(0.228)	(0.165)	(0.247)	(0.172)	(0.176)	(0.183)	(0.366)
Infrastructure sector selection	-0.146*	0.177***	0.120	0.150**	-0.056	-0.057	0.468***
	(0.086)	(0.063)	(0.094)	(0.065)	(0.067)	(0.069)	(0.139)
Constant	5.008***	5.855***	5.661***	5.713***	5.981***	5.436***	3.656***
	(0.321)	(0.233)	(0.348)	(0.242)	(0.248)	(0.258)	(0.517)
Observations	597	597	597	597	597	597	597
R-squared	0.047	0.178	0.237	0.073	0.038	0.119	0.091
Adjusted R-squared	0.027	0.161	0.221	0.054	0.018	0.101	0.073
The dependent variable is represented by the seven cultural dimensions: Ambiguity tolerance (AT) power distance index (PDI), individualism (IDV), masculinity (MAS), uncertainty avoidance index (UAI), long-term orientation (LTO), and indulgence (IVR). The standard errors are reported in parentheses. The p-values ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.							

Source: Author (2023)

Table 5-25: Regression of culture perceptions on managerial demographics in infrastructure projects

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Baseline	Renewable	Transport	Public	Private	Female	Male	International	Local	High-risk	Non-high risk
VARIABLES	interest	interest	interest	interest	interest	interest	interest	interest	interest	interest	interest
Ambiguity tolerance	0.039** (0.019)	0.004 (0.035)	0.052** (0.022)	0.033* (0.019)	0.127 (0.221)	0.067* (0.038)	0.037* (0.021)	-0.103 (0.064)	0.059*** (0.020)	-0.004 (0.036)	0.067*** (0.022)
Power distance	0.152*** (0.031)	0.225*** (0.046)	0.108** (0.044)	0.153*** (0.032)	0.468** (0.164)	0.300*** (0.062)	0.098*** (0.036)	0.277*** (0.067)	0.089** (0.036)	0.236*** (0.058)	0.098*** (0.038)
Individualism vs collectivism	(0.019)	(0.028)	(0.025)	(0.019)	(0.079)	(0.043)	(0.021)	(0.050)	(0.021)	(0.038)	(0.022)
Masculinity vs femininity	0.003 (0.029)	0.002 (0.043)	-0.007 (0.039)	-0.007 (0.029)	0.099 (0.129)	0.048 (0.063)	-0.010 (0.032)	0.046 (0.090)	0.007 (0.031)	-0.009 (0.049)	0.009 (0.037)
Uncertainty avoidance	0.077*** (0.027)	-0.005 (0.045)	0.115*** (0.035)	0.078*** (0.027)	0.242 (0.198)	0.069 (0.052)	0.087*** (0.032)	-0.023 (0.081)	0.087*** (0.029)	0.030 (0.048)	0.107*** (0.034)
Long-term vs short-term orientation	0.086*** (0.025)	0.168*** (0.038)	0.045 (0.034)	0.075*** (0.025)	0.151 (0.118)	0.013 (0.043)	0.104*** (0.032)	0.036 (0.058)	0.066** (0.030)	0.063 (0.043)	0.107*** (0.032)
Indulgence vs restrain	0.022* (0.012)	0.034* (0.018)	0.016 (0.017)	0.022* (0.012)	-0.048 (0.066)	0.051* (0.026)	0.011 (0.014)	0.073** (0.035)	0.018 (0.013)	-0.010 (0.022)	0.043*** (0.015)
Constant	3.293*** (0.225)	3.055*** (0.343)	3.545*** (0.302)	3.364*** (0.228)	0.723 (0.959)	2.234*** (0.429)	3.566*** (0.270)	3.348*** (0.485)	3.626*** (0.281)	3.610*** (0.390)	3.065*** (0.292)
Observations	597	306	291	577	20	153	444	82	515	196	401
R-squared	0.150	0.253	0.113	0.150	0.752	0.302	0.117	0.501	0.088	0.198	0.146
Adjusted R-squared	0.140	0.230	0.095	0.139	0.607	0.268	0.103	0.454	0.075	0.168	0.130
Standard errors in parentheses											
*** p<0.01, ** p<0.05, * p<0.1											

The dependent variable interest is the perception of sovereign risk by the sampled respondents regressed on culture variables where the baseline Model (1) represents the full sample and Models (2) to (11) represent the sub-sample decomposition results representing managers involved renewable energy projects (Renewable), road and rail projects (Transport), public sector funded projects (Public), private sector funded projects (private), female managers (Female), male managers (Male), managers who reported having international experience (International), managers without international experience (Local), managers who reported having left projects due to perception of high risk (High risk) and managers who reported not having left projects due to perceived high risk (Non-high risk). The standard errors are reported in parentheses. The p-values are reported in stars ***, **, and * which denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

Table 5-26: Regression of culture perceptions on managerial demographics in infrastructure projects

Models	(1)	(12)	(13)	(14)	(15)	(16)	(17)
	Baseline	Limited capital	Non-limited capital	Board	Non-board	Certified	Non-certified
VARIABLES	interest	interest	interest	interest	interest	interest	interest
Ambiguity tolerance	0.039** (0.019)	0.026 (0.056)	0.048** (0.020)	-0.071 (0.069)	0.043** (0.019)	-0.061 (0.041)	0.047** (0.021)
Power distance	0.152*** (0.031)	0.265*** (0.065)	0.116*** (0.036)	0.317*** (0.092)	0.134*** (0.033)	0.290*** (0.045)	0.027 (0.042)
Individualism vs collectivism	(0.006) (0.019)	0.023 (0.044)	(0.006) (0.021)	-0.096* (0.054)	0.010 (0.020)	-0.072** (0.030)	0.022 (0.026)
Masculinity vs femininity	0.003 (0.029)	-0.048 (0.059)	0.021 (0.034)	0.190** (0.093)	-0.006 (0.031)	0.044 (0.053)	0.033 (0.035)
Uncertainty avoidance	0.077*** (0.027)	0.051 (0.059)	0.084*** (0.031)	-0.177** (0.079)	0.112*** (0.029)	-0.003 (0.050)	0.147*** (0.032)
Long-term vs short-term orientation	0.086*** (0.025)	0.082 (0.053)	0.068** (0.030)	0.093 (0.061)	0.057** (0.029)	0.028 (0.038)	0.049 (0.034)
Indulgence vs restrain	0.022* (0.012)	-0.011 (0.026)	0.029** (0.014)	0.055 (0.035)	0.019 (0.013)	0.056*** (0.021)	0.007 (0.015)
Constant	3.293*** (0.225)	3.079*** (0.476)	3.406*** (0.277)	3.228*** (0.526)	3.355*** (0.258)	3.428*** (0.350)	3.630*** (0.323)
Observations	597	108	489	73	524	185	412
R-squared	0.150	0.351	0.108	0.328	0.136	0.301	0.095
Adjusted R-squared	0.140	0.306	0.095	0.256	0.125	0.273	0.079
The dependent variable interest is the perception of sovereign risk by the sampled respondents regressed on culture variables where the baseline Model (1) represents the full sample and Models (12) to (17) represent managers who reported having left projects due to perception limited capital access (Limited capital), managers who reported not having left projects due to limited capital access perception (non-limited capital), managers who held board positions (Board), managers who did not hold board positions (Non-board), managers who had project management certification (Certified) and managers who did not have project management certifications (Non-certified). The standard errors are reported in parentheses. The p-values are reported in stars ***, **, and *, which denote significance at the 1%, 5%, and 10% levels, respectively.							

Source: Author (2023)

5.2.9. Objective 3: Assess how culture mediates and moderates the relationship between sovereign risk and the development of Kenyan renewable energy and transportation infrastructure projects

The proposed seven hypotheses for testing managerial behaviour that might mediate the relationship between sovereign risk and managing renewable energy and transportation infrastructure projects as an embedded unit of analysis (*see Figure 4-15 in Chapter Four*). The main assumption is that this effect may not be random if cultural variables displaced the baseline model. Shared values might determine how managers perceive and develop common responses to risks in infrastructure projects. Hypotheses *H7a* to *H7c* were proposed to test the baseline model for the direct effect of debt-side governance, project management and macroeconomic risk on sovereign risk ratings. Subsequently, Hypotheses *H8a* to *H14a* estimated cross-sectional herding being the direct effect of culture on the embeddedness of managerial herding and sovereign risk, controlling for the effect of debt-side governance, project management, and macroeconomic risks. Hypotheses *H15a* to *H15c* estimated category herding being the likelihood of managers selecting a career in a renewable energy or transportation infrastructure project.

5.2.9.1. How culture and debt-side governance risk perception influence sovereign risk ratings

Regression model specification: $SR = \beta_0 + \beta_1 DG_i + \beta_1 CD_i + \varepsilon$ (3)

5.2.9.2. How culture and project management risk perception influence sovereign risk ratings

Regression model specification: $SR = \beta_0 + \beta_1 PM_i + \beta_1 CD_i + \varepsilon$ (4)

5.2.9.3. How culture and macroeconomic risk perception influence sovereign risk ratings

Regression model specification: $SR = \beta_0 + \beta_1 ME_i + \beta_1 CD_i + \varepsilon$ (5)

The findings in Tables 5-27 to 5-29 to test **H7a** to **H7c** and **H8a** to **H14a**, respectively, which include the cultural variables, show that the cross-sectional herding hypothesis was supported for all the cultural variables except ambiguity tolerance.

Table 5-27: Full sample regression of debt-side governance and culture perceptions on sovereign risk perception in infrastructure projects

Model	(1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
VARIABLES	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest
Investment size	0.040	0.040	0.043*	0.038	0.036	0.036	0.037	0.031	0.029	0.036
	(0.030)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Debt to equity ratio	-0.040	-0.045*	-0.046*	-0.041	-0.041	-0.035	-0.034	-0.037	-0.032	-0.04
	(0.020)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.024)	(0.025)	(0.025)	(0.025)
Maturity	0.091***	0.093***	0.094***	0.093***	0.091***	0.094***	0.086***	0.088***	0.088***	0.090***
	(0.020)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Covenant compliance	0.061***	0.058***	0.058***	0.057***	0.061***	0.046**	0.054***	0.055***	0.046**	0.057***
	(0.020)	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)
National indebtedness	0.020	0.021	0.020	0.020	0.017	0.014	0.003	0.008	0.02	0.025
	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.018)	(0.019)
Environmental, social governance	0.040	0.037	0.035	0.036	0.031	0.048**	0.019	0.038	0.050**	0.037
	(0.020)	(0.023)	(0.023)	(0.023)	(0.024)	(0.024)	(0.023)	(0.023)	(0.024)	(0.023)
Green economic development policy	0.165***	0.175***	0.174***	0.171***	0.165***	0.151***	0.169***	0.167***	0.141***	0.173***
	(0.020)	(0.022)	(0.022)	(0.022)	(0.022)	(0.024)	(0.021)	(0.021)	(0.023)	(0.022)
Ambiguity tolerance		-0.020								
		(0.019)								
General ambiguity tolerance			-0.032							
			(0.020)							
The insolubility of multiperspective problems				-0.005						
				(0.012)						
Power distance					0.042*					
					(0.025)					
Individualism vs collectivism						0.032*				
						(0.019)				
Masculinity vs femininity							0.098***			
							(0.020)			
Uncertainty avoidance								0.056**		
								(0.028)		
Long-term vs short-term orientation									0.059***	
									(0.021)	
Indulgence vs restrain										0.024**
										(0.012)
Constant	3.58***	3.626***	3.675***	3.582***	3.382***	3.521***	3.170***	3.353***	3.439***	3.431***
	(0.190)	(0.199)	(0.203)	(0.194)	(0.224)	(0.196)	(0.208)	(0.222)	(0.198)	(0.206)
Observations	597	597	597	597	597	597	597	597	597	597
R-squared	0.200	0.202	0.204	0.201	0.205	0.205	0.231	0.207	0.212	0.206
Adjusted R-squared	0.191	0.192	0.193	0.19	0.194	0.194	0.221	0.196	0.201	0.195

The dependent variable interest is the perception of sovereign risk by the sampled respondents regressed onto the seven debt-side governance variables in the baseline model (Model 1). Model 2 to 9 include each cultural dimension to estimate if part of the variation in the baseline model is explained by shared values as a proxy for the source of herding instincts. These cultural dimensions include ambiguity tolerance (AT), general ambiguity tolerance (GAT), perception of situations as insoluble dimension of ambiguity tolerance (IAT), power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restrain (IVR). The standard errors are reported in parentheses. The p-values are reported in stars ***, **, and * which denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

Table 5-28: Full sample regression of project management and culture perceptions on sovereign risk perception in infrastructure projects

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest
Lifecycle integration management	0.078*** (0.020)	0.076*** (0.020)	0.077*** (0.020)	0.075*** (0.020)	0.075*** (0.020)	0.076*** (0.020)	0.053*** (0.020)	0.078*** (0.020)	0.076*** (0.020)	0.077*** (0.020)
Scope management	0.187*** (0.027)	0.192*** (0.027)	0.188*** (0.027)	0.193*** (0.027)	0.178*** (0.027)	0.195*** (0.027)	0.171*** (0.026)	0.189*** (0.028)	0.187*** (0.026)	0.180*** (0.027)
Schedule management	0.049*** (0.013)	0.049*** (0.013)	0.049*** (0.013)	0.048*** (0.013)	0.050*** (0.012)	0.044*** (0.013)	0.045*** (0.012)	0.050*** (0.013)	0.045*** (0.013)	0.049*** (0.012)
Cost management	-0.034* (0.018)	-0.036** (0.018)	-0.034* (0.018)	-0.036** (0.018)	-0.035* (0.018)	-0.036** (0.018)	-0.032* (0.017)	-0.034* (0.018)	-0.030* (0.018)	-0.032* (0.018)
Quality management	0.046*** (0.015)	0.042*** (0.016)	0.045*** (0.016)	0.041** (0.016)	0.050*** (0.015)	0.038** (0.016)	0.049*** (0.015)	0.045*** (0.015)	0.028 (0.017)	0.052*** (0.016)
Resource management	0.000 (0.028)	0.002 (0.028)	0.000 (0.028)	0.001 (0.028)	-0.001 (0.028)	-0.002 (0.028)	-0.016 (0.028)	0.000 (0.028)	0.006 (0.028)	-0.004 (0.028)
Communication management	-0.015 (0.030)	-0.018 (0.031)	-0.016 (0.030)	-0.018 (0.030)	-0.01 (0.030)	-0.023 (0.031)	-0.016 (0.030)	-0.015 (0.030)	-0.025 (0.030)	-0.016 (0.030)
Procurement management	0.048 (0.034)	0.047 (0.034)	0.048 (0.034)	0.046 (0.034)	0.052 (0.034)	0.043 (0.034)	0.063* (0.033)	0.049 (0.034)	0.033 (0.034)	0.052 (0.034)
Stakeholder integration	-0.005 (0.035)	-0.003 (0.035)	-0.005 (0.035)	-0.003 (0.035)	-0.017 (0.036)	-0.007 (0.035)	0.002 (0.035)	-0.005 (0.035)	-0.017 (0.035)	-0.005 (0.035)
Stakeholder integration policies	0.002 (0.032)	0.003 (0.032)	0.002 (0.032)	0.003 (0.032)	0.007 (0.032)	0.003 (0.032)	-0.014 (0.032)	0.001 (0.032)	0.010 (0.032)	-0.003 (0.032)
Risk management	0.066 (0.056)	0.068 (0.056)	0.067 (0.056)	0.07 (0.056)	0.052 (0.056)	0.07 (0.056)	0.066 (0.055)	0.068 (0.056)	0.068 (0.056)	0.069 (0.056)
Ambiguity tolerance		0.015 (0.020)								
General ambiguity tolerance			0.004 (0.021)							
The insolubility of multiperspective problems				0.013 (0.013)						
Power distance					0.046* (0.026)					
Individualism vs collectivism						0.027 (0.021)				
Masculinity vs femininity							0.093*** (0.021)			
Uncertainty avoidance								-0.008 (0.029)		
Long-term vs short-term orientation									0.056** (0.024)	
Indulgence vs restrain										0.027** (0.012)
Constant	3.182*** -0.236	3.115*** -0.253	3.162*** -0.262	3.127*** -0.242	3.018*** -0.254	3.147*** -0.238	2.913*** -0.24	3.206*** -0.25	3.088*** -0.239	3.072*** -0.241
Observations	597	597	597	597	597	597	597	597	597	597
R-squared	0.200	0.201	0.200	0.202	0.204	0.202	0.227	0.200	0.208	0.206
Adjusted R-squared	0.185	0.184	0.184	0.185	0.188	0.186	0.211	0.184	0.191	0.190

The dependent variable interest is the perception of sovereign risk by the sampled respondents regressed on project management variables in the baseline model (Model 1). Model (2) to (10) include each cultural dimension to estimate if part of the variation in the baseline model is explained by shared values as a proxy for the source of herding instincts. These cultural dimensions include ambiguity tolerance (AT), general ambiguity tolerance (GAT), perception of situations as insoluble dimension of ambiguity tolerance (IAT), power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restrain (IVR). The standard errors are reported in parentheses. The p-values are reported in stars ***, **, and * which denote significance at the 1%, 5%, and 10% levels, respectively

Table 5-29: Full sample regression of macroeconomic risk and culture perceptions on sovereign risk perception in infrastructure projects

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
VARIABLES	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest
Financial market development	0.295*** (0.027)	0.295*** (0.027)	0.298*** (0.027)	0.295*** (0.027)	0.288*** (0.027)	0.290*** (0.027)	0.265*** (0.028)	0.294*** (0.027)	0.292*** (0.026)	0.292*** (0.027)
Market price fluctuations	0.013 (0.020)	0.014 (0.020)	0.015 (0.020)	0.013 (0.020)	0.009 (0.020)	0.01 (0.020)	0.004 (0.020)	0.012 (0.020)	-0.002 (0.020)	0.012 (0.020)
Public debt management	0.192*** (0.027)	0.189*** (0.027)	0.189*** (0.027)	0.188*** (0.028)	0.204*** (0.027)	0.177*** (0.029)	0.202*** (0.027)	0.190*** (0.027)	0.138*** (0.028)	0.194*** (0.027)
Carbon risk perception by stakeholders	0.058*** (0.020)	0.058*** (0.021)	0.056*** (0.021)	0.058*** (0.021)	0.050** (0.021)	0.058*** (0.020)	0.053** (0.020)	0.051** (0.021)	0.049** (0.020)	0.060*** (0.021)
Voluntary carbon risk disclosures	-0.026* (0.016)	-0.027* (0.016)	-0.027* (0.016)	-0.027* (0.016)	-0.024 (0.016)	-0.031* (0.016)	-0.029* (0.015)	-0.02 (0.016)	-0.047*** (0.016)	-0.023 (0.016)
Ambiguity tolerance		0.009 (0.018)								
General ambiguity tolerance			0.016 (0.020)							
The insolubility of multiperspective problems				0.005 (0.011)						
Power distance					0.057** (0.024)					
Individualism vs collectivism						0.022 (0.018)				
Masculinity vs femininity							0.072*** (0.020)			
Uncertainty avoidance								0.047* (0.026)		
Long-term vs short-term orientation									0.105*** (0.021)	
Indulgence vs restrain										0.016 (0.012)
Constant	2.664*** (0.231)	2.644*** (0.234)	2.590*** (0.247)	2.664*** (0.231)	2.348*** (0.266)	2.692*** (0.232)	2.460*** (0.236)	2.409*** (0.269)	2.590*** (0.226)	2.571*** (0.241)
Observations	597	597	597	597	597	597	597	597	597	597
R-squared	0.255	0.255	0.256	0.255	0.262	0.257	0.27	0.259	0.286	0.257
Adjusted R-squared	0.248	0.248	0.248	0.247	0.254	0.249	0.263	0.251	0.279	0.25

The dependent variable interest is the perception of sovereign risk by the sampled respondents regressed on macroeconomic risk variables in the baseline model (Model 1). Models (2) to (10) include each cultural dimension to estimate if shared values explain part of the variation in the baseline model as a proxy for the source of herding instincts. These cultural dimensions include ambiguity tolerance (AT), general ambiguity tolerance (GAT), perception of situations as insoluble dimension of ambiguity tolerance (IAT), power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restrain (IVR). The standard errors are reported in parentheses. The p-values are reported in stars ***, **, and * which denote significance at the 1%, 5%, and 10% levels, respectively

Source: Author (2023)

5.2.10. Binomial regression model results for the renewable energy and transportation infrastructure selection decision

A binomial logit model for the likelihood of managers selecting careers in renewable energy relative to transportation infrastructure projects tested the OLS regression results' robustness and estimated category herding as a determinant of differences in soft infrastructure development between the two sectors. The logit regressions tested the hypotheses **H15a** to **H15c**.

Data preparation

A binary dependent variable indicated the selection of a renewable energy project (coded as 1) or a transportation project (coded as 0). The independent variables included demographics, debt-side governance, project management, and macroeconomic and cultural factors.

5.2.10.1. How culture shapes the relationship between infrastructure debt-side governance risks and sub-sector risk perception

Regression model specification: $S = \beta_0 + \beta_1 DG + \beta_2 CD + \varepsilon$ (6)

Where:

S is the binary dependent variable (0 or 1), indicating the project selection.

DG and CD are the independent variables representing infrastructure debt-side governance and cultural dimensions.

β_0 represents the intercept term.

β_1 , and β_2 are the regression coefficients corresponding to the independent variables.

ε is the error term assumed to follow a binomial distribution.

Table 5-30 shows that the category herding hypothesis **H15a** was supported in the power distance model for the debt-side governance scenario. Hypothesis **H15b** was supported in the power distance model. The negative coefficient estimates for power distance in a sample that indicated a higher acceptance of unequal power distribution suggests that managers in the transportation infrastructure sector may herd in their career selection decisions by preferring egalitarian leadership when deferring to authority, typical in public sector decision-making since most transport projects were funded using public debt. Finally, **H15c** was supported in all the models except the model for indulgence vs restraint for the macroeconomic risk model. Overall, the results show variations in managerial preference for practising in the renewable energy and transportation project development context, suggesting non-random risk perception differences between the two sectors worth further evaluation. Tables 5-30 to 5-32 show managerial career selection patterns may not happen by chance, but culture may be an interpersonal information transmission mode used to communicate about infrastructure project risks.

Table 5-30: Logit regression of debt-side governance and culture perceptions on managerial career selection between the renewable energy and transportation project contexts

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Transport	Transport	Transport	Transport	Transport	Transport	Transport	Transport	Transport	Transport
Interest	-0.107 (0.204)	-0.11 (0.204)	-0.106 (0.204)	-0.109 (0.204)	-0.068 (0.207)	-0.081 (0.203)	-0.143 (0.207)	-0.113 (0.204)	-0.072 (0.206)	-0.107 (0.204)
Investment size	-0.068 (0.133)	-0.07 (0.133)	-0.07 (0.133)	-0.067 (0.133)	0.007 (0.138)	-0.061 (0.132)	-0.063 (0.133)	-0.096 (0.134)	-0.05 (0.133)	-0.067 (0.133)
Debt to equity ratio	0.827*** (0.139)	0.851*** (0.146)	0.834*** (0.143)	0.834*** (0.143)	0.913*** (0.146)	0.805*** (0.140)	0.826*** (0.139)	0.831*** (0.139)	0.812*** (0.140)	0.827*** (0.139)
Maturity	-0.156 (0.110)	-0.151 (0.111)	-0.155 (0.110)	-0.155 (0.110)	-0.104 (0.112)	-0.159 (0.110)	-0.169 (0.111)	-0.183 (0.112)	-0.145 (0.110)	-0.156 (0.111)
Covenant compliance	0.049 (0.090)	0.042 (0.091)	0.047 (0.091)	0.045 (0.092)	-0.027 (0.094)	0.09 (0.096)	0.05 (0.090)	0.049 (0.090)	0.067 (0.092)	0.049 (0.090)
National indebtedness	0.375*** (0.093)	0.368*** (0.094)	0.374*** (0.093)	0.372*** (0.094)	0.429*** (0.098)	0.394*** (0.095)	0.361*** (0.094)	0.339*** (0.097)	0.371*** (0.093)	0.374*** (0.094)
Environmental, social governance	0.18 (0.119)	0.183 (0.119)	0.182 (0.119)	0.182 (0.120)	0.255** (0.123)	0.138 (0.124)	0.157 (0.121)	0.185 (0.119)	0.156 (0.121)	0.18 (0.119)
Green economic policy	-0.458*** (0.120)	-0.478*** (0.125)	-0.463*** (0.122)	-0.465*** (0.124)	-0.445*** (0.123)	-0.395*** (0.129)	-0.447*** (0.121)	-0.456*** (0.120)	-0.415*** (0.126)	-0.458*** (0.120)
Ambiguity tolerance		0.058 (0.099)								
General ambiguity tolerance			0.022 (0.101)							
Insolubility perspective				0.013 (0.062)						
Power distance					-0.616*** (0.145)					
Individualism vs collectivism						-0.125 (0.095)				
Masculinity vs femininity							0.117 (0.107)			
Uncertainty avoidance								0.181 (0.143)		
Long vs short-term orientation									-0.127 (0.110)	
Indulgence vs restrain										-0.003 (0.059)
Constant	-3.188** (1.295)	-3.387** (1.341)	-3.278** (1.361)	-3.212** (1.300)	-1.193 (1.354)	-3.027** (1.286)	-3.521*** (1.335)	-3.786*** (1.380)	-2.962** (1.300)	-3.177** (1.323)
Observations	597	597	597	597	597	597	597	597	597	597
Likelihood-ratio test of rho=0	125.4	125.8	125.5	125.5	145.8	127.2	126.6	127	126.8	125.4
Prob > chi2	0	0	0	0	0	0	0	0	0	0
Pseudo R2	0.152	0.152	0.152	0.152	0.176	0.154	0.153	0.154	0.153	0.152

The dependent variable Transport denotes managers with careers in renewable energy projects coded as 1 relative to the transportation sector coded as 0 among the sampled respondents regressed on debt-side governance variables in the baseline model (Model 1). Model (2) to (10) include each cultural dimension to estimate if part of the variation in the baseline model is explained by shared values as a proxy for the source of herding instincts. These cultural dimensions include ambiguity tolerance (AT), general ambiguity tolerance (GAT), perception of situations as insoluble dimension of ambiguity tolerance (IAT), power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restrain (IVR). The standard errors are reported in parentheses. The p-values are reported in stars ***, **, and * which denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

5.2.10.2. How culture shapes the relationship between infrastructure project management risk and sub-sector risk perceptions

Regression model specification: $S = \beta_0 + \beta_1 PM + \beta_2 CD + \varepsilon$ (7)

Where:

S is the binary dependent variable (0 or 1), indicating the project selection.

PM is the independent variable representing infrastructure project management and cultural dimensions.

Table 5-31 shows that the category herding hypothesis was supported for power distance, masculinity vs femininity, uncertainty avoidance, and indulgence vs restraint.

Table 5-32 shows that the category herding hypothesis was supported for all the cultural dimensions except indulgence vs restraint.

5.2.10.3. How culture might shape the relationship between macroeconomic risk perception and infrastructure sub-sector risk perception

Regression model specification: $S = \beta_0 + \beta_1 ME + \beta_2 CD + \varepsilon$ (8)

Where:

S is the binary dependent variable (0 or 1), indicating the project selection.

ME is the independent variable representing macroeconomic risks.

Table 5-31: Logit regression of project management and culture perceptions on managerial career selection between the renewable energy and transportation project contexts

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Transport	Transport	Transport	Transport	Transport	Transport	Transport	Transport	Transport	Transport
integration management	0.111 (0.094)	0.116 (0.094)	0.116 (0.094)	0.113 (0.094)	0.136 (0.094)	0.12 (0.095)	0.045 (0.097)	0.104 (0.095)	0.115 (0.094)	0.117 (0.094)
Scope management	0.409*** (0.128)	0.397*** (0.131)	0.400*** (0.129)	0.405*** (0.130)	0.481*** (0.132)	0.381*** (0.131)	0.379*** (0.131)	0.321** (0.133)	0.411*** (0.128)	0.444*** (0.130)
Schedule management	0.068 (0.059)	0.068 (0.059)	0.063 (0.059)	0.069 (0.059)	0.067 (0.060)	0.084 (0.061)	0.056 (0.059)	0.038 (0.060)	0.074 (0.059)	0.072 (0.059)
Cost management	-0.052 (0.082)	-0.046 (0.083)	-0.045 (0.082)	-0.051 (0.082)	-0.041 (0.082)	-0.046 (0.082)	-0.048 (0.082)	-0.046 (0.082)	-0.058 (0.082)	-0.063 (0.082)
Quality management	-0.377*** (0.075)	-0.366*** (0.078)	-0.363*** (0.077)	-0.373*** (0.078)	-0.415*** (0.077)	-0.350*** (0.079)	-0.375*** (0.076)	-0.353*** (0.077)	-0.350*** (0.082)	-0.407*** (0.077)
Resource management	-0.032 (0.133)	-0.037 (0.134)	-0.035 (0.134)	-0.032 (0.134)	-0.031 (0.135)	-0.018 (0.134)	-0.086 (0.137)	-0.032 (0.135)	-0.038 (0.134)	-0.016 (0.134)
Communication management	0.356** (0.148)	0.366** (0.149)	0.370** (0.149)	0.359** (0.149)	0.315** (0.149)	0.387** (0.151)	0.378** (0.153)	0.341** (0.149)	0.369** (0.149)	0.363** (0.148)
Procurement management	0.014 (0.161)	0.015 (0.161)	0.011 (0.161)	0.015 (0.162)	-0.022 (0.163)	0.029 (0.163)	0.056 (0.164)	-0.026 (0.165)	0.035 (0.164)	0 (0.162)
Stakeholder integration	-0.151 (0.166)	-0.161 (0.168)	-0.167 (0.168)	-0.154 (0.167)	-0.048 (0.169)	-0.15 (0.167)	-0.137 (0.169)	-0.183 (0.170)	-0.136 (0.168)	-0.144 (0.166)
Stakeholder integration policies	-0.057 (0.149)	-0.059 (0.149)	-0.064 (0.149)	-0.058 (0.149)	-0.091 (0.151)	-0.061 (0.150)	-0.095 (0.152)	-0.024 (0.152)	-0.07 (0.150)	-0.035 (0.151)
Risk management	-0.436 (0.268)	-0.442* (0.268)	-0.449* (0.268)	-0.439 (0.269)	-0.329 (0.272)	-0.444* (0.268)	-0.451* (0.270)	-0.523* (0.271)	-0.431 (0.268)	-0.458* (0.270)
Ambiguity tolerance		-0.047 (0.094)								
General ambiguity tolerance			-0.09 (0.097)							
The insolubility of multiperspective problems				-0.011 (0.058)						
Power distance					-0.376*** (0.130)					
Individualism vs collectivism						-0.104 (0.100)				
Masculinity vs femininity							0.251** (0.103)			
Uncertainty avoidance								0.422*** (0.137)		
Long-term vs short-term orientation									-0.092 (0.117)	
Indulgence vs restrain										-0.120** (0.058)
Constant	0.61 -1.114	0.823 -1.194	1.088 -1.231	0.659 -1.143	1.928 -1.233	0.753 -1.123	-0.164 -1.178	-0.571 -1.193	0.757 -1.129	1.068 -1.144
Observations	597	597	597	597	597	597	597	597	597	597
Likelihood-ratio test of rho=0	63.270	63.530	64.120	63.310	72.170	64.360	69.420	72.940	63.900	67.65
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R2	0.077	0.077	0.078	0.077	0.087	0.078	0.084	0.088	0.077	0.082

The dependent variable Transport denotes managers with careers in renewable energy projects coded as 1 relative to the transportation sector coded as 0 among the sampled respondents regressed on project management variables in the baseline model (Model 1). Model (2) to (10) include each cultural dimension to estimate if part of the variation in the baseline model is explained by shared values as a proxy for the source of herding instincts. These cultural dimensions include ambiguity tolerance (AT), general ambiguity tolerance (GAT), perception of situations as insoluble dimension of ambiguity tolerance (IAT), power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restrain (IVR). The standard errors are reported in parentheses. The p-values are reported in stars ***, **, and * which denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

Table 5-32: Logit regression of macroeconomic and culture perceptions on managerial career selection between the renewable energy and transportation project contexts

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Financial market development	Transport 0.112 (0.123)	Transport 0.121 (0.124)	Transport 0.075 (0.125)	Transport 0.12 (0.124)	Transport 0.142 (0.125)	Transport 0.211* (0.127)	Transport -0.034 (0.131)	Transport 0.109 (0.124)	Transport 0.129 (0.125)	Transport 0.113 (0.124)	Transport 0.112 (0.123)
Market price fluctuations	-0.298*** (0.097)	-0.329*** (0.099)	-0.336*** (0.099)	-0.318*** (0.099)	-0.283*** (0.096)	-0.269*** (0.101)	-0.353*** (0.099)	-0.317*** (0.100)	-0.249** (0.099)	-0.298*** (0.097)	-0.298*** (0.097)
Public debt management	0.238* (0.124)	0.298** (0.127)	0.279** (0.126)	0.322** (0.129)	0.189 (0.126)	0.503*** (0.142)	0.300** (0.127)	0.230* (0.127)	0.471*** (0.138)	0.237* (0.124)	0.238* (0.124)
Carbon risk perception by stakeholders	0.072 (0.095)	0.093 (0.096)	0.1 (0.096)	0.086 (0.096)	0.105 (0.097)	0.084 (0.097)	0.047 (0.096)	-0.002 (0.098)	0.113 (0.097)	0.071 (0.095)	0.072 (0.095)
Voluntary carbon risk disclosures	-0.019 (0.072)	0.005 (0.073)	-0.014 (0.072)	-0.002 (0.073)	-0.027 (0.073)	0.059 (0.076)	-0.034 (0.073)	0.04 (0.075)	0.068 (0.076)	-0.02 (0.073)	-0.019 (0.072)
Ambiguity tolerance		-0.218*** (0.084)									
General ambiguity tolerance			-0.220** (0.092)								
The insolubility of multiperspective problems				-0.131** (0.053)							
Power distance					-0.234** (0.114)						
Individualism vs collectivism						-0.384*** (0.090)					
Masculinity vs femininity							0.375*** (0.101)				
Uncertainty avoidance								0.450*** (0.124)			
Long-term vs short-term orientation									-0.444*** (0.103)		
Indulgence vs restrain										-0.009 (0.054)	
Constant	-0.288 (1.075)	0.205 (1.104)	0.715 (1.161)	-0.281 (1.087)	1.01 (1.250)	-0.759 (1.100)	-1.412 (1.132)	-2.766** (1.304)	0.022 (1.097)	-0.237 (1.122)	-0.288 (1.075)
Observations	597	597	597	597	597	597	597	597	597	597	597
Likelihood-ratio test of rho=0	13.15	20.06	19	19.35	17.5	32.16	27.61	26.91	32.75	13.17	13.15
Prob > chi2	0.022	0.003	0.004	0.004	0.008	0.000	0.000	0.000	0.000	0.040	0.022
Pseudo R2	0.0159	0.0242	0.023	0.0234	0.0211	0.0389	0.0334	0.0325	0.0396	0.0159	0.0159

The dependent variable Transport denotes managers with careers in renewable energy projects coded as 1 relative to the transportation sector coded as 0 among the sampled respondents regressed on macroeconomic risk variables in the baseline model (Model 1). Model (2) to (11) include each cultural dimension to estimate if part of the variation in the baseline model is explained by shared values as a proxy for the source of herding instincts. These cultural dimensions include ambiguity tolerance (AT), general ambiguity tolerance (GAT), perception of situations as insoluble dimension of ambiguity tolerance (IAT), power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restrain (IVR). The standard errors are reported in parentheses. The p-values are reported in stars ***, **, and * which denote significance at the 1%, 5%, and 10% levels, respectively.

5.3.Secondary data analysis

The study modelled sovereign risk in the spirit of Simon’s definition of the organisation as “the pattern of communications and relations among a group of human beings, including the processes for making and implementing decisions” (Simon, 1955). Survey data offers single-point data, which limits the evaluation of culture’s role across time. Hence, the secondary data model used cultural distance to moderate the relationship between Kenya and lending syndicates. The specific impacts of each cultural dimension on infrastructure debt-side governance, project management, and macroeconomic risk across time were validated through moderation analysis through a longitudinal analysis of secondary data. Based on Hofstede's (2010) finding that culture remains stable over long periods – decades or centuries – the study tested the hypotheses to assess if culture’s stability over long periods might account for managerial herding towards market consensus or dispersing from the market consensus. Hypothesis **H7d** assessed the direct effect of sovereign bond spread changes on project risk premium as a baseline effect. Subsequently, hypotheses **H9b** to **H14b** estimated an indirect effect of culture on project risk premium using moderation analysis of secondary data to account for culture’s stability across time and unobservable events. Secondary data was analysed using pooled panel data regressions to triangulate the survey data findings. This longitudinal data analysis guides the study to infer a causal relationship between sovereign bond spreads and infrastructure risk premiums, moderated by the cultural distance between external lenders and Kenya to infer the social interaction between lenders and managers within Kenyan infrastructure projects.

5.3.1. Descriptive statistics of the secondary data

Table 5-33 presents the descriptive statistics from the secondary data comprising 50 qualifying infrastructure projects listed in *Appendix P*. The project selection criteria involved two factors:

- i. The aggregate lifecycle investment was \$100 million or more as of 31 December 2021.
- ii. The aggregate lifecycle investment should have comprised 60% or more external debt in the capital structure for debt-side governance rules to influence management behaviour.

The variable definitions and the sources are in *Appendix Q*.

Table 5-33: Descriptive statistics of the secondary data

Variable	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
Dependent variable							
Monthly project risk premium (basis points)	6468	0.60%	0.03	-2.70%	9.50%	1.237	4.027
Independent variables							
Monthly Sovereign bond spreads (SBS) (basis points)	6468	10.71%	.017	4.80%	17.10%	-0.022	5.277
Debt-side governance variables							
Debt-to-total investment ratio	6468	77.90%	0.09	59.00%	96.60%	0.267	1.608
Maturity in years	6468	29	13.02	10	60	0.842	2.511
Grace period in years	6468	7	2.27	3	10	0.315	1.86
Expected annual internal rate of return	6468	24.60%	0.05	14.40%	33.90%	-0.157	1.758
Public funding for projects	6468	84.60%	0.36	0	1	-1.912	4.657
Loan disbursement delays in years	6468	1.26	1.13	0	6	1.724	7.615
Loan utilisation rate (percentage)	6468	90.30%	0.16	11%	100%	-2.748	12.465
Climate risk disclosure	6468	85.50%	0.35	0	1	-2.016	5.065
Project management variables							
Disclosure of the number of jobs created	6468	75.50%	0.43	0	1	-1.186	2.408
ICT integration	6468	73.50%	0.44	0	1	-1.063	2.13
Schedule delay in years	6468	3	2.76	-0.5	17	2.4	13.294
Cost overrun	6468	79.40%	0.41	0	1	-1.452	3.108
Design change	6468	75.50%	0.43	0	1	-1.186	2.408
Number of community-based projects	6468	3	2.53	0	13	1.441	5.568
Number of institutional capacity-building project	6468	2	1.13	0	7	2.153	9.211
Technical or financial audit delays	6468	20.20%	0.40	0	1	1.485	3.206
Loan utilisation delay	6468	20.20%	0.40	0	1	1.485	3.206
Litigation matter	6468	18.20%	0.39	0	1	1.653	3.731
Loan approval delays	6468	20.40%	0.40	0	1	1.468	3.156
Contractor payment delays	6468	8.20%	0.27	0	1	3.056	10.339
CDM registration	6468	20.20%	0.40	0	1	1.485	3.206
Government funding delays	6468	20.40%	0.40	0	1	1.468	3.156
Land acquisition disputes	6468	59.00%	0.49	0	1	-0.365	1.133
Employee disputes	6468	26.50%	0.44	0	1	1.063	2.13
Vandalism	6468	63.30%	0.48	0	1	-0.55	1.303
Environmental impact assessment events	6468	65.30%	0.48	0	1	-0.643	1.414
Number of cross-sectoral collaborators	6468	7	3.83	2	17	0.782	2.658
Macroeconomic variables							
Carbon price (US\$)	6468	15.521	15.12	3.07	80.9	2.116	7.628
Crude oil price (US\$)	6468	68.545	23.01	18.84	113.93	0.212	1.816
Corruption index	6468	63.30%	0.04	57.90%	71.50%	0.631	2.521
Syndicate size (Number of foreign countries)	6468	2	2.06	1	13	3.335	16.862
GDP growth rate	6468	0.005	0.022	-0.018	0.172	5.044	31.804
Lagged externaldebtimport change	6468	14.580	7.416	5.252	32.004	0.494	2.019
Moderators: Sociocultural variables							
PDI distance	6468	0.107	0.150	-0.100	0.570	0.617	3.664
IDV distance	6468	-0.271	0.200	-0.660	0.050	0.037	2.257
MAS distance	6468	0.053	0.100	-0.205	0.210	-0.280	2.006
UAI distance	6468	-0.094	0.180	-0.440	0.200	0.250	2.099
LTO distance	6468	-0.245	0.200	-0.557	0.063	-0.224	1.801
IVR distance	6468	-0.042	0.140	-0.289	0.400	0.753	3.811

Several dummy variables representing variables from the project appraisal reports are included as follows: 1 for projects funded with public external debt and 0 otherwise; 1, climate risk disclosure data available, 0 otherwise; 1 for disclosure of number of jobs created, 0 otherwise; 1 ICT integration included in the project scope, 0 otherwise; 1 if cost overrun was reported, 0 otherwise; 1 if design changes were reported, 0 otherwise; 1 if technical or financial audit delays were reported 0 otherwise; 1 if there was a loan utilisation delay after approval, 0 otherwise; 1 if there was a litigation incident, 0 otherwise; 1 if the report indicated there was a loan approval delay, 0 otherwise; 1 if there were contractor payment delays reported, 0 otherwise; 1 if the project was registered as Clean Development Mechanism (CDM), 0 otherwise; 1 if government funding as the counterparty to the project finance agreement delayed, 0 otherwise; 1 if there were land acquisition disputes with the community, 0 otherwise; 1 if there were employee disputes, 0 otherwise; 1 if the appraisal report indicated that the project had experienced vandalism, 0 otherwise; 1 if there were negative environmental impact assessment events or incidents, 0 otherwise. These cultural distance dimensions include the power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restraint (IVR).

Source: Author (2023)

5.3.1.1. Theme 1: Sovereign risk premium (dependent variable)

The project risk premium (PRP) in each infrastructure project is the dependent variable; this refers to the additional yield investors demand as compensation for the risk associated with investing in debt securities of the Kenya government for infrastructure projects. It is the difference between the annual interest rate on each project loan and the US 10-year treasury bond yield as the international risk-free investment benchmark (Morsy & Moustafa, 2020). Where several loan disbursements were made, a weighted average was computed. Within the range of -2.70% to 9.50%, the infrastructure premia averaged 0.60 basis points. It suggests that the infrastructure project finance yield can be slightly lower (negative spread) or higher (positive spread) than the 10-year US government bond. The skewness and kurtosis values of 1.237 and 4.027, respectively, indicate a distribution with right skewness and heavy tails. The sovereign bond spreads increased from 4.8 % to 17.1 % over time, which implies that the rising infrastructure risk premia may be attributed to the sovereign risk spillover. Loan maturity has increased from 10 to 60 years, and the loan utilisation rate averaged 90.3%, revealing that most projects were in advanced stages of construction or operational. The loan grace period indicates that construction debt tends to be of short maturity, perhaps 3 to 10 years. Financiers ranged from 1 country to syndicates of 13 countries, revealing Kenya's deepening international market access could expose it to geographical and cultural distance biases that Dorobantu & Müllner (2019) and Dang & Partington (2020) identified.

5.3.1.2. Independent variables

Among the independent variables, debt-side governance variables encompass metrics such as debt-to-total investment ratio (mean: 77.90%, std. dev.: 0.09), maturity in years (mean: 29, std. dev.: 13.02), and loan utilisation rate (mean: 90.30%, std. dev.: 0.16). These variables signify the long lifecycle financial structure and terms of large infrastructure lifecycle management conditions. The government was the lead investor in 84.6% of the projects, portraying low institutional, regulatory, and policy achievements in Kenya's commitment to private sector participation in infrastructure services. Hence, the recent enactment of the Public-Private Partnerships (PPP) Bill (2021) is a step in the right direction.

Project management variables include schedule delay in years (mean: 3, std. dev.: 2.76) and the number of cross-sectoral collaborators (mean: 7, std. dev.: 3.83). Over 70% of projects experienced cost overrun and design change, and over 50% experienced land acquisition disputes, environmental impact assessment disputes or vandalism, suggesting various stakeholder engagement challenges.

Macroeconomic variables exhibit diverse characteristics, such as carbon price (mean: 15.521, std. dev.: 15.12), crude oil price (mean: 68.545, std. dev.: 23.01), and GDP per capita (mean: 1580.888, std. dev.: 278.18), indicating the international economic risk context of project environments. The mean GDP growth rate is positive (0.005), indicating overall economic expansion and the standard deviation suggests minimal

variability in growth rates. The mean external debt to imports ratio is relatively high (14.58), indicating a significant reliance on external financing for imports, with notable variability across time.

Finally, the sample distribution of cultural distances into negative and positive scores reflects Kenya's deepening level of cultural exchanges through its integration into the global economy in geographically dispersed infrastructure project finance syndicate.

5.3.2. Factor analysis

5.3.2.1. Theme 2: Debt-side governance variables

Table 5-34 shows that the KMO value of 0.516 meets the minimum threshold, and Bartlett's sphericity test indicates that the variables are likely correlated and suitable for factor analysis. The eigenvalues above 1 show that the cumulative proportion of variance explained by the first six components is around 0.7956, indicating that these components capture a significant portion of the total variance in the data.

Table 5-34: KMO, Bartlett's test, and factor analysis for debt-side governance

KMO and Bartlett's Test					
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.516			
Bartlett test of sphericity	Chi-square	10659.86			
	df	45			
	p-value	0.000			
Principle component matrix					
Component	Eigenvalue	Difference	Proportion	Cumulative	
Comp1	2.2416	0.7633	0.2242	0.2242	
Comp2	1.4783	0.2135	0.1478	0.3720	
Comp3	1.2648	0.2484	0.1265	0.4985	
Comp4	1.0164	0.0116	0.1016	0.6001	
Comp5	1.0047	0.0540	0.1005	0.7006	
Comp6	0.9508	0.0809	0.0951	0.7956	
Comp7	0.8699	0.3402	0.0870	0.8826	
Comp8	0.5297	0.1737	0.0530	0.9356	
Comp9	0.3560	0.0681	0.0356	0.9712	
Comp10	0.2879	.	0.0288	1.0000	
Variable correlation matrix					
	Comp1	Comp2	Comp3	Comp4	Comp5
Project risk premium	0.5627	0.2522	-0.0439	0.0685	-0.0051
Debt to total investment ratio	- 0.0302	-0.4150	0.1833	0.3479	0.4164
Maturity	- 0.4423	0.4993	-0.0377	0.0405	0.0076
Grace period	- 0.1730	0.6288	0.1312	0.1854	0.3029
Expected internal rate of return	- 0.1571	-0.1048	0.7291	0.0765	-0.0781
Funding source	- 0.4548	-0.2149	0.1629	0.0038	0.0026
Loan disbursement delay	0.3099	0.1189	0.4884	-0.1799	-0.4408
Loan utilisation rate	0.3174	-0.0393	0.0391	0.2130	0.5120
Climate risk disclosure	0.1627	0.2085	0.3833	-0.0957	0.3250
Sovereign bond premium	0.0456	0.0566	-0.0275	0.8634	-0.4080

Source: Author (2023)

5.3.2.2. Theme 3: Project management variables

Table 5-35 shows that the KMO value of 0.513 suggests that the dataset meets the minimum value of 0.5, making it suitable for factor analysis. Moreover, Bartlett's test of sphericity indicates that the variables are likely correlated and suitable for factor analysis. Eigenvalues above 1 and the proportion of variance indicate that the first six components explain around 71.28% of the variance.

Table 5-35: KMO, Bartlett's test, and factor analysis for project management variables

KMO and Bartlett's Test						
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.513				
Bartlett test of sphericity	Chi-square	74102.08				
	df	171				
	p-value	0.000				
Principle component matrix	Eigenvalue	Difference	Proportion	Cumulative		
Comp1	4.7211	1.9885	0.2485	0.2485		
Comp2	2.7326	0.3230	0.1438	0.3923		
Comp3	2.4096	0.9053	0.1268	0.5191		
Comp4	1.5044	0.3522	0.0792	0.5983		
Comp5	1.1521	0.1287	0.0606	0.6589		
Comp6	1.0235	0.1018	0.0539	0.7128		
Comp7	0.9217	0.0701	0.0485	0.7613		
Comp8	0.8515	0.1207	0.0448	0.8061		
Comp9	0.7308	0.1158	0.0385	0.8446		
Comp10	0.6151	0.0886	0.0324	0.8770		
Comp11	0.5265	0.1094	0.0277	0.9047		
Comp12	0.4171	0.0283	0.0220	0.9266		
Comp13	0.3888	0.0685	0.0205	0.9471		
Comp14	0.3203	0.0445	0.0169	0.9639		
Comp15	0.2758	0.1160	0.0145	0.9785		
Comp16	0.1598	0.0459	0.0084	0.9869		
Comp17	0.1139	0.0200	0.0060	0.9929		
Comp18	0.0939	0.0524	0.0049	0.9978		
Comp19	0.0416	.	0.0022	1.0000		
Variable correlation matrix	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6
Jobs created	0.2379	0.2750	-0.1698	0.3732	0.1576	-0.2719
ICT integration in projects	0.1922	0.0631	0.2641	-0.3255	0.0941	-0.2919
Schedule delay	-0.0540	0.1181	0.4290	0.1355	0.4235	0.2376
Cost overrun	-0.0421	0.4178	0.1216	-0.1618	0.0246	0.1031
Design change	0.0634	0.2762	-0.0657	-0.4657	0.4789	-0.0427
Community-based initiatives	0.2995	0.0431	0.0768	-0.0454	-0.2246	-0.1618
Institutional capacity building	0.1711	0.1584	0.2992	0.1405	-0.2043	-0.1451
Financial audit delays	0.3464	-0.2297	0.1008	-0.1126	0.0849	0.2616
Loan disbursement	0.2057	-0.3138	-0.1904	-0.1372	0.3581	-0.1061
Litigation	0.2923	-0.1526	-0.0393	-0.3784	-0.0833	0.0787
Lender-approval time	0.3045	-0.2324	-0.1692	0.1404	0.1627	-0.0944
Contractor payment delays	0.1396	-0.2082	0.3266	0.3216	0.3539	-0.0249
CDM registration	0.2783	-0.0213	0.3661	-0.0360	-0.0874	0.2868
Government funding delay	0.3428	-0.1864	-0.0376	0.0401	-0.2868	-0.0029
Land acquisition disputes	0.1956	0.2801	-0.4043	-0.1414	0.0446	0.1353
Employee dispute	0.2482	0.1222	-0.1846	0.1485	-0.0647	0.3992
Vandalism	-0.1127	-0.1538	-0.2738	0.2043	0.2287	0.3580
Environmental impact events	0.2773	0.2905	-0.1055	0.2838	0.1227	-0.2968
Number of cross-sector collaborators	0.1855	0.3466	0.0208	0.0805	-0.0852	0.3914

Source: Author (2023)

5.3.2.3. Theme 4: Macroeconomic variables

According to Table 5-36, the KMO value of 0.754 indicates a relatively acceptable level of sampling adequacy, and the very low p-value from the Bartlett's test of sphericity indicates that the correlations between variables are significantly different from zero, further supporting the appropriateness of factor analysis. The eigenvalues, proportions, and cumulative proportions show that the explained variance by the first two components accounts for 65.56% of the variation.

Table 5-36: KMO, Bartlett's test, and factor analysis for macroeconomic variables

KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.754		
Bartlett test of sphericity	Chi-square	41689.1		
	df	28		
	p-value	0.000		
Principle component matrix	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.5578	3.2156	0.5064	0.5064
Comp2	1.3422	0.3422	0.1491	0.6556
Comp3	1.0000	0.2053	0.1111	0.7667
Comp4	0.7947	0.1102	0.0883	0.8550
Comp5	0.6846	0.3738	0.0761	0.9310
Comp6	0.3107	0.1499	0.0345	0.9656
Comp7	0.1608	0.0810	0.0179	0.9834
Comp8	0.0798	0.0105	0.0089	0.9923
Comp9	0.0693	.	0.0077	1.0000
Variable correlation matrix	Comp1	Comp2		
Carbon futures price	0.3441	0.3949		
Crude oil futures price	-0.3248	0.4017		
Corruption index	0.3612	0.1933		
Syndicate size	0.1203	0.0001		
External debt to imports	0.4461	0.0085		
GDP per capita	0.4425	0.0278		
Short-term debt to reserves	-0.0943	-0.7002		
Exchange rate	0.4251	-0.1622		
Inflation	-0.2473	0.3576		

Source: Author (2023)

5.3.2.4. Theme 5: Cultural distance

This study delves into a comprehensive exploration of the cultural disparities between Kenya and its external infrastructure lending syndicates. Through a meticulous analysis of cultural variables encompassing the power distance index (PDI), individualism vs collectivism (IDV), masculinity vs femininity (MAS), uncertainty avoidance index (UAI), long-term vs short-term orientation (LTO), and indulgence vs restraint (IVR), key statistical insights about cultural distance emerge. The mean values provide a foundational measure of central tendency, while the standard deviations signify the extent of variance present within the dataset. A lower mean value and standard deviation for cultural distances like IDV and UAI might indicate a degree of cultural alignment between Kenya and its lending syndicates. This alignment can foster smoother communication, collaboration, and decision-making processes, potentially leading to more effective infrastructure development projects. Higher standard deviations and skewed

distributions in certain variables like power distance index (PDI) and long-term orientation (LTO) may suggest cultural frictions or disparities that could impact the negotiation and implementation of lending agreements. These disparities might lead to misunderstandings or conflicts if not managed appropriately. The range of values and the magnitude of skewness could inform the assessment of risks associated with lending agreements. For instance, a higher skewness might indicate an uneven distribution of cultural attitudes, leading to unforeseen challenges during the project's lifecycle.

5.3.3. Correlation analysis

5.3.3.1. Theme 1: Debt-side governance

Table 5-34 presents the variable correlation matrix where the risk premium, debt-to-total investment ratio, maturity, expected internal rate of return, and funding source significantly correlate with Comp1. These variables could represent a factor related to financial risk and differences in funding sources between commercial and concessional debt identified by Pueyo (2018). The debt-to-total investment, maturity, grace period, loan disbursement delay, and loan utilisation rate correlate positively with Comp2, suggesting that these variables might capture aspects related to international market timing and terms of debt financing. Expected internal rate of return and climate risk disclosure show strong positive correlations with Comp3. This component could represent the intersection of financial return expectations and climate-related risks. The sovereign risk strongly correlates with Comp4, suggesting a factor associated with the government's financial stability risk.

5.3.3.2. Theme 2: Project management variables

Table 5-35 presents the matrix correlating the original variables and the identified components. Variables such as the jobs created by ICT integration in projects, design change, community-based initiatives, and government funding delays have significant positive correlations with Comp1. This indicates that these variables tend to vary and contribute to the underlying factor represented by Comp1, possibly related to collaboration characteristics. Schedule delays, cost overruns, financial audit delays, contractor payment delays, and the number of cross-sector collaborators show positive correlations with Comp2. These variables might be associated with time and cost/budget management aspects of projects. Land acquisition disputes, employee disputes, and vandalism show moderate positive correlations with Comp3. These factors could pertain to project disruptions and conflicts.

5.3.3.3. Theme 3: Macroeconomic risks

The variable correlation matrix in Table 5-36 indicates that cultural carbon futures price, crude oil futures price, corruption index, external debt to imports, GDP per capita, exchange rate, and inflation have moderate to strong positive correlations with Comp1. This suggests that these variables share a common

underlying pattern contributing to the variance explained by Comp1, potentially indicating a group of macroeconomic factors related to infrastructure risk management determinants under certain economic conditions and across time in the lifecycle. Short-term debt to reserves and exchange rate negatively correlate with Comp2, showing that these variables are inversely related to certain macroeconomic aspects.

5.3.4. Panel data regression analysis

5.3.4.1. Data preparation and multicollinearity analysis

Cross-sectional data is the external debt in US\$ for 50 projects comprising 29 renewable energy and 21 transportation infrastructure projects (1 rail). Each project's time series data is monthly sovereign risk premium observations from 2011 to 2021.

- **The dependent variable**, project risk premium (PRP), is the difference between each project's annual loan interest rate and the US 10-year treasury bond.
- **Independent variables**: the time-varying international risk variable is the sovereign bond spreads (SBS), and the time-invariant variable is cultural distance.
- **Control variables**: debt-side governance, project management, and macroeconomic factors.

Table 5-37 shows that the variance inflation factor (VIF) and the reciprocal (1/VIF) for various variable categories indicate a moderate multicollinearity level in the overall OLS model in Table 5-38. Besides, the correlation analyses in Tables 5-39 to 5-41 show low correlations, confirming low multicollinearity.

Table 5-37: Variance inflation factor results for secondary data

Variable	VIF	1/VIF
Lagged SBS	1.1900	0.8429
GDP growth	1.0400	0.9637
Lagged externaldebtimports	5.0900	0.1964
Debt-to-total investment	4.3100	0.2319
Maturity	3.1900	0.3138
Grace period	2.5100	0.3979
Expected internal rate of return	3.2700	0.3055
Sector	2.9600	0.3373
Disbursement delay notice	3.8200	0.2619
Loan utilisation	2.3400	0.4270
Climate risk disclosure	1.7100	0.5839
ICT integration	2.3400	0.4279
Schedule delay	3.0400	0.3285
Cost overrun	2.8200	0.3542
Design change	3.3100	0.3025
Community-based projects	2.8900	0.3464
Institutional capacity	2.3500	0.4262
Litigation	2.3100	0.4320
Timely contractor payment	2.5500	0.3922
CDM registration	3.8700	0.2586
Land disputes	5.7900	0.1727
Employee disputes	2.8300	0.3538
Vandalism	2.9600	0.3377
Environmental impact	3.0100	0.3320
Cross-sectoral institutions	4.2300	0.2366
Carbon futures price	2.3900	0.4191
Crude oil futures price	2.5500	0.3926

Corruption index	2.6700	0.3742
Syndicate size	5.1300	0.1949
Mean VIF	3.0500	

Source: Author (2023)

Table 5-38: OLS regression of infrastructure project risk premium on sovereign bond spread and culture

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	PRP	PRP	PRP	PRP	PRP	PRP	PRP
Lagged_SBS	0.1172***	0.1392***	0.2076***	0.1282***	0.1454***	0.1137***	0.1361***
	-0.0088	-0.009	-0.0089	-0.0088	-0.0083	-0.0093	-0.0084
GDP_growth	-0.0134**	-0.0133**	-0.0133**	-0.0135**	-0.0135**	-0.0134**	-0.0133**
	-0.0064	-0.0063	-0.006	-0.0063	-0.006	-0.0064	-0.0061
Lagged_externaldebtimports	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Debt to total investment	-0.0623***	-0.0619***	-0.0797***	-0.0643***	-0.0465***	-0.0622***	-0.0895***
	-0.003	-0.003	-0.0029	-0.003	-0.0029	-0.003	-0.0031
Maturity	-0.0002***	-0.0001***	-0.0001***	-0.0002***	-0.0000**	-0.0002***	-0.0001***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Grace period	0.0014***	0.0006***	-0.0003**	0.0012***	0.0001	0.0014***	0.0010***
	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
Expected Internal rate of return	0.0164***	0.0060	(0.0057)	0.0152***	-0.0289***	0.0148***	0.0079*
	-0.0045	-0.0046	-0.0044	-0.0045	-0.0045	-0.0047	-0.0043
Sector	-0.0304***	-0.0307***	-0.0344***	-0.0307***	-0.0267***	-0.0305***	-0.0351***
	-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	-0.0007	-0.0006
Disbursement delay notice	0.0100***	0.0106***	0.0123***	0.0105***	0.0107***	0.0100***	0.0122***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Loan utilisation	-0.0034***	-0.0093***	-0.0166***	-0.0022*	-0.0039***	-0.0038***	-0.0141***
	(0.0013)	(0.0014)	(0.0013)	(0.0013)	(0.0012)	(0.0013)	(0.0013)
Climate risk disclosure	-0.0078***	-0.0066***	-0.0034***	-0.0063***	-0.0064***	-0.0075***	-0.0033***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0005)
ICT Integration	0.0169***	0.0176***	0.0170***	0.0160***	0.0137***	0.0168***	0.0156***
	(0.0005)	(0.0005)	(0.0004)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Schedule delay	-0.0002**	0.0006***	0.0014***	0.0001	0.0010***	-0.0002*	0.0005***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Cost overrun	-0.0179***	-0.0208***	-0.0176***	-0.0185***	-0.0163***	-0.0179***	-0.0149***
	(0.0006)	(0.0006)	(0.0005)	(0.0006)	(0.0005)	(0.0006)	(0.0006)
Design change	-0.0177***	-0.0203***	-0.0256***	-0.0178***	-0.0199***	-0.0179***	-0.0268***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0005)	(0.0006)	(0.0007)
Community-based projects	0.0006***	0.0004***	0.0008***	0.0007***	0.0011***	0.0006***	0.0012***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Institutional capacity	0.0013***	0.0015***	0.0005***	0.0014***	0.0020***	0.0013***	-0.0007***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Litigation	-0.0085***	-0.0098***	-0.0072***	-0.0089***	-0.0074***	-0.0085***	-0.0082***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Timely contractor payment	0.0019**	-0.0023***	-0.0044***	(0.0004)	-0.0035***	0.0015*	0.0013*
	(0.0008)	(0.0009)	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0008)
CDM registration	0.0027***	0.0039***	0.0071***	0.0012*	0.0068***	0.0026***	0.0023***
	(0.0007)	(0.0007)	(0.0006)	(0.0007)	(0.0006)	(0.0007)	(0.0006)
Land disputes	0.0118***	0.0162***	0.0216***	0.0141***	0.0164***	0.0120***	0.0197***
	(0.0007)	(0.0008)	(0.0007)	(0.0007)	(0.0006)	(0.0007)	(0.0007)
Employees disputes	0.0171***	0.0149***	0.0130***	0.0157***	0.0126***	0.0169***	0.0155***
	(0.0005)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0005)
Vandalism	-0.0188***	-0.0224***	-0.0229***	-0.0190***	-0.0210***	-0.0190***	-0.0214***
	(0.0005)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Environmental impact	0.0051***	0.0056***	(0.0002)	0.0030***	0.0013***	0.0050***	0.0015***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Cross-sectoral institutions	-0.0006***	-0.0006***	-0.0003***	-0.0006***	-0.0010***	-0.0006***	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Carbon futures price	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Crude oil futures price	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Corruption index	0.0918***	0.0921***	0.0920***	0.0918***	0.0915***	0.0919***	0.0920***
	(0.0055)	(0.0055)	(0.0052)	(0.0055)	(0.0052)	(0.0055)	(0.0053)
syndicate size	-0.0031***	-0.0033***	-0.0050***	-0.0031***	-0.0035***	-0.0031***	-0.0043***
	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
Lagged_SBS_PDI		-0.2038***					
		(0.0190)					
Lagged_SBS_IDV			0.3173***				
			(0.0113)				
Lagged_SBS_MAS				-0.1862***			
				(0.0206)			
Lagged_SBS_UAI					0.2506***		
					(0.0086)		
Lagged_SBS_LTO						-0.0144	
						(0.0124)	
Lagged_SBS_IVR							0.4054***
							(0.0159)
Constant	0.0258***	0.0363***	0.0651***	0.0255***	0.0234***	0.0263***	0.0592***
	(0.0045)	(0.0045)	(0.0044)	(0.0044)	(0.0042)	(0.0045)	(0.0045)
Observations	6,468	6,468	6,468	6,468	6,468	6,468	6,468
R-squared	0.8011	0.8046	0.8227	0.8036	0.8243	0.8012	0.8195

PRP denotes infrastructure risk premium changes. SBS denotes sovereign bond spread changes. The lagged SBS measure is interacted with six dimensions of national culture: power distance index (PDI), individualism (IDV), masculinity (MAS), uncertainty avoidance index (UAI), long-term orientation (LTO), and indulgence (IVR). The standard errors are reported in parentheses. The P-values are reported as stars ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

5.3.4.2. Diagnostic tests for panel data properties

Before running the regression models, the diagnostic tests for panel data properties were done. It entailed testing the presence of heteroscedasticity and endogeneity in the data. Heteroscedasticity was examined using Breusch and Pagan's (1980) Lagrange multiplier (LM) test to assess if the variances of the error terms vary systematically across observations to determine cross-sectional dependence. Robust standard errors were used to address heteroskedasticity. Subsequently, the instrumental variable (IV) technique, the Durbin–Wu–Hausman test (Hausman, 1978), was used to identify potential endogeneity issues arising from omitted variables or reverse causality.

Heteroscedasticity test results

Variable: Fitted values of project risk premium

H0: Constant variance

Chi2(1) = 541.90

Prob > chi2 = 0.0000

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

H0: $\sigma(i)^2 = \sigma^2$ for all i

chi2 (49) = 150.96

Prob>chi2 = 0.0000

The null hypothesis was rejected since the p-value (0.0000) is smaller than the significance level (usually 0.05). It suggests heteroskedasticity in the model, indicating that the assumption of constant variance of the error terms is violated. The presence of heteroskedasticity may affect the reliability of the coefficient estimates and statistical inference in the regression model. Robust standard errors were used to address heteroskedasticity.

Endogeneity test results

H0: Variables are exogenous

Durbin (score) chi2(1) = 6370.33 (p = 0.0000)

Wu-Hausman F (1,6441) = 420082 (p = 0.0000)

Based on both tests, there is strong evidence to reject the null hypothesis of exogeneity. It suggests that endogeneity is present in the model, meaning that at least one independent variable correlates with the error term. It implies that the estimates obtained from the regression model may be biased and not provide reliable estimates of the true causal relationships. Endogeneity was addressed by using the instrumental variable

estimation command in Stata. The study used the xtreg command with the vce (robust) option to address heteroskedasticity in a pooled panel data model.

Consequently, the pooled panel data model was the appropriate estimation method based on the model assumptions and the diagnostic tests. The pooled panel data model with an interaction term was selected to allow the inclusion of time-invariant variables and to account for unobserved heterogeneity across panel units (projects). It allowed examination of the effect of interaction terms between the independent variable (sovereign bond spreads) and time-invariant moderator variables (cultural distances that shape the dependent variable) and sovereign risk premium in infrastructure projects.

The study examined hypothesis **H7d** by estimating multivariate regression models (9). It controls for the economic growth and national debt factors that might directly impact sovereign ratings and premium shifts by following Borensztein *et al.*'s (2013) analysis of the spillover effect. The study used the lagged independent variables (sovereign bond spreads, GDP growth and external debt to imports), analysed the dependent variable (project risk premium) across a long-time horizon, controlled for the direct effect of infrastructure debt-side governance, project-level and macroeconomic-level variables, and year dummies to address potential endogeneity, and omitted variables in the baseline specification.

$$PRP_{it} = \beta_0 + \beta_1 SBS_{t-1} + \beta_2 X_i + \beta_3 CUL_c \times SBS_{t-1} + \alpha_i + \mu_i + \varepsilon_{it} \quad (9)$$

Where:

Subscript *it* refers to project *I* and period *t*.

PRP_{it} refers to the project risk premium derived from the sovereign risk premium level in evaluating infrastructure lifecycle management.

SBS_{t-1} refers to sovereign bond spread levels denoting the systematic risk affecting all economic infrastructure projects' sovereign risk premium level. All models included the one-month lagged sovereign bond spreads variable to partially adjust systemic risk to the long-run equilibrium.

X_i denotes economic growth and external debt to imports control variables representing the unsystematic sovereign risk-taking actions.

$\beta_5 CUL_c \times SBS_{t-1} + \varepsilon_{it}$ represents the interaction effect between national culture and sovereign bond spreads.

Year fixed effects are included.

α_i denotes the time-invariant moderator variable (cultural distance).

μ_i represents the fixed effects capturing unobserved heterogeneity across panel units.

ε_{it} is the error term.

To test Hypothesis **H7e**, whether the national culture affects the spillover of sovereign risk on infrastructure risk premia in the private sector, the study implemented the regression analysis with year-fixed effects based on the following multivariate regression models (10). Since culture remains stable for decades (Hofstede *et al.*, 2010), this model only considers culture's interactional effects with sovereign bond spreads.

$$PRP_{it} = \beta_0 + \beta_1 SBS_{t-1} + \beta_2 X + \beta_3 Year_i + \beta_4 CUL_c \times SBS_{t-1} + \mu_i + \varepsilon_{it} \quad (10)$$

Where:

$\beta_3 Year_i$ stands for the year dummy variables.

To test hypotheses **H9b**, **H10b**, **H11b**, **H12b**, **H13b**, and **H14b**, whether the national culture affects the spillover of sovereign risk on infrastructure risk premium, the study implemented the regression analysis based on the following multivariate regression models (11) as follows.

$$SRP_{it} = \beta_0 + \beta_1 SBS_{t-1} + \beta_2 X_i + \beta_3 Z_i + \beta_4 CUL_c \times SBS_{t-1} + \alpha_i + \mu_i + \varepsilon_{it} \quad (11)$$

Where:

Z_i stands for the infrastructure debt-side governance, project management, and macroeconomic risk variables representing each scenario's unsystematic managerial risk-taking actions.

CUL_c is the measure for the six dimensions of national culture.

5.3.4.3. Regression of sovereign bond spread on infrastructure project risk premium with national culture moderation effect

According to the sovereign bond spreads (SBS) coefficients, Table 5-42 shows that sovereign risk premiums significantly and positively affect the project risk premium (PRP) at the 1% level in the baseline model (1) and cultural subsample models (2) to (8). The baseline model results confirm **H7d** and the positive spillover effect consistent with Borensztein *et al.* (2013) and Hill *et al.* (2018). It indicates that past systemic risk contributes to Kenya's current infrastructure risk premia by approximately 15.47% in the sampled projects. As expected, GDP growth is desirable, but the rising external debt to imports is undesirable. Additionally, the sector dummy coefficient significantly and negatively affects the project risk premium (PRP) at the 1% level in the baseline model (1) and cultural subsample models (2) to (8). These results confirm **H7e**, that the spillover effect is severe in the private sector (coded as 0), implying a private sector project will be riskier than a home government project since the sovereign default directly influences the project solvency assessment model considering cultural and institutional integration risks (Guiso *et al.*, 2016) through government policy guarantees to the private sector (Delmon, 2021). These results affirm Kamau's (2016) view that the private sector did not participate in infrastructure PPPs due to risk aversion.

The results also show that infrastructure project risk premiums are significantly and positively associated with UAI at the 1% level and significantly and negatively associated with MAS at the 1% level. As shown in columns (4) and (6) of Table 5-42, the coefficients for (SBS×MAS) and (SBS×LTO) are statistically significant and positive at the 10% and 5% level, respectively, consistent with hypotheses *H7d*, *H11b*, and *H13b*, revealing that the positive spillover effect is sustained when SBS interacts with these dimensions. This evidence suggests herding towards market consensus about infrastructure project risk is a spillover effect. While Kenya's masculinity is desirable in pursuing economic objectives, aggressiveness and short-term orientation may be undesirable in confronting sovereign risk spillover to infrastructure projects, consistent with the evidence from the Chinese context by Liu *et al.* (2015). Columns (3), (5), and (7) show that the coefficients for (SBS×IDV), (SBS×UAI), and (SBS×IVR) are statistically significant and negative at the 5% level; this is inconsistent with *H7d*, *H10b*, and *H14b*, revealing that the positive spillover effect reverses when SBS interacts with IDV and IVR. This confirms hypothesis *H12b*. Considering Kenya's collectivist, intermediate UAI and restraint cultural orientation relative to the syndicates sampled, the results imply that collectivism, associated with lower risk premiums, could indicate that IDV, UAI, and IVR mediate herding towards within-country consensus by dispersing from international market risk consensus to prioritise effective public sector collaboration and reduced uncertainty to mitigate high-risk sovereign premiums. The IVR finding suggests that restrained cultural orientation relative to the sampled syndicates where social norms influence behaviour may reinforce social order, which is desirable in the sovereign risk assessment model of cross-border-funded projects. This resonates with the finding that collectivists value negotiation and inclusive decision-making, which minimises conflict (Liu *et al.*, 2015).

5.3.4.4. Regression of sovereign bond spread interaction with national culture and year dummy variables on infrastructure project risk premium

Table 5-43 demonstrates the regressions of sovereign bond spread level (SBS) interaction with national culture effects on infrastructure project risk premium (PRP) with year dummy variables to account for unobservable policy and regulatory changes. According to the year dummy coefficients, Table 5-43 shows that year dummies significantly and negatively affect the project risk premium (PRP) at the 1% level in all the models. In terms of magnitude, the coefficients for 2013, 2014, 2018, 2012, and 2015 are notable, with 2013 having the strongest impact. Kenya launched its Vision 2030 in 2012, focusing on long-term development and ambitious infrastructure goals, including transportation, energy, and urban development. The introduction of the Feed in Tariff Policy in 2012 aimed to promote renewable energy investment. The National Integrated Transport Policy and the Public-Private Partnerships Act of 2012 and 2013, respectively, provided frameworks for transportation planning, infrastructure development, and PPP project implementation. These policies aimed to enhance transparency and private sector participation. Kenya's

2013 presidential elections led to political change and financial closing for the Standard Gauge Railway project. This project aimed to modernise rail transportation and began construction in 2013. The country continued to develop its geothermal energy resources with projects like the Olkaria Geothermal Plant. The Renewable Energy Act 2014 facilitated renewable energy sector growth, while Kenya issued its first sovereign bond for \$2.2 billion. The Kenya Urban Support Program, launched in 2015, focused on improving urban infrastructure and services. 2015 saw progress in wind energy with the Lake Turkana Wind Power Project and energy sector reform via the reformation of the Energy Act in 2015 and 2019.

A review of Kenya's sovereign ratings history by Fitch Ratings (2023) revealed a B+ rating until July 2015, when it was downgraded to "Negative", signifying increased default risk. The country ceiling also experienced downgrades to B in December 2022, reflecting a declining debt service capacity. These policy changes, infrastructure developments, and sovereign rating fluctuations underscore the importance of evaluating the role of culture through Kenya's managerial learning capacity. Columns (3), (5) and (7) of Table 5-43 show that the coefficients for (SBS×IDV), (SBS×UAI) and (SBS×IVR) are statistically significant and negative at the 1% level, inconsistent with hypotheses *H7d*, *H10b*, and *H14b*. While they reveal that the positive spillover effect reverses when SBS interacts with these dimensions, they confirm hypothesis *H12b* and corroborate herding towards in-country consensus. As shown in columns (4) and (6) of Table 5-43, the coefficients for (SBS×MAS) and (SBS×LTO) are statistically significant and positive at the 1% level, consistent with hypotheses *H7d*, *H11b*, and *H13b*, revealing that the positive spillover effect is sustained when SBS interacts with these cultural dimensions, thus reflecting herding towards international market consensus in evaluating the sovereign risk susceptibility of infrastructure projects. The SBS effect is reinforced in column 6 of Table 5-43, the model with the interaction term (SBS×LTO). This affirms that short-term orientation may be undesirable in evaluating the sovereign risk in long-term infrastructure project development lifecycles.

5.3.4.5. Regression of sovereign bond spreads on infrastructure project risk premium with national culture moderation effect and debt-side governance variables

In Table 5-44, the overall results show that infrastructure project risk premiums are significantly and positively associated with PDI and UAI at the 10% and 5% level, respectively, when controlling for the effect of debt-side governance, economic growth, and external debt to imports. Loan disbursement and utilisation delays positively influence project risk premiums. This suggests that cross-border asymmetric information and information flow are impounded in project risk premiums (Dorobantu & Müllner, 2019). It is consistent with the debt-side governance theory that low information flow elevates monitoring costs (Whitehead, 2015), which spills over to elevated project risk premiums. Meanwhile, infrastructure project risk premiums are significantly and negatively related to climate risk disclosure, GDP growth, loan

maturity, and the expected internal rate of return at the 1% level. In a panel dataset in which private sector projects attract higher premiums than public sector projects, these effects may be associated more with private sector infrastructure management practices than the public sector. Despite the high leverage ratios, the study confirms that the term structure of credit spreads in infrastructure project financing in Kenya appears hump-shaped (Sorge & Gadanecz, 2008). It implies that the contractual risk management tools used to address the higher leverage and short-term liquidity risk, along with the sequential resolution of uncertainty and information asymmetry throughout the project lifecycle, may alleviate all the initial perceived longer-maturity risk and uncertainty. Incorporating maturity adjustments into the regulatory formula for funding infrastructure projects focusing on lengthening maturity above the current average of 29 years and leveraging the risk-reducing effects of the hump-shaped term structure of infrastructure risk premiums by improving project delivery methods can reduce their risk and bolster their economic growth contribution. As shown in columns (3) and (11) of Table 5-44, the coefficients for (SBS×PDI) and (SBS×LTO) are statistically significant and positive at the 10% and 5% level, respectively, consistent with hypothesis **H7d** and **H13b**, revealing that the positive spillover effect is sustained when SBS interacts with these dimensions. The results confirm hypothesis **H12b**.

In comparison, columns (5) and (13) show that infrastructure project risk premiums are significantly and negatively related to (SBS×IDV) and (SBS×IVR) at the 1% level, contrasting hypotheses **H10b** and **H14b**. The findings suggest that the national culture of power distance and long-term orientation positively impacts infrastructure risk premium, which is consistent with Dang and Partington (2020). Dang and Partington (2020) found that uncertainty avoidance positively influenced ratings. However, the current study finds it insignificant in mediating sovereign risk spillover to infrastructure projects when controlling for debt-side governance. The finding that individualism and indulgence negatively influenced the spillover effect in a context characterised by collectivism and restraint suggests that sustained in-group cohesion and social order (Hofstede *et al.*, 2010) within the community of practice (Wenger, 2000) can mitigate susceptibility to sovereign risk spillover effects through a sustained specific infrastructure project finance and management knowledge structure.

5.3.4.6. Regression of sovereign bond spreads on infrastructure project premium with national culture moderation effect and project management variables

In Table 5-45, the results show that infrastructure project risk premiums are significantly and positively associated with UAI at the 5% level when controlling for the effect of project management, economic growth, and external debt to imports. ICT integration and environmental impact assessment disputes positively influence the risk premium for evaluating infrastructure lifecycle management. This indicates that technological tools integration and environmental risk management complexity are impounded in the

premium. It is consistent with the cultural-historical theory that tools mediate human action (Vygotsky & Cole, 1978) and stakeholder theory (Jones & Wicks, 1999), which argues that divergent interests can create tensions in infrastructure lifecycle management. Meanwhile, infrastructure project risk premiums are significantly and negatively related to cost overrun, vandalism, cross-sectoral collaborators, and GDP growth at the 1% level. In a dataset in which private sector projects attract higher premiums than public sector projects, these effects may be more prevalent within private sector infrastructure management practices than in the public sector. As shown in column (11), the positive coefficient for the interaction term (SBS×LTO) and infrastructure project risk premium is statistically significant at the 5% level, confirming hypothesis **H13b**. Notably, in column (11), the positive spillover effect is more pronounced (0.1615) than in the baseline model (0.1515) in column (1) when SBS interacts with LTO.

In comparison, column (13) shows that infrastructure project risk premium is significantly and negatively related to (SBS×IVR) at the 10% level. The results contrast hypothesis **H14b** that indulgent culture mediates the spillover effect. The positive spillover effect is less pronounced (0.1493 coefficient for the SBS) than in the baseline model (0.1515) column (1) when SBS interacts with IVR. This suggests that a restrained culture may reinforce information cascade by maintaining historical norms and values of infrastructure management practices. However, the desire for stability may stifle innovativeness and block new information flow and adoption.

5.3.4.7. Regression of sovereign bond spreads on infrastructure project risk premium with national culture moderation effect and macroeconomic variables

In Table 5-46, the results show that infrastructure project risk premiums are significantly and positively associated with UAI at the 1% level when controlling for the effect of macroeconomic, economic growth, and external debt to imports. Carbon price fluctuations, corruption, and the syndicate size positively impact the risk premium for evaluating infrastructure lifecycle management. While the finding on carbon price is consistent with the economic theory that systematic risk cannot be diversified and affects all projects in the economy, the finding on syndicate size resonates with the findings by Dorobantu and Müllner (2019) that certain ecological factors determine the geography of infrastructure project finance syndicates. Consistent with Liu (2021), Onjala (2018) and Locatelli *et al.* (2017), features such as large project size, uniqueness, and complexity favour corruption, and project performance worsens in corrupt contexts, with our results indicating that corruption can increase premia by 9% at the 1% significance level in Kenya. However, the rising number of partners in infrastructure syndicates has a significant positive effect on risk premia at the 5% significance level, suggesting that more geographically dispersed syndicates may increase organisational complexity in response to uncertainty, potentially undermining economies of

scale. Coordination problems and fragmented governance in larger syndicates exacerbate information asymmetry, elevating premiums (Brautigam, 2022).

Interestingly, infrastructure project risk premium is significantly and negatively related to external debt to imports, GDP growth and crude oil price at the 1% level. In a dataset in which private sector projects attract higher premiums than public sector projects, the spillover effect may be more prevalent in private sector infrastructure management practices than in the public sector when macroeconomic risks are controlled. As shown in column (11), the positive coefficient for the interaction term (SBS×LTO) and infrastructure project risk premium is statistically significant at the 5% level, consistent with hypotheses **H7d** and **H10b**. Notably, in column (11), the positive spillover effect is more pronounced (0.1615) than in the baseline model (0.1515) in column (1) when SBS interacts with LTO. In comparison, columns (5), (9), and (13) show that infrastructure project risk premium is significantly and negatively related to (SBS×IDV), (SBS×UAI), and (SBS×IVR) at the 5% level. The results confirm hypothesis **H12b** that uncertainty avoidance mediates the spillover effect, but the IDV and IVR direction contrast hypotheses **H10b** and **H14b**. The coefficients show that the positive spillover effect is less pronounced in these models at (0.1103), (0.1168), and (0.1207), respectively, than in the baseline model (0.1232) column (1) when SBS interacts with IDV, UAI, and IVR. The findings corroborate Mayfield's (2012) hypothesis that national culture models can influence how infrastructure development outcomes “grow” GDP to healthy levels with sovereign risk prediction and assessment. It suggests considering cultural nuances in infrastructure policy design and management interventions.

Table 5-39: Matrix of correlations for debt-side governance variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Debt-to-total investment	1.000								
(2) Maturity	-0.209	1.000							
(3) Grace period	-0.035	0.522	1.000						
(4) Expected internal rate of return	0.111	0.065	0.050	1.000					
(5) Public funding	0.027	0.228	-0.033	0.210	1.000				
(6) Disbursement notices delays	-0.064	-0.199	-0.012	0.200	-0.232	1.000			
(7) Loan utilisation rate	0.017	-0.248	-0.037	0.010	-0.167	0.022	1.000		
(8) Climate risk disclosure	-0.042	-0.086	0.099	0.068	-0.016	0.108	0.069	1.000	
(9) Sovereign bond premium	0.004	0.004	0.006	0.008	0.002	-0.003	0.003	-0.021	1.000

Table 5-40: Matrix of correlations for project management variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Jobs created	1.000																
(2) ICT integration in projects	0.088	1.000															
(3) Schedule delay	-0.080	0.136	1.000														
(4) Cost overrun	0.074	0.151	0.182	1.000													
(5) Design change	0.117	0.303	0.118	0.296	1.000												
(6) Community-based initiative	0.223	0.354	-0.067	-0.121	0.091	1.000											
(7) Institutional capacity building	0.142	0.296	0.179	0.187	-0.035	0.396	1.000										
(8) Financial audit delays	0.063	0.302	-0.017	-0.246	0.050	0.405	0.136	1.000									
(9) Loan utilisation rate	0.063	0.072	-0.259	-0.372	0.050	0.184	-0.133	0.493	1.000								
(10) Litigation	0.035	0.283	-0.177	-0.153	0.145	0.348	0.053	0.541	0.409	1.000							
(11) Contractor payment delays	0.170	0.179	0.316	-0.216	-0.177	0.089	0.172	0.407	0.221	0.053	1.000						
(12) CDM registration	0.063	0.302	0.259	0.131	-0.068	0.364	0.450	0.620	0.113	0.409	0.407	1.000					
(13) Government funding	0.288	0.304	-0.283	-0.242	-0.183	0.422	0.090	0.628	0.250	0.550	0.219	0.376	1.000				
(14) Land acquisition disputes	0.500	-0.031	-0.384	0.201	0.393	0.178	0.006	0.110	0.213	0.285	-0.357	0.006	0.114	1.000			
(15) Employee disputes	0.342	0.047	-0.118	-0.036	0.127	0.285	0.111	0.389	0.043	0.197	-0.010	0.158	0.384	0.407	1.000		
(16) Vandalism	-0.139	-0.266	-0.061	-0.168	-0.139	-0.187	-0.225	-0.133	0.078	-0.179	-0.082	-0.344	-0.139	0.062	0.074	1.000	
(17) Environmental events	0.781	0.145	0.020	0.170	0.183	0.412	0.298	0.164	0.058	0.133	0.061	0.164	0.263	0.447	0.438	-0.200	1.000
(18) Cross-sectoral collaborators	0.438	0.097	0.144	0.286	0.153	0.283	0.216	0.117	-0.095	0.090	-0.015	0.303	0.173	0.451	0.338	-0.183	0.311

Table 5-41: Matrix of correlations macroeconomic variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Sovereign bond spreads	1.000						
(2) Carbon futures price	-0.057	1.000					
(3) Crude oil futures price	-0.286	-0.150	1.000				
(4) Corruption Index	0.095	0.658	-0.352	1.000			
(5) Syndicate size	-0.002	0.000	-0.000	-0.000	1.000		
(6) GDP growth rate changes	0.137	-0.073	0.069	-0.023	0.000	1.000	
(7) External debt to imports	0.064	0.648	-0.651	0.745	-0.000	-0.068	1.000

Table 5-42: Regression of sovereign bond spread on infrastructure project risk premium with national culture moderation effect

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP
Lagged_SBS	0.1547*** (0.0053)	0.1518*** (0.0076)	0.1420*** (0.0078)	0.1494*** (0.0050)	0.1485*** (0.0051)	0.1632*** (0.0056)	0.1523*** (0.0055)	0.1506*** (0.0071)
GDP growth rate	-0.0153*** (0.0009)	-0.0153*** (0.0009)	-0.0153*** (0.0009)	-0.0153*** (0.0009)	-0.0153*** (0.0009)	-0.0153*** (0.0009)	-0.0153*** (0.0009)	-0.0153*** (0.0009)
Lagged_externaldebttoimports	0.0004*** 0.0000	0.0004*** 0.0000	0.0004*** 0.0000	0.0004*** 0.0000	0.0004*** 0.0000	0.0004*** 0.0000	0.0004*** 0.0000	0.0004*** 0.0000
Sector dummy	-0.0021*** (0.0006)	-0.0020*** (0.0006)	-0.0021*** (0.0006)	-0.0022*** (0.0007)	-0.0021*** (0.0006)	-0.0021*** (0.0007)	-0.0021*** (0.0006)	-0.0021*** (0.0006)
PDI		0.0209 (0.0236)						0.0969*** (0.0356)
Lagged_SBS X PDI		0.0277 (0.0260)						-0.0451 (0.0403)
IDV			0.014 (0.0145)					0.0269 (0.0389)
Lagged_SBS X IDV			-0.0470** (0.0206)					-0.0339 (0.0295)
MAS				-0.0605* (0.0362)				0.0076 (0.0487)
Lagged_SBS X MAS				0.0992** (0.0457)				0.0274 (0.0295)
UAI					0.0445*** (0.0160)			0.0477* (0.0246)
Lagged_SBS X UAI					-0.0656** (0.0265)			-0.0457** (0.0191)
LTO						-0.0165 (0.0138)		-0.0476 (0.0298)
Lagged_SBS X LTO						0.0346* (0.0185)		0.0234 (0.0180)
IVR							0.0279 (0.0233)	-0.0199 (0.0436)
Lagged_SBS X IVR							-0.0575** (0.0289)	0.0074 (0.0266)
Constant	-0.0144*** (0.0036)	-0.0167*** (0.0040)	-0.0106** (0.0049)	-0.0112*** (0.0035)	-0.0103** (0.0041)	-0.0184*** (0.0060)	-0.0132*** (0.0033)	-0.0260** (0.0119)
Observations	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468
Number of ids	49	49	49	49	49	49	49	49
R-squared within	0.3670	0.3670	0.3670	0.3670	0.3670	0.3670	0.3670	0.3680
R-squared between	0.3290	0.0641	0.0963	0.0900	0.1230	0.0779	0.0701	0.2490
R-squared overall	0.0684	0.0825	0.0739	0.1080	0.1400	0.0792	0.0812	0.2580
Wald Chi-square	29,451	60,929	23,530	24,542	18,588	66,763	29,535	49,860
RMSE	0.0054	0.0054	0.0054	0.0054	0.0054	0.0054	0.0054	0.0054
Sigma_u	0.0198	0.0202	0.0196	0.0187	0.0191	0.0191	0.0197	0.0184
Sigma_e	0.0054	0.0054	0.0054	0.0054	0.0054	0.0054	0.0054	0.0054
Rho	0.9320	0.9340	0.9300	0.9240	0.9270	0.9270	0.9310	0.9220

PRP denotes infrastructure risk premium changes. SBS denotes sovereign bond spread changes. The sector dummy variable equals 1 for the public sector and 0 otherwise. There are six dimensions of national culture: power distance index (PDI), individualism (IDV), masculinity (MAS), uncertainty avoidance index (UAI), long-term orientation (LTO), and indulgence (IVR). The standard errors are reported in parentheses. The P-values are reported as stars ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

Table 5-43: Regression of sovereign bond spread interaction with national culture and year dummy variables on infrastructure project risk premium

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP
Lagged SBS	0.0945*** (0.0031)	0.0943*** (0.0037)	0.0842*** (0.0048)	0.0917*** (0.0034)	0.0908*** (0.0034)	0.1056*** (0.0045)	0.0947*** (0.0032)	0.0924*** (0.0095)
GDP_growth		-0.0079*** (0.0021)	-0.0079*** (0.0021)	-0.0079*** (0.0021)	-0.0079*** (0.0021)	-0.0079*** (0.0021)	-0.0079*** (0.0021)	-0.0079*** (0.0021)
Lagged_externaldebtimports		0.0003*** 0.0000	0.0003*** 0.0000	0.0003*** 0.0000	0.0003*** 0.0000	0.0003*** 0.0000	0.0003*** 0.0000	0.0003*** 0.0000
2011	-0.0106*** (0.0002)	-0.0059*** (0.0005)	-0.0059*** (0.0005)	-0.0059*** (0.0005)	-0.0059*** (0.0005)	-0.0059*** (0.0005)	-0.0059*** (0.0005)	-0.0059*** (0.0005)
2012	-0.0013*** (0.0001)	0.0012*** (0.0003)	0.0012*** (0.0003)	0.0012*** (0.0003)	0.0012*** (0.0003)	0.0012*** (0.0003)	0.0012*** (0.0003)	0.0012*** (0.0003)
2013	-0.0028*** (0.0001)	-0.0013*** (0.0002)	-0.0013*** (0.0002)	-0.0013*** (0.0002)	-0.0013*** (0.0002)	-0.0013*** (0.0002)	-0.0013*** (0.0002)	-0.0013*** (0.0002)
2014	-0.0022*** (0.0001)	-0.0010*** (0.0001)	-0.0010*** (0.0001)	-0.0011*** (0.0001)	-0.0011*** (0.0001)	-0.0010*** (0.0001)	-0.0010*** (0.0001)	-0.0011*** (0.0001)
2015	-0.0013*** 0.0000	-0.0006*** (0.0001)	-0.0006*** (0.0001)	-0.0006*** (0.0001)	-0.0006*** (0.0001)	-0.0006*** (0.0001)	-0.0006*** (0.0001)	-0.0006*** (0.0001)
2016	-0.0008*** 0.0000	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)
2017	-0.0012*** 0.0000	-0.0009*** 0.0000	-0.0009*** 0.0000	-0.0009*** 0.0000	-0.0009*** 0.0000	-0.0009*** 0.0000	-0.0009*** 0.0000	-0.0009*** 0.0000
2018	-0.0015*** 0.0000	-0.0013*** 0.0000	-0.0013*** 0.0000	-0.0013*** 0.0000	-0.0013*** 0.0000	-0.0013*** 0.0000	-0.0013*** 0.0000	-0.0013*** 0.0000
2019	-0.0004*** 0.0000	-0.0005*** 0.0000	-0.0005*** 0.0000	-0.0005*** 0.0000	-0.0005*** 0.0000	-0.0005*** 0.0000	-0.0005*** 0.0000	-0.0005*** 0.0000
2020	0.0006*** 0.0000	0.0005*** 0.0000	0.0005*** 0.0000	0.0005*** 0.0000	0.0005*** 0.0000	0.0005*** 0.0000	0.0005*** 0.0000	0.0005*** 0.0000
Lagged_SBS_PDI		0.0271 (0.0183)						0.0479 (0.0343)
Lagged_SBS_IDV			-0.0477*** (0.0132)					0.0366 (0.0316)
Lagged_SBS_MAS				0.1008*** (0.0264)				0.0289 (0.0382)
Lagged_SBS_UAI					-0.0668*** (0.0145)			-0.0460** (0.0192)
Lagged_SBS_LTO						0.0343*** (0.0132)		0.0232 (0.0266)
Lagged_SBS_IVR							-0.0577*** (0.0192)	0.0093 (0.0397)
Constant	0.0014*** (0.0004)	-0.0055*** (0.0007)	-0.0055*** (0.0007)	-0.0055*** (0.0007)	-0.0055*** (0.0007)	-0.0055*** (0.0007)	-0.0055*** (0.0007)	-0.0055*** (0.0007)
Observations	6468	6468	6468	6468	6468	6468	6468	6468
R-squared	0.7079	0.7140	0.7145	0.7142	0.7149	0.7142	0.7143	0.7152
Number of ids	49	49	49	49	49	49	49	49
R-squared between	0.0059	0.0213	0.0055	0.0433	0.0851	0.0115	0.0167	0.1250
R-squared overall	0.0525	0.0580	0.0460	0.0356	0.0260	0.0465	0.0440	0.0183
F-Stat	1412	1142	1145	1145	1147	1143	1144	845.8
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Degree of Freedom	6408	6405	6405	6405	6405	6405	6405	6400
Sigma_u	0.0238	0.0238	0.0239	0.0241	0.0243	0.0239	0.0240	0.0244
Sigma_e	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036
Rho	0.9770	0.9780	0.9780	0.9780	0.9780	0.9780	0.9780	0.9790

Year 1 to Year 10 represent dummy variables to account for unobservable seasonality. The standard errors are reported in parentheses. The P-values are reported as stars ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

Table 5-44: Regression of sovereign bond spreads on infrastructure project risk premium with national culture moderation effect and debt-side governance variables

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP
Debt to total investment	(0.0379)	(0.0237)	(0.0238)	(0.0397)	(0.0399)	-0.0431**	-0.0429**	-0.0540**	-0.0540**	(0.0372)	(0.0372)	-0.0446*	-0.0447*
	(0.0239)	(0.0246)	(0.0246)	(0.0270)	(0.0270)	(0.0218)	(0.0218)	(0.0254)	(0.0254)	(0.0229)	(0.0229)	(0.0233)	(0.0232)
Maturity	-0.0003***	-0.0003***	-0.0003***	-0.0003***	-0.0003***	-0.0003**	-0.0003**	-0.0003***	-0.0003***	-0.0003***	-0.0003***	-0.0003***	-0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Grace period	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Expected Internal rate of return	-0.1217*	-0.1111*	-0.1109*	-0.1209*	-0.1208*	(0.1059)	(0.1061)	-0.1163*	-0.1164*	-0.1208*	-0.1208*	-0.1206*	-0.1205*
	(0.0640)	(0.0631)	(0.0631)	(0.0638)	(0.0637)	(0.0726)	(0.0725)	(0.0627)	(0.0626)	(0.0632)	(0.0633)	(0.0637)	(0.0637)
Sector	-0.0021***	-0.0020***	-0.0019***	-0.0021***	-0.0021***	-0.0022***	-0.0022***	-0.0021***	-0.0021***	-0.0021***	-0.0020***	-0.0021***	-0.0021***
	(0.0005)	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Disbursement delay notice	0.0081***	0.0081***	0.0081***	0.0081***	0.0081***	0.0084***	0.0084***	0.0080***	0.0080***	0.0081***	0.0081***	0.0081***	0.0081***
	(0.0023)	(0.0022)	(0.0022)	(0.0023)	(0.0023)	(0.0024)	(0.0024)	(0.0021)	(0.0021)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Loan utilisation	0.0457**	0.0496***	0.0496***	0.0451**	0.0450**	0.0435***	0.0436***	0.0431***	0.0430***	0.0462**	0.0462**	0.0447**	0.0446**
	(0.0188)	(0.0169)	(0.0170)	(0.0186)	(0.0186)	(0.0167)	(0.0167)	(0.0148)	(0.0148)	(0.0192)	(0.0193)	(0.0200)	(0.0200)
Climate risk disclosure	-0.0190***	-0.0192***	-0.0193***	-0.0188***	-0.0187***	-0.0187***	-0.0186***	-0.0188***	-0.0186***	-0.0189***	-0.0190***	-0.0188***	-0.0188***
	(0.0015)	(0.0013)	(0.0013)	(0.0017)	(0.0017)	(0.0018)	(0.0018)	(0.0017)	(0.0017)	(0.0016)	(0.0016)	(0.0017)	(0.0017)
Lagged_SBS	0.1519***	0.1519***	0.1474***	0.1519***	0.1424***	0.1519***	0.1485***	0.1519***	0.1478***	0.1519***	0.1616***	0.1519***	0.1496***
	(0.0051)	(0.0051)	(0.0072)	(0.0052)	(0.0079)	(0.0051)	(0.0049)	(0.0052)	(0.0052)	(0.0051)	(0.0054)	(0.0051)	(0.0054)
GDP_growth	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Lagged_externaldebtimports	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PDI		0.0360*	0.0316										
		(0.0188)	(0.0199)										
Lagged_SBS_PDI			0.0416*										
			(0.0253)										
IDV				0.0020	0.0058								
				(0.0145)	(0.0150)								
Lagged_SBS_IDV					-0.0350*								
					(0.0199)								
MAS						(0.0417)	(0.0485)						
						(0.0343)	(0.0354)						
Lagged_SBS_MAS							0						
							(0.0452)						
UAI								0.0382**	0.0428**				
								(0.0162)	(0.0167)				

Lagged_SBS_UAI									-0.0437				
									(0.0271)				
LTO										0.0023	-0.0019		
										(0.0126)	(0.0131)		
Lagged_SBS_LTO											0.0396**		
											(0.0178)		
IVR												0.0139	0.0195
												(0.0225)	(0.0224)
Lagged_SBS_IVR													-0.0532*
													(0.0283)
Constant	0.0169	-0.0041	-0.0033	0.0193	0.0207	0.0205	0.0204	0.0338	0.0341	0.0164	0.0155	0.023	0.0235
	(0.0287)	(0.0297)	(0.0298)	(0.0314)	(0.0315)	(0.0249)	(0.0249)	(0.0234)	(0.0234)	(0.0281)	(0.0282)	(0.0300)	(0.0300)
Observations	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468
Number of ids	49	49	49	49	49	49	49	49	49	49	49	49	49
R-squared within	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850
R-squared between	0.2700	0.3050	0.3040	0.2730	0.2740	0.3010	0.3010	0.3500	0.3520	0.2710	0.2700	0.2780	0.2790
R-squared overall	0.2770	0.3100	0.3090	0.2800	0.2810	0.3060	0.3060	0.3510	0.3530	0.2780	0.2770	0.2850	0.2850
Wald Chi-square	33,769	35,112	54,900	33,595	58,073	37,921	62,101	36,508	63,209	33,294	52,137	35,816	60,236
RMSE	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Sigma_u	0.0169	0.0171	0.0173	0.0160	0.0161	0.0156	0.0157	0.0157	0.0159	0.0165	0.0166	0.0162	0.0163
Sigma_e	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Rho	0.9110	0.9130	0.9150	0.9010	0.9030	0.8970	0.8990	0.8980	0.9010	0.9070	0.9080	0.9040	0.9050

Debt-side governance-level control variables include debt-to-equity ratio, maturity, grace period, expected internal rate of return, loan disbursement delays, loan utilisation rate and climate risk disclosure. The standard errors are reported in parentheses. The P-values are reported as stars ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

Table 5-45: Regression of sovereign bond spreads on infrastructure project premium with national culture moderation effect and project management variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP
ICT Integration	0.0130**	0.0149***	0.0149***	0.0141**	0.0141**	0.0136**	0.0136**	0.0108**	0.0108**	0.0130**	0.0130**	0.0127**
	(0.0055)	(0.0056)	(0.0056)	(0.0058)	(0.0058)	(0.0059)	(0.0059)	(0.0054)	(0.0054)	(0.0056)	(0.0056)	(0.0056)
Schedule delay	0.0007	0.0013	0.0013	0.0010	0.0010	0.0004	0.0004	0.0012	0.0012	0.0005	0.0005	0.0006
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0009)
Cost overrun	-0.0147***	-0.0176***	-0.0176***	-0.0149***	-0.0149***	-0.0142***	-0.0141***	-0.0158***	-0.0157***	-0.0145***	-0.0145***	-0.0152***
	(0.0047)	(0.0047)	(0.0047)	(0.0045)	(0.0045)	(0.0047)	(0.0047)	(0.0042)	(0.0042)	(0.0047)	(0.0047)	(0.0050)
Design change	(0.0024)	(0.0032)	(0.0032)	(0.0028)	(0.0028)	(0.0026)	(0.0026)	(0.0020)	(0.0020)	(0.0021)	(0.0020)	(0.0018)
	(0.0072)	(0.0067)	(0.0067)	(0.0070)	(0.0070)	(0.0073)	(0.0073)	(0.0071)	(0.0071)	(0.0072)	(0.0072)	(0.0074)
Community-based projects	0.0014	0.0008	0.0008	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0014
	(0.0010)	(0.0011)	(0.0011)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0009)	(0.0009)	(0.0011)	(0.0011)	(0.0010)
Institutional capacity	0.0013	0.0022	0.0022	0.0013	0.0013	0.0011	0.0011	0.0023	0.0023	0.0012	0.0012	0.0016
	(0.0025)	(0.0029)	(0.0029)	(0.0025)	(0.0025)	(0.0024)	(0.0024)	(0.0023)	(0.0023)	(0.0025)	(0.0025)	(0.0026)
Litigation	(0.0079)	(0.0094)	(0.0094)	(0.0084)	(0.0084)	(0.0079)	(0.0078)	(0.0085)	(0.0085)	(0.0075)	(0.0076)	(0.0075)
	(0.0071)	(0.0072)	(0.0072)	(0.0072)	(0.0072)	(0.0071)	(0.0071)	(0.0063)	(0.0063)	(0.0070)	(0.0070)	(0.0073)
Timely contractor payment	(0.0088)	(0.0122)	(0.0122)	(0.0102)	(0.0102)	(0.0069)	(0.0069)	(0.0104)	(0.0104)	(0.0077)	(0.0077)	(0.0086)
	(0.0157)	(0.0156)	(0.0156)	(0.0151)	(0.0151)	(0.0165)	(0.0165)	(0.0132)	(0.0132)	(0.0157)	(0.0157)	(0.0158)
CDM registration	0.0038	0.0039	0.0039	0.0039	0.0039	0.0050	0.0050	0.0038	0.0038	0.0040	0.0040	0.0039
	(0.0135)	(0.0133)	(0.0133)	(0.0134)	(0.0134)	(0.0131)	(0.0131)	(0.0117)	(0.0117)	(0.0134)	(0.0134)	(0.0135)
Land disputes	(0.0040)	(0.0016)	(0.0016)	(0.0033)	(0.0032)	(0.0052)	(0.0052)	(0.0040)	(0.0040)	(0.0046)	(0.0046)	(0.0046)
	(0.0092)	(0.0090)	(0.0090)	(0.0091)	(0.0091)	(0.0082)	(0.0082)	(0.0079)	(0.0079)	(0.0091)	(0.0091)	(0.0093)
Employees disputes	0.0039	0.0025	0.0025	0.0032	0.0031	0.0050	0.0050	0.0034	0.0034	0.0044	0.0044	0.0042
	(0.0069)	(0.0064)	(0.0064)	(0.0067)	(0.0067)	(0.0075)	(0.0075)	(0.0067)	(0.0067)	(0.0072)	(0.0072)	(0.0068)
Vandalism	-0.0229***	-0.0252***	-0.0252***	-0.0238***	-0.0238***	-0.0227***	-0.0227***	-0.0231***	-0.0231***	-0.0224***	-0.0224***	-0.0224***
	(0.0064)	(0.0070)	(0.0070)	(0.0067)	(0.0067)	(0.0061)	(0.0061)	(0.0064)	(0.0064)	(0.0060)	(0.0060)	(0.0061)
Environmental impact	0.0170**	0.0177***	0.0177***	0.0161**	0.0161**	0.0181***	0.0181***	0.0146**	0.0145**	0.0172**	0.0172**	0.0174**
	(0.0068)	(0.0066)	(0.0066)	(0.0072)	(0.0072)	(0.0067)	(0.0067)	(0.0067)	(0.0067)	(0.0069)	(0.0069)	(0.0072)
Cross-sectoral institutions	-0.0013*	(0.0012)	(0.0012)	(0.0012)	(0.0012)	-0.0014*	-0.0014*	(0.0010)	(0.0010)	-0.0014*	-0.0014*	-0.0014*
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0008)	(0.0007)	(0.0008)	(0.0008)	(0.0007)
Lagged_SBS	0.1515***	0.1515***	0.1472***	0.1515***	0.1428***	0.1515***	0.1481***	0.1516***	0.1477***	0.1515***	0.1615***	0.1515***
	(0.0051)	(0.0051)	(0.0072)	(0.0051)	(0.0079)	(0.0051)	(0.0049)	(0.0051)	(0.0052)	(0.0051)	(0.0054)	(0.0051)
GDP_growth	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***	-0.0155***
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Lagged_externaldebtimports	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PDI		-0.0224	-0.0267									
		(0.0250)	(0.0252)									
Lagged_SBS_PDI			0.0407									
			(0.0248)									

IDV				0.009	0.0125								
				(0.0139)	(0.0141)								
Lagged_SBS_IDV					-0.0323								
					(0.0196)								
MAS						0.017	0.0101						
						(0.0329)	(0.0332)						
Lagged_SBS_MAS							0.0639						
							(0.0450)						
UAI								0.0295**	0.0339**				
								(0.0138)	(0.0140)				
Lagged_SBS_UAI									-0.0412				
									(0.0270)				
LTO										0.0049	0.0006		
										(0.0143)	(0.0144)		
Lagged_SBS_LTO											0.0404**		
											(0.0177)		
IVR												-0.0067	-0.0012
												(0.0201)	(0.0206)
Lagged_SBS_IVR													-0.0519*
													(0.0281)
Constant	-0.007	-0.0053	-0.0048	-0.0049	-0.004	-0.0074	-0.0071	-0.0053	-0.0049	-0.0058	-0.0068	-0.0072	-0.007
	(0.0075)	(0.0078)	(0.0078)	(0.0085)	(0.0085)	(0.0076)	(0.0076)	(0.0071)	(0.0071)	(0.0085)	(0.0085)	(0.0076)	(0.0076)
Observations	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468
Number of ids	49	49	49	49	49	49	49	49	49	49	49	49	49
R-squared within	0.3840	0.3840	0.3840	0.3840	0.3840	0.3840	0.3840	0.3840	0.3840	0.3840	0.3850	0.3840	0.3840
R-squared between	0.5810	0.5880	0.5880	0.5840	0.5850	0.5830	0.5830	0.6230	0.6240	0.5820	0.5810	0.5820	0.5820
R-squared overall	0.5660	0.5730	0.5730	0.5690	0.5700	0.5680	0.5690	0.6060	0.6060	0.5670	0.5670	0.5670	0.5670
Wald Chi-square	105,218	110,255	108,695	105,225	96,532	101,825	144,754	80,448	95,228	114,639	121,848	106,992	115,222
RMSE	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Sigma_u	0.0179	0.0179	0.0181	0.0179	0.0182	0.0182	0.0185	0.0170	0.0172	0.0182	0.0185	0.0181	0.0184
Sigma_e	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Rho	0.9200	0.9200	0.9220	0.9200	0.9220	0.9220	0.9250	0.9120	0.9140	0.9220	0.9250	0.9220	0.9240

Project management-level control variables and country-level variables are included. The standard errors are reported in parentheses. The P-values are reported as stars ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

Table 5-46: Regression of sovereign bond spreads on infrastructure project risk premium with national culture moderation effect and macroeconomic variables

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP	PRP
Carbon futures price	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
Crude oil futures price	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
Corruption index	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0900***	0.0900***	0.0900***	0.0900***	0.0901***	0.0900***	0.0901***	0.0900***	0.0901***	0.0900***	0.0900***	0.0900***	0.0900***
	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0027)
syndicate size	0.0044***	0.0042***	0.0042***	0.0046***	0.0046***	0.0046***	0.0046***	0.0049***	0.0049***	0.0045***	0.0045***	0.0046***	0.0046***
	(0.0008)	(0.0010)	(0.0010)	(0.0009)	(0.0009)	(0.0008)	(0.0008)	(0.0009)	(0.0009)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Lagged_SBS	0.1232***	0.1232***	0.1203***	0.1232***	0.1103***	0.1232***	0.1177***	0.1232***	0.1168***	0.1232***	0.1317***	0.1232***	0.1207***
	(0.0068)	(0.0068)	(0.0089)	(0.0068)	(0.0081)	(0.0068)	(0.0057)	(0.0068)	(0.0059)	(0.0068)	(0.0074)	(0.0068)	(0.0068)
GDP_growth	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***	-0.0136***
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Lagged_externaldebtimports	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PDI		0.0098	0.0069										
		(0.0256)	(0.0268)										
Lagged_SBS_PDI			0.0272										
			(0.0261)										
IDV				0.0151	0.0202								
				(0.0141)	(0.0148)								
Lagged_SBS_IDV					-0.0474**								
					(0.0208)								
MAS						-0.0542*	-0.0651**						
						(0.0320)	(0.0331)						
Lagged_SBS_MAS							0.1012**						
							(0.0459)						
UAI								0.0448***	0.0519***				
								(0.0154)	(0.0160)				
Lagged_SBS_UAI									-0.0666**				
									(0.0268)				
LTO										(0.0155)	(0.0192)		
										(0.0137)	(0.0142)		
Lagged_SBS_LTO											0.0348*		
											(0.0186)		
IVR												0.0267	0.0329
												(0.0225)	(0.0230)
Lagged_SBS_IVR													-0.0580**
													(0.0290)
Constant	-0.0661***	-0.0668***	-0.0665***	-0.0625***	-0.0611***	-0.0636***	-0.0630***	-0.0630***	-0.0623***	-0.0702***	-0.0711***	-0.0653***	-0.0650***
	(0.0042)	(0.0044)	(0.0046)	(0.0050)	(0.0052)	(0.0041)	(0.0041)	(0.0043)	(0.0043)	(0.0063)	(0.0062)	(0.0039)	(0.0039)
Observations	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468	6,468
Number of ids	49	49	49	49	49	49	49	49	49	49	49	49	49
R-squared within	0.5000	0.5000	0.5010	0.5000	0.5010	0.5000	0.5010	0.5000	0.5010	0.5000	0.5010	0.5000	0.5010
R-squared between	0.1480	0.1510	0.1510	0.1640	0.1640	0.2010	0.2010	0.2670	0.2670	0.1650	0.1650	0.1720	0.1720
R-squared overall	0.1740	0.1770	0.1770	0.1890	0.1890	0.2230	0.2240	0.2840	0.2840	0.1900	0.1900	0.1970	0.1970
Wald Chi-square	1,433,000	1,431,000	460,497	1,513,000	436,218	1,467,000	424,867	1,461,000	433,036	1,452,000	430,013	1,464,000	428,658
RMSE	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Sigma_u	0.0207	0.0209	0.0212	0.0208	0.0210	0.0199	0.0201	0.0191	0.0193	0.0205	0.0207	0.0205	0.0207
Sigma_e	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048
Rho	0.9500	0.9510	0.9520	0.9500	0.9510	0.9460	0.9470	0.9410	0.9430	0.9490	0.9500	0.9490	0.9500

Macroeconomic risk management-level control variables and country-level variables are included. The standard errors are reported in parentheses. The P-values are reported as stars ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Source: Author (2023)

5.4. Robustness checks

The following robustness tests were conducted to assess the stability of cultural dimensions and confirm the likelihood of cross-sectional herding and category herding:

- (i) Sub-sample decomposition of the OLS regression results to compare cultural dimensions with the renewable energy and transportation sector. The results are presented in *Appendix J to O*.
- (ii) Triangulation of the dependent variable sovereign risk premium with a binary sub-sector variable where 1 represented renewable energy and 0 transportation in the logit models, which enabled the study to pin down category herding.
- (iii) Use of time dummy variable to account for unobservable events like policy changes.
- (iv) Triangulation of the subjective dependent variable sovereign risk premium opinions with the objective sovereign bond spread in the panel data models eliminated potential bias. The saturated OLS model results are presented in Table 5-38.

5.5. Chapter summary

This chapter examined cultural distance as a moderator of the relationship between project risk premiums and debt-side governance, project management and macroeconomic risk variables. Overall, the findings from testing the hypothesised paths in the conceptual framework provide empirical evidence supporting the moderating influence of cultural distance. The implications of these findings can inform the design of collective decision-making processes and risk assessment strategies and the development of effective human-centred infrastructure policymaking and project management frameworks. However, it is essential to acknowledge the need for qualitative research to validate and expand upon these findings based on managerial collaboration experiences. The following chapter presents the qualitative research findings.

Chapter Six: Qualitative Findings

6.1. Introduction

This chapter presents results and a discussion of the qualitative findings relating to the experiences of managing projects in a developing country (Kenya) to mitigate their contribution to sovereign risk. A case study strategy was employed based on in-depth interviews and observational data collection methods. The thematic analysis revealed how managers in Kenyan infrastructure projects might self-select into cultural identities that intensify herding. Herding prevents new knowledge from joining the public knowledge pool, exacerbating information asymmetry and causing risk premium to deviate from fundamental values.

6.2. Data analysis and findings discussion framework

This research evaluated how national culture may moderate the relationship between sovereign risk and infrastructure development activity, focusing on large-scale Kenyan renewable energy and transportation projects. The aim was to propose a human-centred infrastructure design and implementation framework. The perspectives of the interviewed subjects, key actors in knowledge exchange during the interview, were analysed based on Hofstede's national cultural dimensions to infer the cultural-historical influences on their perception of sovereign risk, debt-side governance, project management, and macroeconomic risk exposure of renewable energy, road, and rail transportation projects. The study adopted the conceptual framework from Chapter Three to guide in-depth interview data collection (*see Figure 3.3.1*). Figure 6-1 summarises the key interview questions based on the conceptual framework.

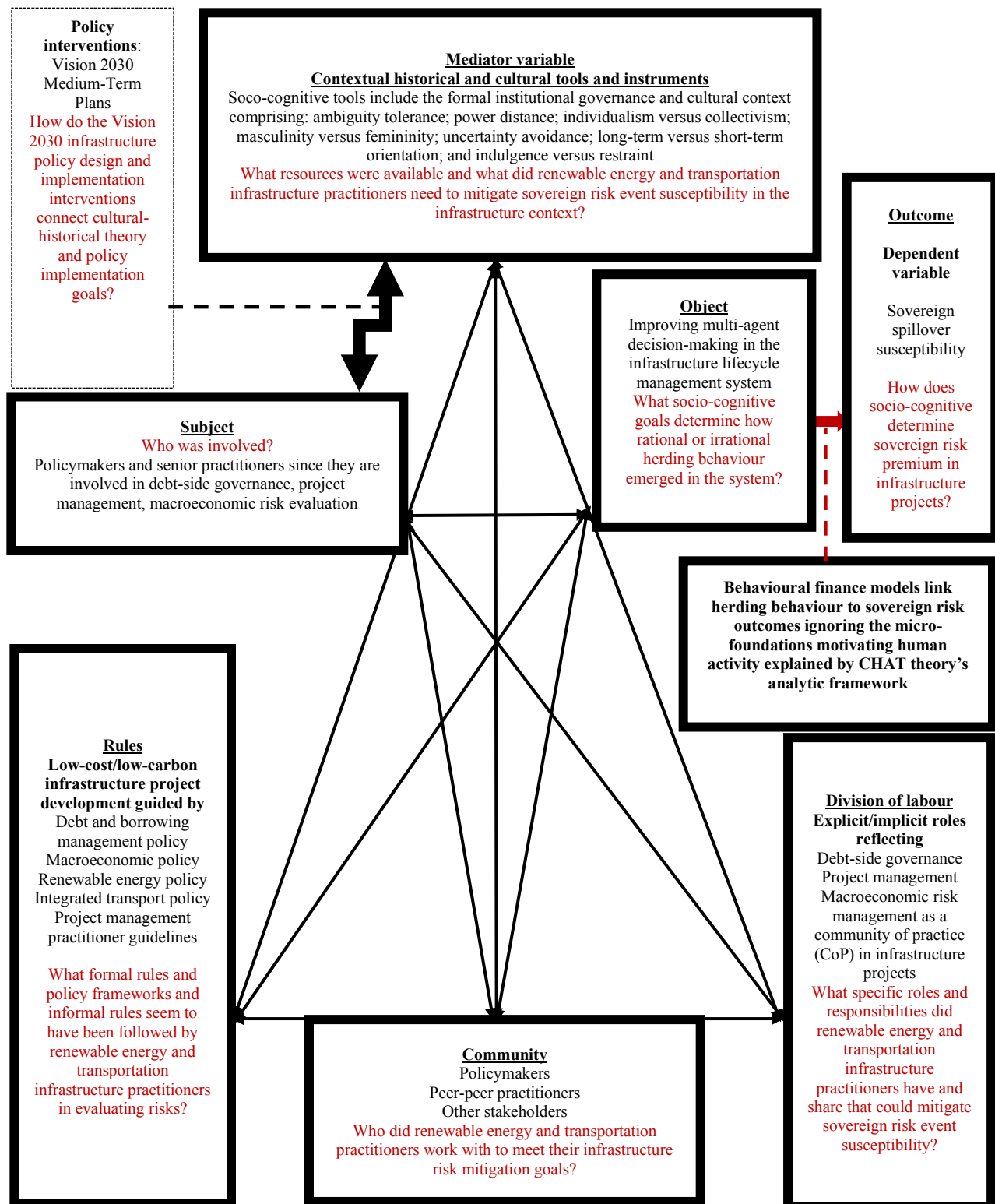


Figure 6-1: Qualitative interview framework for evaluating socio-cognitive learning in the infrastructure lifecycle management system

Source: Author (2023)

6.3. Descriptive statistics of participant demographic characteristics

Table 6-1 shows the frequency distribution of the participants. The study recruited 31 participants comprising 20 key informants and 11 policymakers with expertise in renewable energy, representing geothermal and wind energy and transportation project management. Overall, 64% of the policymakers were in renewable energy, while 36% were in the transportation infrastructure context. 60% of the key informants represented the renewable energy context, while 40% represented the transportation context.

Table 6-1: Detailed demographics of participants

Code	Respondent Cadre	Gender	Sector	Experience	Education	International experience	Context
Participant1	Policymaker	Male	Geothermal	12	Masters	Yes	Peri-Urban
Participant2	Key Informant	Male	Road	20	Masters	Yes	Peri-Urban
Participant3	Key Informant	Male	Wind	26	PhD	Yes	Urban
Participant4	Key Informant	Female	Rail	18	Masters	Yes	Urban
Participant5	Key Informant	Male	Geothermal	16	Bachelors	Yes	Peri-Urban
Participant6	Key Informant	Female	Road	19	Masters	Yes	Peri-Urban
Participant7	Policymaker	Female	Wind	10	Bachelors	Yes	Peri-Urban
Participant8	Key Informant	Male	Wind	14	Bachelors	No	Peri-Urban
Participant9	Key Informant	Male	Geothermal	8	Masters	Yes	Peri-Urban
Participant10	Policymaker	Male	Road	21	Masters	Yes	Peri-Urban
Participant11	Policymaker	Male	Wind	24	Bachelors	No	Peri-Urban
Participant12	Key Informant	Male	Rail	11	Masters	No	Urban
Participant13	Policymaker	Female	Geothermal	23	Bachelors	Yes	Peri-Urban
Participant14	Policymaker	Male	Road	21	PhD	Yes	Urban
Participant15	Key Informant	Male	Geothermal	18	Bachelors	No	Peri-Urban
Participant16	Key Informant	Male	Rail	16	Masters	Yes	Rural
Participant17	Policymaker	Male	Road	23	Masters	No	Urban
Participant18	Key Informant	Female	Road	8	Masters	Yes	Rural
Participant19	Key Informant	Male	Wind	20	Bachelors	Yes	Rural
Participant20	Key Informant	Male	Geothermal	23	Masters	No	Urban
Participant21	Key Informant	Male	Geothermal	14	Bachelors	No	Urban
Participant22	Key Informant	Male	Geothermal	27	PhD	Yes	Urban
Participant23	Policymaker	Male	Wind	25	Masters	No	Rural
Participant24	Key Informant	Male	Rail	9	Bachelors	No	Urban
Participant25	Policymaker	Female	Geothermal	18	PhD	Yes	Peri-Urban
Participant26	Policymaker	Female	Geothermal	27	Masters	No	Rural
Participant27	Key Informant	Male	Wind	21	Masters	Yes	Peri-Urban
Participant28	Key Informant	Male	Rail	18	Bachelors	Yes	Peri-Urban
Participant29	Key Informant	Male	Geothermal	18	Masters	Yes	Peri-Urban
Participant30	Policymaker	Male	Road	11	Bachelors	Yes	Urban
Participant31	Key Informant	Male	Wind	13	Bachelors	No	Rural

Source: Author (2023)

The cadre distribution in Table 6-1 revealed a balanced representation, with 54.84% being key informants and the remaining 45.16% being policymakers. Gender-wise, male participants were predominantly evident, accounting for 70.97% of the sample, while female participants constituted 29.03%. When considering the sectors in which participants were involved, the distribution varied, with geothermal (32.26%), road (25.81%), wind (22.58%), and rail (12.90%) being the prominent sectors. Participants' years of experience were an average of 18.39 years, with the maximum years of experience reported at 27 years

and the minimum at 8 years. Education level diversity was observed, with 45.16% holding master's degrees, 38.71% having bachelor's degrees, and 16.13% possessing PhD degrees. Moreover, 61.29% of participants had international experience, while the remaining 38.71% did not. The context of participants' engagement demonstrated a distribution of 58.06% in peri-urban, 25.81% in urban, and 16.13% in rural locations. This distribution could be attributed to globalisation and rural-urban migration, as supported by Otieno's (2023) findings on infrastructure governance and regional disparities post Kenya's devolution in 2013. Similar deficits in infrastructure management and maintenance capacity were noted by Mazele and Amoah (2022) in South African local municipalities, accentuating the link between limited job creation through rural projects and rural-urban migration. Washbourne's (2022) study on South African and UK cities highlighted how environmental and green infrastructure decisions shaped socioeconomic status, potentially influencing managerial career decisions.

The study implies that managerial orientation toward long-term vs short-term careers and sustainability might drive global and rural-urban relocations for better education, jobs, and services. This perspective challenges Ndiritu and Engola's (2020) view on Kenya's renewable energy policy's ineffectiveness due to skills shortages, suggesting that local tertiary education programmes affect management capacity to develop their careers. Colenbrander *et al.* (2015) note that there are deficits in Sub-Saharan African renewable energy PhD programmes, affecting governance and research quality. There is a need for collaboration between academia and industry to propose practice-based theories to improve managerial capacity building and bridge the gap between theory and practice. Gender disparities in career relocation were also apparent, resonating with Kenya's struggle for gender equity in infrastructure. Due to knowledge differences, gender-driven decisions impact representation, management risks and development costs.

The quantitative results in Chapter Five (Table 5-1) align with Table 6-1, implying male dominance in career choices concerning infrastructure project management. Cultural norms could influence job selection as constraints to their "zone of proximal development". The study's constructivist approach linked Kenya's sovereign risk exposure to distributed managerial cognition within the infrastructure development context. Figure 6-2 illustrates the relationships between sovereign risk and infrastructure management identified by policymakers and key informants. It reveals a shared understanding of cultural and contextual risks.

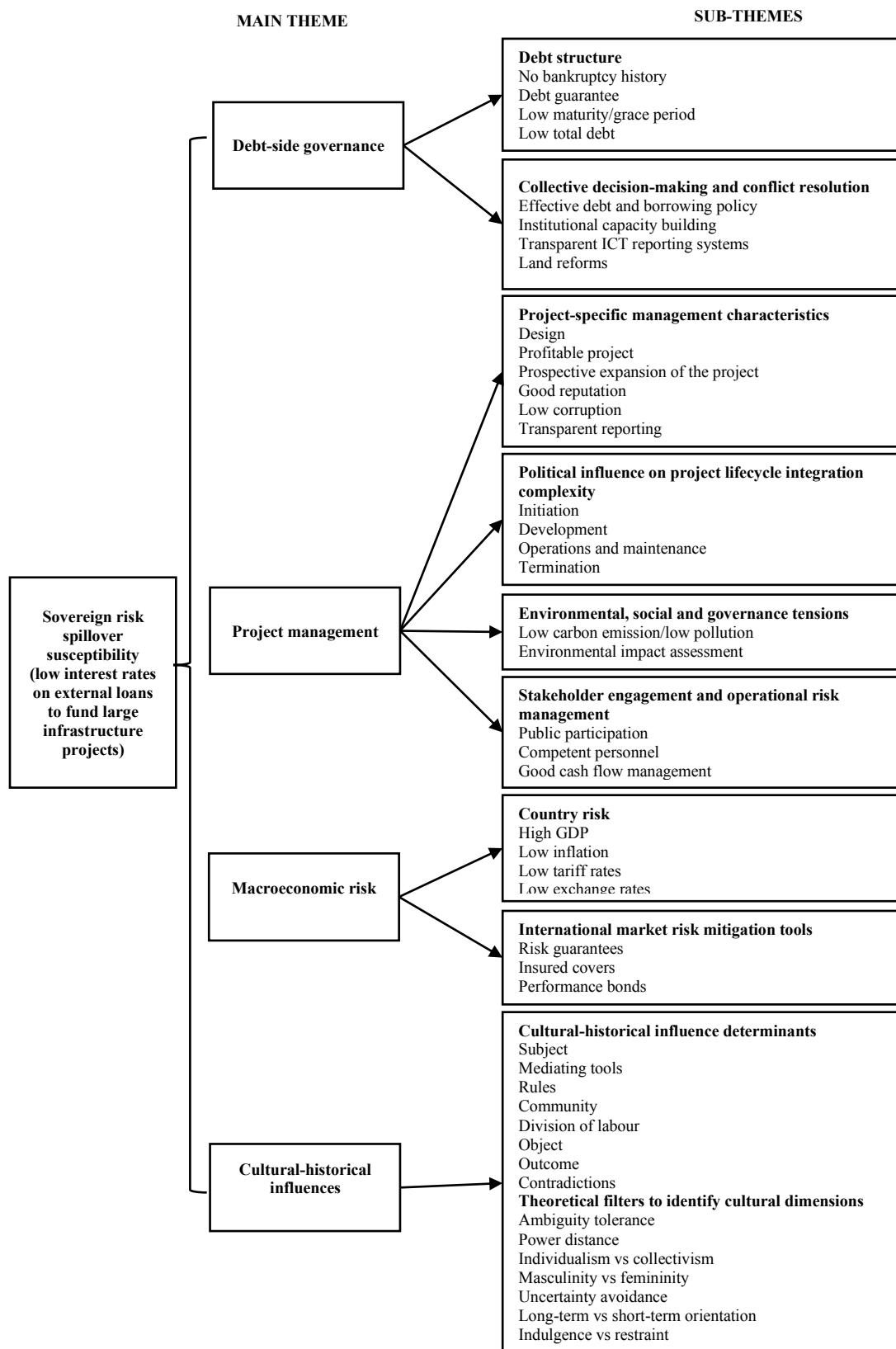


Figure 6-2: Thematic framework for the professional knowledge about sovereign risk determinants in infrastructure lifecycle management

Source: Author (2023)

6.4. Objective 1: Identify the key determinants of sovereign risk, debt-side governance, project management, macroeconomic risk, and culture in the Kenyan renewable energy and transportation infrastructure project context

The interview explored the perception of debt-side governance, project management, and macroeconomic risks to establish participants' foundational professional knowledge. Participants shared their views as the common knowledge about how these variables influence infrastructure risk outcomes. This professional knowledge was pivotal in analysing how culture may influence cost-effective infrastructure development practices, considering the psychological dependence of managers on social groups. Cultural orientation could impact both the interviewer and participant, influencing their roles in the knowledge-building process.

6.4.1. Theme 1: Sovereign risk

The interview discussed the factors affecting accessing low-interest loans (sovereign debt). *Participant 13* mentioned that loans guaranteed by the government come with lower interest rates due to reduced risk. This indicates that most participants attribute sovereign debt management to spillovers to project risk.

“An important question we [Kenya] should ask is what is the optimal risk premium and what determines the interest that we should accept as a government?” [Participant 13]

6.4.2. Theme 2: Debt-side governance

6.4.2.1. Debt structure

As per Pueyo (2018), participants observed that cash flow and maturity shape interest rates. Poor cash flow and longer maturity periods elevate interest rates. Most participants used the SGR project to showcase the complex interplay of factors influencing external debt negotiation and interest rates as a major source of the elevated sovereign risk. While most stated that stakeholders, policies, risk management practices, and community engagement are crucial to decision-making in infrastructure development projects, *Participant 23* observed that government leaders do not observe local regulations. Participants observed that involving diverse practitioners, policymakers, and government stakeholders in infrastructure debt governance is a key improvement area. The reason for this is that collaboration and information sharing among stakeholders leads to better negotiation decisions, potentially because it could limit information loss, resulting in lower interest rates and cost-effective debt terms. This mirrors Onjala's (2018) observation that loan negotiation threatens Kenya's debt sustainability, especially in bilateral loan agreements with China.

As suggested by Participant 15, “These [infrastructure debts] are long-term financial arrangements with very attractive moratoriums and clauses that will safeguard and ensure that the government can retain its fiscal capacity over a long period. So, I think what might influence how we negotiate and agree on issues like interest is how we demonstrate that the project is impactful for the country.”

Participant 23 notes, “There is no way we [Kenya] can adopt universal debt governance frameworks adopted by countries like the US. It might not work. We need to improve the governance practices when enforcing laws and regulations in Kenya.”

6.4.2.2. Collective decision-making and conflict-resolution

The question focused on getting the participants to reflect on the challenges of implementing collective decision-making, especially when international policies contradict certain local policies. Participants stated debt management and land acquisition as the main problematic practices. *Participant 12* suggested limited transparency in sovereign debt management, especially about infrastructure development. This perspective reveals a gap in the current design and implementation of the Constitution of Kenya 2010’s policy about separating power while decentralising the national decision-making structure in infrastructure projects. It affords some participants opportunities to hide information and reproduce old centralised decision-making. *Participant 15* suggested that conflicts between the project company and communities arise due to differing land valuation and relocation compensation viewpoints. Besides, the decision-making process may become prolonged due to community disputes.

As pointed out by Participant 12, “Government organs need to speak, discuss, and collectively assess the fiscal impact of this borrowing on the government’s debt structure. That is not happening efficiently, I can say, because of what we have seen before happening in the previous [political] regimes, and we are hoping that some adjustments are supposed to be made to ensure this process is efficient.”

Participants intimated there was opportunistic behaviour in the SGR project by suggesting that the lender incurred additional costs on behalf of the government to expedite land acquisition and deliver a politically influenced project, which elevated the external debt risk. Some participants attributed the confidence to incur colossal costs to the open guarantee or insurance that the government has through taxpayer money and user fees, including the power to change tariffs to suit the lender’s profitability goals. The consensus was that effective conflict resolution involves weighing the burden of conflicting policies and risks to create informed stakeholder engagement decisions and tools. As a result, the study probed experts about local stakeholder engagement and the most viable operational risk management tools at the project level.

6.4.3. Theme 3: Project management

6.4.3.1. Project-specific management characteristics

Overall, the participants highlighted project lifecycle, design attributes, and management factors affecting interest rates that largely entail procurement practices that do not comply with the competitive bidding rules. The other issues were stakeholder communication, engagement, risk, and cost management. Borrower

reputation plays a significant role in the international context, as noted by Brautigam *et al.* (2022), with those having a tarnished reputation likely to face higher interest rates. Moral hazards (Brautigam, 2022) associated with rampant corruption create sovereign debt crises within the project and increase interest rates. Clean and politically unaffected projects are likely to receive lower interest rates.

Participant 13 affirmed that it is important to understand the whole project lifecycle from where it begins and ends. A value-for-money analysis will be done to establish the best procurement and financing methods for those projects.

Participant 16 suggested that the project specification must consider the key stakeholder interests.

6.4.3.2. Political influence on project lifecycle integration complexity

This discussion addressed political influence on project lifecycle integration by examining the influence of political regime changes on infrastructure planning and decision-making tools. The participants noted that political affiliations and corruption impact infrastructure planning and decision-making, potentially affecting interest rates and project outcomes. Secondary data findings revealed that Kenya could reduce its project risk premiums by 9% through anti-corruption measures and 15.47% through sovereign borrowing behaviour. However, insights from the in-depth interviews suggest that the main challenge was leaving out key stakeholders in the infrastructure initiation process or political framing of infrastructure development projects as future-making in order to influence stakeholders to support projects, especially during imminent political regime changes. Thus, Vision 2030 policy interventions may deviate from intended objectives and lead to “white elephants” or discriminatory infrastructure development outcomes. Referring to Vision 2030 policy risks, several studies identified environmental, social, and governance tensions as the main risks.

“Corruption and politics within your project affect your reputation as a borrower.” [Participant 9]

Participant 13 opined that the Big 4 Agenda was a key policy instrument enabling the previous government regime (2018–2022) to involve the private sector through the Presidential Delivery Unit (PDU). They noted that the PDU was central in monitoring the implementation of infrastructure projects since it advised the executive on how they could enhance the efficiency of negotiating the financing of government projects. However, most of the information is unavailable to validate outcomes.

6.4.3.3. Environmental, social, and governance tensions

The interview delved into the impact of carbon risks on interest rates. Most participants agreed that projects emitting large amounts of carbon face higher interest rates as they may be subject to regulatory scrutiny and possible shutdowns. This view affirms the rising role of local communities in monitoring and evaluating environmental, social and governance practices. For instance, Kenya halted its first coal plant construction

valued at \$ 2 billion due to community action against the owners for failing to assess environmental and community concerns about pollution (United Nations Environmental Program, 2019). This action reveals the rising importance of integrating behavioural economics theory and human-centred infrastructure design principles to understand end-user needs right from the start of the project as key dimensions of eliciting stakeholder behaviours. While carbon emission prices contribute to future innovative financial instruments (Baimwera *et al.*, 2017), registering a project as a clean development mechanism involves working with international consultants, which is expensive and indirectly contributes to higher interest rates, diverting funds from the project's development activities to advisory fees. This finding reinforces the observation by Pueyo (2018) that accessing concessional loans may take longer than commercial loans due to lengthy administrative processes, potentially leading borrowers to issue expensive commercial loans to meet their infrastructure development timelines.

Furthermore, most participants highlighted social unrest and discriminatory infrastructure planning as a major threat to Vision 2030 and intergenerational risk-sharing in infrastructure development. These views elaborated the finding in the secondary data analysis concerning the environmental impact assessment disputes positively influencing project risk premiums by 1.7% and the survey data finding that green infrastructure development policies mitigate risk. Consequently, the interview probed participants about collective stakeholder decision-making and conflict-resolution mechanisms to identify improvement areas.

*According to **Participant 16**, the community and interested groups like environmental conservation groups fighting for effective environmental impact assessments are key stakeholders.*

6.4.3.4. Stakeholder engagement and operational risk management

Most participants emphasised the importance of the private sector, public participation, and community involvement in decision-making. Engaging the public allows diverse stakeholders to share their opinions and experiences, contributing to better infrastructure design, risk management and interest rate negotiation. The participants highlighted the significance of leveraging collective wisdom in influencing foreign debt interest rates and infrastructure benefits realisation. Information sharing and insights from practitioners and stakeholders lead to better risk management and access to low-cost loans.

***Participant 13** inferred cross-sectoral collaboration challenges by stating that “the government is calling on the private sector to help it deliver and finance these projects because the government alone cannot deliver them efficiently. However, there must be effective collaboration between the public and private sectors, communities, and end-users.”*

6.4.4. Theme 4: Macroeconomic risks

6.4.4.1. Country risk

The interview discussed macroeconomic and international market risks, including inflation rates, exchange rates, and GDP growth (Mpapalika & Malikane, 2019). Most participants suggested that interest rates are affected by economic growth, international interest rate changes, exchange rates, equipment prices, and inflation rates. They emphasise that infrastructure projects in different lifecycle stages may face varying lifecycle costs because interest rates are based on these market factors if they experience schedule delays and cost overruns necessitating refinancing of the initial debt due to delayed implementation. It seems like a contradiction between managers representing lenders and borrowers when practitioners believe that macroeconomic fundamentals impact sovereign risk. Yet, Morsy and Moustafa (2020) found that investors ignore macroeconomic fundamentals due to herding behaviours that may result from cultural constraints.

Participant 9 affirms country risk spillover by suggesting that country risk contributes to how much the foreign debt will cost.

6.4.4.2. International market risk mitigation tools

The participants explained how international market risk mitigation tools could influence interest rates. Factors like government guarantees, risk insurance, and performance bonds demonstrate commitment to projects, leading to reduced interest rates. However, they acknowledge that securing these instruments is costly, and decision-makers must enhance their loan negotiation capacity. This reflects the complexity associated with a fragmented international system. Dorobantu and Müllner (2019) state that opportunistic creditor behaviour, politics, and market risks shape debt-side governance and the geography of project syndicates. Hence, the interview delved into the perception of decision-making and conflict resolution.

“Ideally, this financing should come in concessionary long-term financial arrangements to allow the government to streamline infrastructure finance and manage its fiscal space. We [Kenya] should enhance the capacity of the loan negotiators sitting at the table in those international negotiating meetings to make sure that whatever loan package we are getting from the potential lenders for these projects is in line with what the government can be able to manage in terms of the fiscal space.” [Participant 13]

6.4.5. Theme 5: Cultural-historical influences

Based on the CHAT concepts in Figure 6-1, the cultural-historical influences are discussed to evaluate the behavioural pooling effect of culture on managerial behaviour. Hofstede’s framework offers a theoretical filter to identify the emerging cultural themes as defensive socio-cognitive learning motives. This section discusses the response pattern to elicit the sociocultural perception of sovereign risk and infrastructure

management. Of the three professional knowledge themes in Figure 6-2 (debt-side governance, project management, and macroeconomic risks) that the participants described as impacting the external debt interest rates when funding infrastructure projects, it is important to note that the respondents had different views on the project lifecycle, suggesting variations in long-term vs short-term planning that could be linked to CHAT's historicity concept. Overall, 19% of participants opined that those projects at their development or initiation stage attracted higher interest rates. The main reason was that these projects were uncertain regarding their return on investment and were considered high risk by investors. On the other hand, 17% felt that projects at their termination stage typically attracted low interest rates since they were in their final stages and were considered stable and sustainable, while 5% thought that projects already in operation attracted low interest rates for the same reason, which could also be linked to variations in their uncertainty avoidance and ambiguity tolerance orientations.

Participants seemed to value a collectivist culture in terms of their perception of the experience of involving practitioners in infrastructure governance, like project initiation, planning, and investment decision-making, to access low-cost debt. This was evident, for instance, in their responses to the questions about their experiences of the outcomes of involving practitioners and policymakers simultaneously in designing rules that foster access to low-cost monitoring and evaluation of infrastructure debt. Among the 31 responses, a thematic analysis revealed that 27 emphasised the diverse expertise of various practitioners (this included qualities like knowledge of debt sources and advisory and consultative roles). Diversity and inclusivity were emphasised. Fifteen participants emphasised the influence practitioners had to win over investors or lenders as intermediaries in knowledge exchange to access the infrastructure debt at low interest rates. A word frequency query revealed that “involvement” occurred 43 times, “share ideas” occurred 12 times, and the word “consultation” 12 times. This evidence suggests that collectivism is important in mitigating information loss in infrastructure debt governance and risk information aggregation to access low-cost debt.

*As declared by **Participant 5**, a collaborative risk assessment should limit complications in accessing low-cost debt. Nevertheless, the government and practitioners must make independent risk assessments and collaboratively review the outcomes to reduce the rising sovereign debt sustainability risk and risk premiums. **Participant 5**'s viewpoint suggests that collectivism should mitigate sovereign risk spillover susceptibility by stating the infrastructure debt and risk premiums should not increase due to defaults on existing covenants even if they are forgivable due to public sector governance, avoidable project management practices like corruption and the time to borrow because the international market is very volatile.*

The “involvement” corroborates the observation of Jordan (2017) that collectivist cultures like Kenya might expect friends (lenders) to help by offering “softer repayment terms” or forgiving its debts and “to break

the rules when needed”. It also validates the recommendation by Ombagi *et al.* (2023) that human-centred attributes like knowledge brokerage, mobilisation, and cognitive skills influence public policy network collaboration, formulation, implementation, and adoption outcomes by shaping actors’ information sharing, cooperation, and agreement. Furthermore, participants felt that there were success factors in involving practitioners in the initial infrastructure planning and decision-making phases to access low-interest loans and accept viable project management covenants. These included possession of knowledge of the effect of macroeconomic policy rates on lifecycle costs and of sources of funding and evidence-based knowledge of implementing the rules tied to loans. Diverse knowledge enabled rich consultations before the public sector representatives took up a loan. Some frequent comments on the success factors of the involvement of practitioners could be traced to **Participants 10** and **17** as follows:

“The practitioners are good enough because of the sharing of ideas, field experiences, and information, which can adjust future borrowing strategies and adopt methods that can lead to the decline of these rising interest rates over time.” [Participant 10]

“Their [practitioners’] field experiences working with foreign contractors enlighten public sector decision-makers where to get the loans at a lower interest rate, review project management covenants, and how to plan well on clearing their loans considering the international market changes, especially interest rates and exchange rates. For now, there is a risk of not taking up new debt, but we can see ways to refinance the existing debt and improve future infrastructure management practices.” [Participant 17]

Most participants acknowledged that it was important to have policymakers on board as they understood the policymaking rules and regulations of infrastructure debt structuring and lifecycle management risks. This meant collaborative project design leads to better PPP policies and interest rates. Although the overall attitudes towards the involvement of practitioners in large infrastructure investment decision-making and delivery can be described as predominantly positive, there were different opinions on how practitioners’ involvement shapes low-cost external debt access. This stems from divergent views on the objectives of collective decision-making processes in accessing low-cost debt. Some of these views included vague policies that made foreign lenders/investors impose their terms and conditions through imbalanced loan covenants, lack of support from the private sector to deliver projects efficiently, lack of a collective voice from local financiers, policymakers, and project executioners, and rigidity in practitioners’ ideas. These divergent opinions expose conflicting perceptions of constraints that reflect the managerial self-perception of the ability to participate in collective decision-making under risk, ambiguity, or uncertainty and the affordances of the infrastructure development environment. While conflicting perceptions of constraints may lead to discriminatory alignment emerging from culture’s effect on the psychological dependence on

social groups that these managers perceive to be helpful in navigating risk, ambiguity, or uncertainty, they reveal misunderstandings of managerial responsibilities at the intersection of policy and practice.

***Participant 24** emphasised that the local and international development community influence the debt risk: “There are things the local and international communities know and do not, and vice versa. [While the practitioners] will use their local knowledge, skills, and techniques to assess risk, the international community may inadequately observe some local risks and price them in debt. [The local community] will also give the infrastructure the social licence, which minimises environmental disputes.”*

“The local communities are special; their inclusion from the development phase eliminates significant lifecycle risk. [The challenge with practitioners is] that we sometimes do not assess all the critical stakeholders within that community as sources of information about influential decision-makers because of the complexity of accessing and analysing multiple sources of information at any point. Every community has a way of organising itself. I am a scholar and have seen studies that have reported that this behaviour [limited stakeholder engagement] is common in many African, Latin American, and Russian infrastructure development contexts. Chinese contractors seem to go the extra mile to understand community decision-making systems as key stakeholders because they cannot afford to let a Chinese government-funded project fail. The consequences for the China Exim-Bank are dire. We need such rules. That means we need our [Africa] Ex-Im Bank.

“On top of that, because we want to deliver political infrastructure development promises to influence future voters from these communities, the decision to borrow at a certain international market risk premium is often associated with poor market timing due to the urgency to fulfil political promises. Infrastructure risks in developing countries must be embedded in lifecycle theory to address the current debt sustainability risk without curtailing much-needed infrastructure development projects to deliver Vision 2030 goals. The quality of the borrower-lender interactions needs to focus on evaluating international and intergenerational risk-sharing between developed and developing nations to address historical risks at the local and international level in the prevailing policy and management practices that have led to the elevated sovereign risk in Kenya.”
[Participant 25]

The perceptions from the interviews and their relationships have been summarised in Figure 6-3.

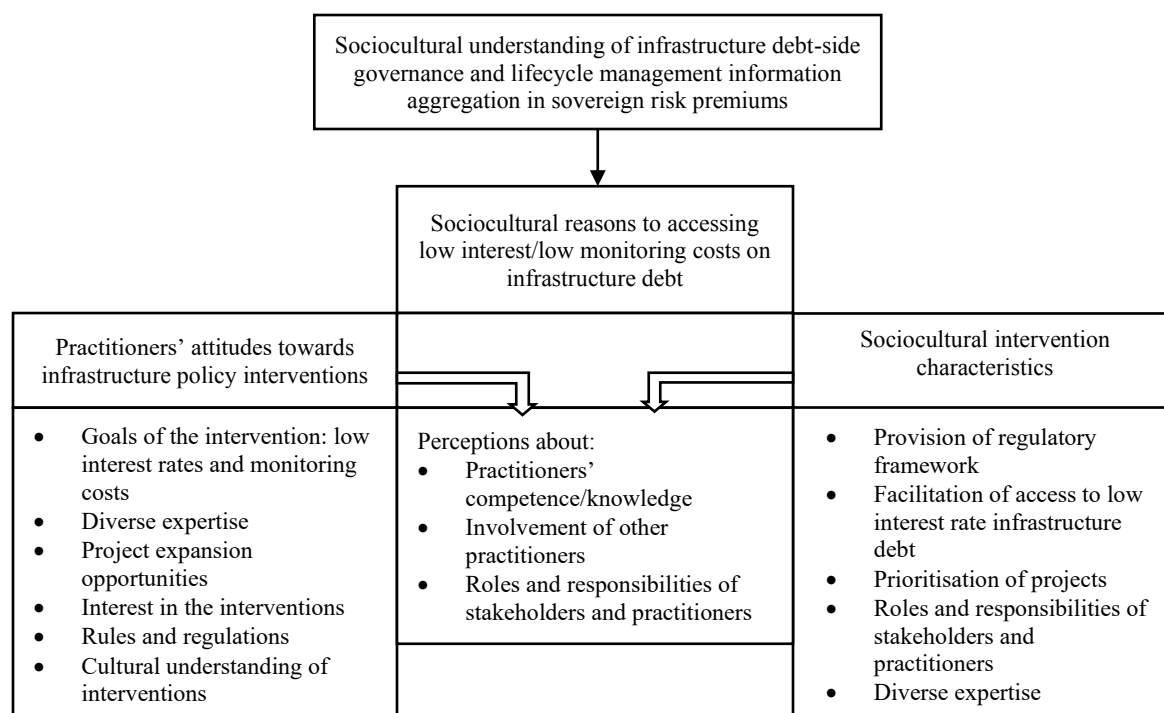


Figure 6-3: Thematic framework for the sociocultural perceptual dimensions of the interview responses

Source: Author (2023)

The vignettes illustrate the differing perceptions of participants about the involvement of practitioners in collective decision-making in Kenya. It has necessitated the government to develop interventions to bring together practitioners. Yet, the extent to which practitioners think those interventions are effective, thus influencing their attitudes towards collective infrastructure debt governance and risk management, is vague. Suppose a practitioner is involved in a public infrastructure project with the idea that they are sourcing funds with low interest rates to execute a project. In that case, their expectations of the interventions in place will be different: they will have different beliefs about the competencies of other project owners/executioners, ideas shared by stakeholders, and the roles and responsibilities of each stakeholder.

6.5. Objective 2: Examine the relationship between culture and managerial demographics in Kenyan renewable energy and transportation infrastructure contexts

The seven CHAT framework concepts, affordances, Hofstede's six-dimensional culture framework and herding provide constructs to evaluate how culture moderates the behavioural dimension of the relationship between sovereign risk and infrastructure development. The study focuses on secondary contradictions. Based on the theoretical standpoint that culture exists within individuals, integrating these concepts guides the study to elaborate on the interaction between national cultural constraints and participants' perceptions of debt-side governance, project management, and macroeconomic risk experiences during the interview.

6.5.1. Subjects: Policymakers and key informants

The subjects were policymakers and key informants as experts interviewed to provide insights into infrastructure development and sovereign risk. The objective was to propose a human-centred infrastructure design and implementation framework based on subjects' perceptions. It was assumed that managers in Kenyan infrastructure projects worked in a high-risk context based on the recent research on the rising external sovereign debt sustainability risk (Onjala, 2018) in Kenya and the compounding effect of sovereign risk mispricing for Sub-Saharan African nations (Morsy & Moustafa, 2020). These nations face an elevated sovereign risk partly due to within-country moral hazards among decision-makers (Brautigam *et al.*, 2022) and cultural distance in sovereign credit risk ratings (Dang & Partington, 2020).

The qualitative analysis provides important insights into the possible sources of some of the beliefs and attitudes expressed by participants in Figure 6-2. Cultural values guide the study in pinpointing likely herding behaviour and sovereign risk intensifiers. Vignettes from the interview responses represent specific statements to analyse and understand the participants' perspectives on infrastructure debt governance and project management information in order to provide alternative explanations to the existing findings about managerial behaviour and sovereign infrastructural risk.

6.5.2. Mediation: Managerial interaction with mediating tools in the infrastructure context

CHAT's mediation concept evaluated how culture might shape herd instinct and sovereign risk spillover to infrastructure projects by asking participants about their perception of available rules, institutional structure and division of labour. Renewable energy and transportation infrastructure development managers need to adapt their sovereign risk assessments to formal and informal infrastructure governance structures. The eleven mediating tools and cultural dimensions that emerged are discussed in Sections 6.5.2.1 to 6.5.2.11.

6.5.2.1. Vision 2030 policy interventions in infrastructure lifecycle management

While the study evaluated the Big 4 Agenda as the most recent policy intervention, it is important to note that before the Big 4 Agenda was implemented as the third mid-term intervention to Vision 2030. Practitioners were already involved in infrastructure decisions within the devolved governance systems. Thus, the interview touched on collaborative Vision 2030 policy risks, including the role of diverse stakeholders at the national and sub-national levels, management capacity building, policy reforms, and the importance of the political, economic, and social context dynamics in infrastructure development lifecycles. These concepts provide insights into how culture and history shape future decision-making related to foreign infrastructure debt governance and risk information aggregation that could shape sovereign risk. The aim was to establish how Vision 2030 policy intervention design and implementation map Kenya's cultural history and infrastructure project management behaviour on sovereign risk. The secondary data

analysis from government records revealed that the government and its agencies had developed several integrated policy interventions to align debt governance information aggregation and practices with infrastructure development goals. Implementation should facilitate access to low-cost debt.

Participants mentioned that most of their infrastructure management questions were answered through the Central Bank's Integrated Financial Management Information System, as the main instrument, which has the information required by practitioners to identify prioritised projects for funding. Mediation through ICT tools can be traced to a study by Ombagi *et al.* (2023), which notes that adopting ICT tools like online forums and interactive digital platforms can boost collaboration, streamline data flow and communication, and offer visual tools to understand the policymaking process better. Other participants noted that even before the Big 4 Agenda, politics influenced historical Vision 2030 policy interventions, especially during regime changes, and delayed required information about prioritised infrastructure projects for funding for managers because of ongoing projects from a past regime. This implies that managers could not disseminate evidence-based information as they were not involved in evolving sovereign debt and political framing of infrastructure benefits to voters. Political framing of infrastructure benefits can be linked to CHAT's historicity tenet as there are tensions between historical vs current infrastructure needs, cultural norms vs risk mitigation, and power dynamics vs hierarchies. It also exemplifies that infrastructure development can afford political ambition over economic, social, technological, environmental and legal reform benefits. The government implemented the Big 4 Agenda as the most recent 5-year short-term blueprint covering 2018 to 2022, according to the Vision 2030 guideline, to implement the longer-term development strategy as one of the most publicised Vision 2030 interventions. Table 6-2 shows the positive and negative impacts of the Big 4 Agenda on infrastructure management linked to cultural communication constraints identified by Ombagi *et al.* (2023). Thus, communication breakdown can lead to discriminatory alignments.

Table 6-2: Impact of Big 4 Agenda on infrastructure lifecycle management behaviour

Negative	Positive	Facilitators
• Delays are caused by the length of time taken in consulting • Dominance by some stakeholders • Conflict of interest among stakeholders • Overlapping of ideologies	• Diverse and needed expertise • Improved national cohesion • Positive impact on meaningful projects • The decline in interest rates of infrastructure debt due to better bargaining power • The conceptualisation and design of projects are done collectively	• Diverse knowledge and competencies of infrastructure practitioners • Clarity of rules and regulations

Source: Author (2023)

6.5.2.2. The regulatory framework, loan covenants, and information asymmetry

Participants highlighted the challenges in accessing information about debt financing due to secrecy and the disclosure limitations lenders impose in some external infrastructure financing agreements. Participants recommended that information about debt financing in infrastructure projects should be public and transparent. **Participant 16** opined that critical information might be kept secret due to strict foreign policy regulations on disclosure and geopolitical interests perpetuated through some loan agreements. This reflects the tension between openness and the optimal level of transparency required that aligns with the cultural dimension of individualism vs collectivism and the need to protect sensitive financial information in bilateral lending agreements that could be linked to uncertainty avoidance by some lenders to protect the country of origin's geopolitical interest and compliance with the country of origin's foreign policy.

"In most cases, most of these contracts are shrouded in secrecy due to limitations on disclosure in some bilateral loan financing agreements. For instance, Chinese financing for the SGR project comes with conditions and critical information that cannot be disclosed to the public. This limitation impacts the public's understanding of how risk premiums and financing for infrastructure projects are determined. Moreover, an emerging major issue is how to use these projects to build local management capacity, reduce reliance on expatriates in future projects, and transfer such rail infrastructure development knowledge to Kenyans." [Participant 16]

According to Hofstede (2013), China and Kenya are high power distance contexts. Centralised governance systems make these contexts susceptible to cultural constraints between seniors (political decision-makers) and subordinates (infrastructure project managers). One may infer China's state-led internationalisation strategy as redefining the executive agency and the state's capacity (Chiyemura *et al.*, 2023) to develop projects if power distance intensifies how tied bilateral loan agreements reshape the regulatory framework, policy risk, and uncertainty and ambiguity guarantees. It appears that the tensions between the state and citizen opinions in the context of the SGR project suggest that the state actors' institutional, economic, political, and bureaucratic governance tools are firmly embedded in the shared high power distance culture. This elicits the issue of covenant compliance and the risk of tied bilateral loan agreements, exacerbating sovereign risk creation due to communication breakdown in hierarchies. High power distance is associated with information asymmetry and fragmented governance in the international financial system that may reshape project management behaviour through bilateral infrastructure debt terms.

Participant 14 observed that the ultimate decision-maker concerning foreign infrastructure debt issuance is the government of Kenya through the National Treasury. These institutions decide whether to accept or reject the terms and management conditions presented by potential lenders based on their assessment of value for money and alignment with government goals.

Vignette on power distance: It could be inferred that participant experts in infrastructure delivery shared their knowledge that the limited disclosure of key information in financing agreements may be exacerbated by inefficient separation of power while decentralising national decision-making authority and redefining multilateral and bilateral loan negotiations (e.g., Kenya and China display high power distance contexts). The interview extracts elicit the CHAT concepts of subjects (government officials) who are influenced by cultural rules (power distance norms) that mediate their interaction with external lenders (negotiation) with whom cultural constraints lead to discriminatory alignment by failing to question information disclosure (low disclosure) of infrastructure debt and governance effectiveness because they perceive counterparties (China) to have superior information on infrastructure development projects. Mentioning the dominant role of foreign financing agents in infrastructure projects reflects a difference in power distance between local stakeholders and external financiers. The subject (local government officials) is influenced by cultural constraints (power dynamics rules) that shape their mediation (covenant negotiation) with foreign financing agents, impacting the outcome (infrastructure project finance and management behaviour).

“It is complex, to be honest, a complex process [laughter]. I will not say it is easy. Besides having diverse international multi-stakeholder groups, many recent infrastructure policies in Kenya must be interpreted considering historical outcomes. Many assurances [risks] need to be put on the table and evaluated because some of those assurances might not come from one individual body. However, the taxpayer is the ultimate risk bearer. So, you have many local and international sources to collect information to get one policy done [integrated policy] and coordinate interactions with other policymakers and international creditors who also have their infrastructure development loan conditions and geopolitical interests because of their country’s goals in the international space.” [Participant 13]

While policymakers expressed the complexity of learning from different stakeholders, most participants frequently referred to government guarantees and regulations as the ultimate reference guidelines in foreign infrastructure debt governance during the interviews. This corroborates participants’ perception that policy and institution instruments should afford them tools to avoid ambiguity and uncertainty. The participants’ risk perceptions indicate a high power distance context where cultural constraints predispose authority figures to shape herding as highly respected informational structures. Information cascade rules may lead to centralised decision-making to protect historical cultural power structures. High power distance may augment managerial preference for authority vs collaborative knowledge-sharing. The interview extracts suggest that power distance could lead to tensions between formal vs informal governance when leaders override rules and regulations governing infrastructure development and other important information

aggregation structures, like integrating the local community's views into the organisation structure, local government legislative, and cross-sectoral interventions to meet lender covenant compliance conditions.

6.5.2.3. Counterparty risk and government guarantees

Participants 8 and **7** opined that the interest rate is influenced by equity and the country's reputation. **Participant 13** referred to rules suggesting that power purchase agreements and government letters of comfort affect external debt costs by demonstrating government effectiveness. One could infer that the preference for stability vs adaptability and an uncertainty avoidance culture is embedded in their innovative decisions vs a preference for universal risk mitigation standards as the project evolves.

“I am, generally speaking [referring to counterparty risk/government guarantees]. If you go to specific projects, more items [risk mitigation tools] come into place. The types of the project depend on the fact that [renewable energy], for example, in the energy sector, you find that if you are more or less assured of the demand through power purchase agreements that are in place that in itself influences the costing of the foreign debt, for example, if you remove something like power purchase agreement or if you remove something like government letter of comfort, the cost [definitely] goes up. These are sovereign risks that the government must guarantee, and they are very expensive and require complex loan structuring. As you have seen in the media about governance issues affecting the Kenya Power Company's performance, government officials interfere in contract implementation despite guarantees. These risks can impact plant operations if Kenya Power Company delays paying for the electricity procured through PPPs.” [Participant 13]

Participants acknowledged the complexity of managing counterparty risk and securing government guarantees in the infrastructure lifecycle development and financing process.

“Yeah, before you are given funding, one of the key things is that the lender appraises the project, and this appraisal captures many factors to establish governance effectiveness. You must look at the fact that during the project lifecycle, what could go wrong, the technology, and if the technology would change the cost of the project implementation. You would want to evaluate the finance bit also attributable to that project in structuring management covenants. Things like tariffs, inflation and exchange rates can dramatically change your project profitability if the tariff is too high for citizens to afford. Despite having a 20- to 25-year concession to develop and operate the plant, political and policy risk is a reality and can influence the loan maturity you will get because lenders want to avoid uncertainty at all costs and price this risk properly. So, despite being given a grace period to enable you to do the construction, the longer the loan maturity, the higher the uncertainty and the higher the costs. Most projects in Kenya are not even completed within those grace periods

and end up refinancing construction debt at additional premiums because markets change daily. You must include all those in your financial model to have a good idea of structuring your debt and the policy guarantees required.” [Participant 10]

6.5.2.4. Involvement of stakeholders

Most participants emphasised the importance of involving various stakeholders in infrastructure project planning and decision-making, including government organs, private sector players, environmental groups, and affected local communities. **Participant 1** stressed the importance of involving practitioners from the public and private sectors in infrastructure planning and decisions. This aligns with Vygotsky’s zone of proximal development (ZPD) concept, where individuals (in this case, practitioners) learn from others to solve societal problems and achieve better outcomes that can be enhanced through collaboration. Lack of collaboration disproportionately influences individual vs collaborative learning goals. It can mediate the interaction between expert and novice perspectives. It also reflects that the cultural dimension of low power distance may positively mediate social interactions between experts and novices from different backgrounds, which could lead to more democratic infrastructure decision-making. Furthermore, it could establish a hierarchical structure that reduces discriminatory alignment through structured learning vs informal learning. Such environments may affect individual development vs collective development in improving infrastructure lifecycle management as one of the ways to address the elevated sovereign risk.

“The government needs to do all the local and international studies and risk analysis during the conceptualisation phase of projects to identify the ideal financier, whether it is public finance or leveraging private sector finance. How we structure the projects [referring to PPP] will determine how we negotiate with partners for interest rates and risk premiums, which are essential in attracting favourable financing terms.” [Participant 1]

Vignette on individualism vs collectivism: The perception of various stakeholders – such as the government, users, private sector implementers, environmental groups, and affected communities – as being important reflects collectivism in CHAT’s community concept, where the project’s management community’s interests are more important than the individual’s. While collectivism within the community of stakeholders, representing different collective interests and knowledge structures, may play a crucial role in collaboratively shaping infrastructure outcomes, it is mediated by the division of labour. Wenger’s (2000) concept of communities of practice and socio-cognitive learning led the study to infer that cultural norms determine how the involvement of various stakeholders and their emphasis on group objectives influence the implementation of environmental, social, and governance policies. While managers representing a borrower in this study manifested a collectivist cultural orientation, the findings offer cautionary evidence when compared to Dang and Partington (2020), who revealed that the cultural distance of collectivist vs

individualism influences negative ratings through an international bond portfolio of S&P and Moody's sovereign risk ratings. Individualism and long-term orientation determined sovereign ratings and the probability of a change in those ratings. Individualism and a long-term orientation make upgrades more likely and downgrades less likely. Hence, the study observes that managers perceive cultural constraints differently. These perceptual differences influence their approaches towards risk-sharing when representing a lender or borrower in infrastructure development projects due to varying risk-sharing objectives.

“Because of these [different expertise], you cannot run away from consultations, and these consultations are important because they harness the vibes of the stakeholders. Moreover, you will be more responsible if the project fails. For example, if you are putting up a wind power plant, you must ensure that you take care of the environment, the noise pollution and all that you must factor in. Furthermore, of course, something else which is very important, especially for the wind power station, if the project you will be carrying out will impact carbon emissions reduction, then that is a plus because that will help you safeguard the surroundings. You can easily attract international investors.” [Participant 19]

The participants emphasised the importance of understanding and involving stakeholders, including the public (local community groups), to foster collaborative decision-making. This suggests a collectivist cultural perception, where decisions are made collectively for the greater good of society. The perception of collectivist vs individualist culture may determine how managers legitimise and implement public policy guidelines to mitigate gentrification (Khanani *et al.*, 2021) in designing infrastructure systems and avoiding social unrest in their implementation phases by ensuring all stakeholder interests are considered.

“Nowadays, due to the laws [Constitution of Kenya 2010], you must do extensive paperwork to demonstrate environmental impact assessment, the project specification of some sort, or the key stakeholders you are involving. Most citizens know their rights, so the public has stopped some projects [Kinangop Wind Farm project and Geothermal Power Plant] despite securing government guarantees and external debt funding. You cannot underestimate their knowledge about the project's implications for their economic and social welfare. You must have a social licence on top of other policy requirements before moving on with a project [transportation], things like environmental requirements because some of these infrastructures have affected tourism and wildlife economic activities [SGR]. So, because of these, you cannot run away from aligning national and local government consultations. These consultations are important because they harness the vibes of the local communities as major stakeholders in all types of infrastructure projects [renewable energy, road, and rail] you will ever implement in Kenya because the key staff

you will find when looking for county government permits are from the affected local communities.”
[Participant 29]

6.5.2.5. Management capacity building

Participants perceived fragmentation in Vision 2030 pillars in infrastructure development decisions. They recommended enhancing the capacity of public sector officials to negotiate effectively with potential lenders and collaborate with the private sector. This reflects the concept of “mediated action”, where the skills and knowledge of individuals are shaped and developed through social interactions and experiences.

*For instance, **Participant 12** noted that accessing low-cost foreign infrastructure debt requires demonstrating the impact of projects on the country [Vision 2030 pillars] and enhancing the capacity of external loan negotiators to align financing terms with the government’s fiscal space.*

Onjala (2018) notes that weak loan negotiation skills and analytical tools influence infrastructural sovereign debt sustainability and benefit realisation in Kenya. Dorobantu & Müllner (2019) reveal that infrastructure transaction costs rise due to opportunistic creditor behaviour’s significant effect on political and socioeconomic development objectives. The weak loan negotiation skills appear to reflect a socio-cognitive learning dimension of integrating local vs international knowledge structures into the negotiation process.

***Participant 16** highlighted collaboration constraints associated with masculinity vs femininity traits by stating that one of the challenges in involving private sector practitioners in infrastructure planning is that most of the assignments are conducted upstream by foreign consultants. This limits the capacity of local experts to compete, and there is a need to realign strategies to engage more local consultants in planning and decision-making.*

Vignette on masculinity vs femininity: The emphasis on efficiency, negotiation skills, capacity building and opportunism in infrastructure management in Kenya aligns with the country’s masculinity dimension, which values assertiveness and achievement. However, the correlation in Chapter Five suggests that how managers balance cultural dimensions plays a more significant role in their external loan negotiation capacity which can influence discriminatory alignment at the national level of infrastructure development. Specifically, the interaction of power distance with masculinity vs femininity and individualism vs collectivism was notably correlated. This managerial capacity aspect aligns with CHAT’s concept of internalising negotiation skills and capacity building, influenced by human-centred socio-cognitive learning goals. The involvement of private sector practitioners supports the goal of collective low-cost infrastructure financing, highlighting tensions in balancing market-based profitability vs sustainability goals. Participants had consistently prioritised competition and profitability in accessing low-cost loans, indicating a culture

of valuing financial achievement in the negotiation process. This study underscores the complexity of culture's influence on social welfare in infrastructure management and loan negotiation in Kenya, requiring a nuanced understanding of cultural constraints and their interplay.

6.5.2.6. Decision-making in foreign infrastructure debt issuance

The participants explained that the ultimate decision-maker regarding accepting, rejecting, or deferring infrastructure debt lies with the borrowing government. This aligns with the power distance in shaping social interactions within hierarchies, where decisions are made in the higher echelons of the government.

“Various stakeholders are involved in infrastructure projects, including the government, users, private sector implementers, environmental groups, and affected communities. Mapping out these stakeholders and understanding their needs is crucial in accessing low-cost foreign infrastructure debt, technology and infrastructure management expertise.” [Participant 17]

However, decision-making may differ across sectors.

“Ideally, the major difference is the capitalisation mode for infrastructure projects between Africa and the rest of the world. You see, capital for infrastructure in Africa is only accessible through the formal banking streams, and banking, especially in Africa, uses short-term customer deposits to do business, so most of the time, they must charge high interest rates. These interest rates have become prohibitive, especially regarding project financing with uncertain profitability. So, for such high interest rates, the return on investment on financed projects takes longer, and banks want to avoid such uncertainty or risk. Foreign debt dominated by international financial institutions has very low interest rates because the cash acquisition mode is unlike the customer deposit orientation for African banks but requires a large-scale project. So foreign debt financing will beat self-financing in Africa, pushing the government to propose large projects including technology and management expertise to maintain it.” [Participant 5]

Infrastructure practitioners' consideration of various lifecycle factors, including technology and innovative financing, mediates government decision-making in determining the debt structure and implementing the rules in the appraisal process, which involves evaluating multiple factors to make informed decisions. However, collaborative infrastructure planning requires improvement.

“I sometimes blame the players in this field. The local financiers, project executioners, and policymakers have no collective voice regarding infrastructure debt sustainability. If you look at most infrastructure projects, they are normally dealt with on an ad hoc individual basis. If we had one representation, an integrated practitioners' body that can represent the interests of local

financiers, that can now involve all stakeholders, including the government and policymakers, that can improve the mode of financing and execution of such projects. PPP [Public-Private Partnerships] Unit and PDMO [Public Debt Management Office] have been recently established at the National Treasury. They must strongly collaborate with practitioners representing the technical [engineering] and finance [external debt] because policy trails evidence-based and innovative thinking from practitioners' field experience. If you cannot innovatively influence finance and technical policy simultaneously, it cannot benefit you [infrastructure lifecycle management] because they are linked. The only way you can influence these interconnected policies is by having representations at various levels of technical and financial engineering discussions, and that can only happen if you have an umbrella body representing cross-sectoral professional bodies in infrastructure development.” [Participant 7]

6.5.2.7. Customisation of the governance framework using agile and iterative processes

Participants acknowledge that foreign debt governance frameworks should be tailored to suit the specific conditions and limitations of the country. While this aligns with cultural-historical theory's emphasis on contextualised and cultural relevance to demonstrate expansive learning, tailoring the governance tools to sovereign risk conditions suggests that the participants, as experts, may have observed a local managerial inability to adopt agile or adaptive project management methods.

“Every government is keen to ensure that borrowers [public and private] ultimately pay their debt to avoid a negative sovereign risk reputational. That is why the government gives letters of comfort and sovereign risk guarantees to key private sector infrastructure developers. However, negotiating for reduction of interest rates and flexible terms requires enhancing the skills and capacity of public sector officials, so they can effectively negotiate contracts and respond to eventualities like the COVID-19 pandemic.” [Participant 1]

Agile lifecycle development entails several iterations, which repeat one or more phases before proceeding to the next one. In such an iterative approach, managers can only proceed when user feedback, in this case from public debt and infrastructure lifecycle managers, is available for initiating new external debt and infrastructure development projects, refinement, and improvement cycles to mitigate a debt repayment risk. This reinforces **Participant 12**'s opinion about aligning infrastructure decisions with the fiscal space as an infrastructural Debt-to GDP rule before initiating new projects. From a historical viewpoint, Otieno (2023) observes that the devolved governance reforms enacted in 2013 to comply with the Constitution of Kenya 2010 led to governance and regional development disparities using evidence from the north-eastern part of the country pre- and post-decentralisation because of the inadequacy of local managerial capacity.

“Customising the debt governance frameworks to suit the country’s limitations and realities is important. Strong governance frameworks can elevate the country’s rating and positively influence negotiations for better terms and conditions for borrowing.” [Participant 13]

Due to fragmented governance, one could infer that socio-cognitive learning motives vary in sub-national governments. It can lead to culture-mediated herding if managers hesitate to recommend adjustments to the centralised governance system, causing issues like corruption to persist in some county governments (Otieno, 2023). Such hesitation may limit private information from joining the prevailing public pool of knowledge influencing sovereign risk pricing. Kolstad and Wiig (2011) refer to defensive socio-cognitive learning by suggesting that lessons learnt should be revisited when evaluating new infrastructure development evidence and prospects offered by new technological horizons to deliver sustainable outcomes. However, there appears to be a learning challenge in translating historical evidence into current knowledge and adapting it to evolving infrastructure development contexts. These social practices reflect a human-centred orientation towards short-term vs long-term perspectives, the value placed on sustainable economic growth vs environmental and social sustainability and the ability to integrate centralisation vs local empowerment in infrastructure lifecycle development systems.

6.5.2.8. Role of private sector practitioners

Consistent with Hope’s (2010) recommendation to address the regional resource pooling challenge in infrastructure development through infrastructure bonds and attracting private investments through PPPs and PPIs, all participants recommended involving private sector practitioners in infrastructure planning and decision-making to improve project efficiency and attract friendlier infrastructure debt conditions due to robust risk-sharing. This relates to the “collaborative activity” concept, where social interactions between stakeholders contribute to achieving common goals and facilitate positive social influence by the state. Yet, in a global study, Dorobantu and Müllner (2019) found that borrowers might be susceptible to opportunistic creditors. Moreover, Ferchen and Perera (2019) note that distorted commercial and political incentives are two-way streets with substantial information asymmetry, denoting inefficient collaboration. The debate seems unresolved in ways that suggest that the culture-mediated division of labour vs shared responsibility goals determine the ultimate sovereign risk premium bearer in infrastructure PPPs when navigating uncertainty. The private sector may only bear remunerated risk based on market rates.

Participant 20 affirmed that enhancing a better foreign debt governance framework significantly impacts the cost of financing. The involvement of private sector players can convey positive signals to the market and lead to negotiating better terms for debt, ultimately reducing the country’s debt burden.

Vignette on uncertainty avoidance: The caution in entering financing agreements and the need for clear rules reflect a high uncertainty avoidance culture among local banks and practitioners, who might engage in discriminatory alignment by preferring structured and predictable risk management processes or tools. The study associates this perception with the CHAT concept of rules. Effective PPP rules and information aggregation tools help manage infrastructure financing and lifecycle uncertainty. The mention of political changes and currency volatility indicates a high uncertainty avoidant community. CHAT's community concept implies that stakeholders must assess how collaboration mitigates relational risks and uncertainties, but their uncertainty avoidance tendencies differ. Managers need to understand uncertainty avoidance tendencies as they may explain how higher risk premiums may emerge from lenders' herding behaviours, classifying African debt as one asset class and following the crowd in pricing debt (Morsy & Moustafa, 2020). Consequently, the interviews touched upon risk mitigation to establish the tools managers use in infrastructure projects to avoid uncertainty.

"Yes, there are apart from mainstream government institutions [cross-sectoral risk guarantees]. I am talking about the key ministries [Foreign Affairs, Treasury, Ministry of Energy] we call government stakeholders. We have other government-oriented institutions, like the Central Bank of Kenya, KRA [Kenya Revenue Authority] and the CAK [Construction Authority of Kenya]. Due to licensing, those bodies are critical regarding foreign debt infrastructural financing and lifecycle management. Either way, they bring government-to-government institutional stability and professionalism into the infrastructure economic exchange. So, many bodies, including professional certification bodies, the National Construction Authority, the Energy Regulatory Authority, are [stakeholders] that influence your financing through overall infrastructure lifecycle cost." [Participant 21]

Vignette on establishing institutions for uncertainty avoidance: Participants stressed the significance of risk mitigation and adherence to regulations and policies to reduce risks in infrastructure projects. While Kenya implemented various institutional capacity-building projects, participants recommended lowering regulatory risk and mitigating managerial uncertainty through institutional collaboration in implementing reforms. For instance, Eberhard *et al.* (2017) observe that renewable energy infrastructure project planning, procurement, contracting, and permitting power generation capacity responsibilities are generally more well-defined and efficient in Kenya than in other Sub-Saharan countries. This reflects a perception of shortfalls in policy and institutional affordances as important social actors among managers with a high uncertainty avoidance. Such managers may herd by conforming to historical rules when they face significant ambiguity or uncertainty. This strong preference for rules and structure to manage uncertainty

may limit innovative or independent thinking as project lifecycles evolve and create a complexity of lifecycle integration and adaptive/agile resource management.

6.5.2.9. Lifecycle integration and resource management complexity

Participants provided insights into the challenges and complexities involved in infrastructure lifecycles from initiation to termination due to evolving global and regional debt-side governance and information aggregation structures, as well as the role of different stakeholders in influencing decision-making and infrastructure project outcomes. Participants shared that, as well as there being significant uncertainty at the project initiation phase, the infrastructure development process is expensive, suggesting that schedule delays might be mitigated during implementation with adequate funding and expertise.

“Having done a good feasibility study for a particular project and using expensive finance means there are few things that either will be forgotten or spread for a long time because of access to finance. Suppose we have foreign debt financing disbursed timely, for example, which is handy when you have a solid project. In that case, we can crush a project, for example, and ensure it is operational in good time to meet debt repayment maturity.” [Participant 28]

While the phrase “we can crush a project” suggests overconfidence in the collective managerial ability to deliver projects when there is adequate funding, it also implies that project management qualities are associated with the timely availability of resources.

“For me, having access to cheaper cash means I can recommend employing the best project managers since I can get them in the international market with better remuneration. If I have expensive capital, my resources must be remunerated very lowly. I will attract the wrong calibre of resources that I need. So, from a project design perspective, depending on my capital type will impact the schedule, cost, and quality. Of course, these factors directly determine benefits realisation through plant lifecycle costs, maintenance costs, upgrades, performance efficiency, and its overall economic impact.” [Participant 4]

Managerial judgement and decisions when formulating the business case can have lifecycle implications for project cost and sovereign risk as a pricing benchmark in infrastructure project development portfolios.

“Moreover, when it comes to execution, I will be forced to look for cheaper solutions to actualise a project because of the tightness of the available capital. So that time, you will have a shortcut to delivering quality regarding equipment and other resources. So, look at most projects we execute using local financing [the expensive local financing]. Those projects do not go beyond 4 or 5 years before requiring an overhaul. The failure rate is high because of the shortcuts, the type of

equipment used because you have been forced to compromise the quality to adapt to the available financial capacity.” [Participant 22]

The references to shortcuts and frequent overhauls suggest short-term vs long-term orientation. Moreover, participants imply that most lifecycle errors happen at the project initiation phase, suggesting inadequate planning and inability to amend decisions once made. They corroborate Flyvbjerg’s (2007) theory that policy and infrastructure planning are often misaligned. This misalignment emerges from the judgement surrounding debt sustainability in the infrastructure portfolio and uncertainty about taxation tariffs affecting equipment importation costs.

“Let me be very honest with you. This should be at the feasibility stage because at the feasibility stage is where you can decide the levels of commitment that the government may expect, the levels of commitment the Central Bank of Kenya can commit in terms of exemptions [tax incentives to boost foreign direct investment in infrastructure projects] the KRA involvement, is there any duty waivers, are there special treatments, are there exemptions, you bring in testing bodies for the equipment and materials you will import like Kenya Bureau of Standards. If those things are not aligned at the feasibility stage, you will be faced with non-compliance conditions that may affect the lifecycle of a project. I know projects stopped because of limited disclosure of the equipment and materials used.” [Participant 16]

Participants insinuated that there is sovereign risk creation through the interaction of state-led political framing of the Vision 2030 infrastructure development agenda and international influence on institutional mandates that internalise debt-trap diplomacy (Eickhoff, 2022). This exposes local vs international knowledge adaptation tensions. Most participants stated that the Big 4 Agenda was one of the mid-term policy interventions required in the Vision 2030 blueprint that was highly publicised by national and local governmental institutions as the guideline for 2018 to 2022 due to the imminent political regime change.

“You know these Big 4 Agenda projects just raised the risk profile [sovereign debt], but these forums [infrastructure policy reforms] have always been there, maybe not so much publicised with trendy names like the Big 4 Agenda, but they have always been there. You cannot do anything without the country’s Treasury, and everything modified [public policy] must go through the public policymaking and fiscal management process. It is just that these things [Vision 2030 infrastructure development pipeline] have been national integration, economic agendas and more of political cards for a long time. Big 4 was only trying to actualise them [Vision 2030 infrastructure development] with a flashy name.” [Participant 13]

The reference to the Big 4 Agenda could be linked to CHAT's historicity concept in terms of the perception of Vision 2030 policy affordances as an alternative explanation to Ferchen and Perera's (2019) observation that political interests may go beyond the election cycle. Politicians may be motivated to take unsustainable risks to protect political interests since future long-term infrastructure development payoffs may be credited to opponents. Participants recognised that Vision 2030 policy intervention forums and consultations have always been part of the political farming process, with the Big 4 Agenda bringing them into the spotlight using a "flashy name". Still, managerial behaviour mediates policy intervention outcomes by interacting with the National Treasury regarding prioritised infrastructure project funding and adherence to established processes. Consequently, the study probed participants more on the Big 4 Agenda, focusing on the political framing of infrastructure development and sovereign risk.

6.5.2.10. Big 4 Agenda and political infrastructure projects framing as future-making

Participants acknowledged that long-term political career considerations might have influenced the Big 4 Agenda, which is a government initiative (Ferchen & Perera, 2019). It relates to "political mediation" in cultural-historical theory, where state-led authority redefines institutional mandates. Redefined mandates can misalign historical vs current infrastructure development objectives. Historical fiscal deficits, political dynamics and infrastructure development objectives or goals shape government policies and collaborative decision-making rules concerning fiscal space. Participants discussed the Big 4 Agenda's role in infrastructure project planning and decision-making. While there are challenges in working with foreign consultants and the potential for politicisation, involving private sector experts can positively shape the governance framework and result in better terms and conditions for borrowing. Most participants acknowledged that bilateral lenders prioritise the ability to reorganise projects if the political regime changes (Dorobantu & Müllner, 2019). This aligns with long-term vs short-term infrastructure development incentives, collective vs individual intelligence, and masculinity vs femininity, where involving diverse perspectives can lead to better solutions.

Participant 1 suggested that the Big 4 Agenda strongly aimed to involve private sector practitioners in infrastructure planning and decision-making to influence the long-term infrastructure development goals. While it faced challenges, it demonstrated that the private sector can positively influence foreign infrastructure debt governance and outcomes for major Vision 2030 infrastructure projects by actively or passively participating in new projects under the new regime.

Vignette on long-term orientation vs short-term orientation: The focus on long-term financial arrangements and social, economic, and political impact assessment in project conceptualisation reflects a long-term orientation, valuing future sustainability. This perception could be linked to CHAT's historicity

concept. Historicity is analysing past results and experiences to inform future decisions. The outcome is achieving low-cost foreign infrastructure debt aligned with long-term strategic goals. Long-term planning and the impact of policy changes on project lifecycles reflect a long-term orientation, which contradicts the observation by *Participant 22*. It exposes contextual long-term vs short-term orientation differences among participants. Long-term vs short-term goals can be inferred from the Big 4 Agenda and Vision 2030 context as the importance of considering the project lifecycle while determining loan interest rates. It was important to probe participants about renewable energy and transportation infrastructure projects.

6.5.2.11. Impact on renewable energy and transportation infrastructure investment

The participants acknowledged that better debt governance and information aggregation could positively influence the capacity to invest in renewable energy and transportation infrastructure. Governments can attract more foreign direct investment in infrastructure projects, especially sustainable renewable energy and transportation infrastructure projects, by negotiating better interest rates and reducing debt costs on innovative projects to curtail carbon risks.

Vignette on indulgence vs restraint: The mention of incorporating private sector expertise and foreign ideas into infrastructure decision-making reflects an indulgent culture. This perception aligns with CHAT concepts of externalisation, involving the private sector, and internalisation, building local managerial capacity for innovative approaches. The willingness to embrace new financing tools mirrors an indulgent socio-cognitive learning motive as an opportunity to embrace innovative risk mitigation tools. However, some participants emphasised the importance of transparency and good governance practices to access low-cost foreign debt, indicating restraint, where discipline and responsibility are valued. These opinions show that cultural constraints are not absolute. Managers may exhibit a mix of traits to varying degrees.

Vignettes in Section 6.2.4 show how cultural values may influence decision-making and attitudes towards accessing low-cost foreign infrastructure debt based on the CHAT concepts of subjects, rules, mediation, community, division of labour, object, outcome, contradictions, internalisation and externalisation, and historicity as interconnected and influenced by Hofstede's cultural dimensions and the affordance theory. Culture comprising ambiguity tolerance, individualism vs collectivism, uncertainty avoidance, power distance, masculinity vs femininity, long-term vs short-term orientation, and indulgence vs restraint may mediate how CHAT concepts and affordances are understood in different cultural contexts. Sections 6.2.5 to 6.2.9 discuss each CHAT concept.

6.5.3. Rules: Perception of the infrastructure policy and institutional affordances

The rules concept in CHAT was introduced in Section 6.2.4 to establish participants' perceived affordances of formal rules and policy guidelines alongside culture as an informal information structure in renewable

energy and transportation infrastructure development. The rules in this context refer to the formal and informal norms, guidelines, and practices followed during infrastructure delivery.

6.5.3.1. Formal infrastructure debt-side governance and information aggregation rules

This research sought to understand some in-depth rules surrounding infrastructure debt governance and information aggregation activities that mitigate the risk of accessing low-cost external debt. Figure 6-4 shows some of the main local and international policies the participants were aware of and the rules under each policy that surround foreign infrastructure debt.

International Financial Reporting Standards
• Transparency/disclosure of required information to investor • Pay principle amount and interest on time/consequences • Proper cash flow management
National debt management policy
• Limits borrowing capacity to GDP • Guarantorship of infrastructure loans
Big Four Agenda policy
• Consultation of all stakeholders before borrowing • Spending on the project and not diverting debt to other projects • Borrowing limitations for projects

Figure 6-4: Rules surrounding infrastructure debt governance and risk management

Source: Author (2023)

Apart from the generic Vision 2030 policy instrument, participants noted that sector-specific rules existed in infrastructure debt-side governance and management that influenced their risk management alignments. Some sector-specific policies include quality infrastructure and environmental policies, which give guidelines for executing projects without polluting the environment. Participants unanimously agreed that these policies act as Kenya’s guide to effective and sustainable borrowing for developmental purposes. Most participants affirmed that effective policies curb some management challenges that projects face, including corruption, which greatly shapes access to low-interest infrastructure debt.

“[When I started as a risk auditor in a privately funded wind project], I had already been warned that the public infrastructure management context requires political alignment.” [Participant 19]

CHAT’s mediation concept could be applicable here. Mediation refers to tools or artefacts that assist in communication and knowledge transfer. In this interview, the mediation tools are language and verbal communication. Despite the benefits of good policies, the study observed that sometimes conflicts arise between the policy objectives and what managers know about the risks associated with infrastructure debt.

Most participants said the government consultatively amended the policy to resolve the conflict in such circumstances. Some structures cited that helpful design of infrastructure debt governance included the World Bank and the IMF's global standards. Eickhoff (2022) cautions that debt-trap framing proponents seek to politically influence policies and public opinion without identifying their potential cultural channels of framing messages. One of the participants infers politically mediated power distance by suggesting that:

“I knew the Big 4 Agenda had critical political and policymaking information we could use to address transitional infrastructure lifecycle management risk because a political regime change was imminent. Through the interactive monitoring and evaluation sessions, you will see that certain policymaking things you might be going through are unique; then, you seek government intervention because Vision 2030 infrastructure policy must withstand political regime changes.”
[Participant 13]

Political mediation infers power distance effects. Cultural differences may influence the project funding negotiation strategies and communication styles between stakeholders, such as government officials, private sector practitioners, and external lenders when mediating financing terms. The involvement of private sector practitioners and international consultants in infrastructure project planning and decision-making serves as uncertainty avoidance mediation between the government and lenders. The cultural context in which various stakeholders collaborate, including government officials, policymakers, financing agents, and infrastructure practitioners, mediates the influence of decisions in infrastructure debt governance and information aggregation on sovereign risk premiums through managerial herding.

“You know, the more you understand government, the more you realise that politics is everything. You might find this government policy is towards the West and another towards the East. For example, if you must align yourself to the West, there is a probability that if you want to align yourself, then it might be easier to get your loan, but they might have many strings attached in the sense of control of your projects. If you go to the East, they will want to supply everything to you. If you go to the West, they will allow you to supply, but they will want much control in how you govern your country.” **[Participant 26]**

6.5.3.2. Informal infrastructure debt-side governance and information aggregation rules

Most participants indicated that debt-side governance and information aggregation mechanisms traditionally did not involve consultations. Project owners can access loans without substantively consulting diverse stakeholders due to their political influence on the stakeholders. Table 6-3 shows some of the ramifications of these behaviours, including high-interest project loans.

Table 6-3: Traditional infrastructure governance behaviours

Characteristics	Consequences
No consultations	High-interest loans for infrastructure projects
Agreeable collateral	Mismanagement of funds and projects
Use of local materials and local workforce	High management or monitoring costs

Source: Author (2023)

It is behind this backdrop that the study further sought to understand the sociocultural characteristics of the participants that facilitate access to low-cost monitoring or risk premiums. All the participants inferred that, culturally, the stakeholders were communities or the public. Less than 10% of the participants further indicated that financial analysts and financial institutions like the World Bank and the IMF are the key stakeholders of infrastructure projects funding. Participants indicated that these stakeholders should be involved through public participation to ensure prioritisation of needs and how best to identify low-interest debt and effectively implement the projects. In cases where managers needed questions answered about policy and regulation, they needed to have consultative stakeholder meetings. In the same context, 67% of the participants said it is acceptable for a manager to be open about rising infrastructure risks due to governance and management practices. The remainder felt that it was only acceptable for managers to be open at the initiation stage of projects. Despite these differences, all participants confirmed that this information on rising sovereign debt risks would negatively impact the projects as it gives room to analyse the contribution of sovereign risk to project risk pricing and negotiate appropriately for lower interest rates.

6.5.4. Community and division of labour: Perceptions of the infrastructure management community and the division of labour among stakeholders

Considering the multilevel governance structure due to devolution, CHAT's community concept guides in establishing who renewable energy and transportation practitioners work with to meet their infrastructure lifecycle management goals. The community concept was associated with the multi-level interactions in the division of labour to identify roles and responsibilities that could mitigate sovereign risk event susceptibility. It was unclear from the participants' responses who within the government and its agencies were responsible regarding risk in the community and division of labour. One (1) participant believed the board of directors was the key stakeholder responsible for risk as they made decisions on the personnel that would execute the project.

“The [infrastructure management system] is politically influenced. So, you focus on those activities favouring the political party in power. You could mention emergent issues, and no one

acknowledges them. The [interactive] sessions, the monitoring and the evaluation, favour political interest.” [Participant 5]

The participants acknowledged the strain in the infrastructure debt governance and management system and associated it with public governance and project management facilities. Other studies suggested that the quality of infrastructure debt governance and project management systems is likely worse publicly than privately in developing countries.

“Sometimes, the practitioners do not get the required information from the public systems. You find that where there is access to central government policy information, like in the Big 4 Agenda, sharing local government implementation information is necessary to guide interactions between local and national government agencies.” [Participant 3]

The study examined stakeholders’ involvement in project lifecycle phases, revealing that most participants advocated regular or frequent engagement throughout all stages. However, 21% indicated that certain stakeholders are only pertinent in the developmental phase when required. These perceptions align with CHAT’s mediation and affordance theory, where managers’ understanding of policy instruments shapes compliance and stakeholder engagement. The community concept emerges from stakeholder involvement and their subjective perspectives, aligning with Hofstede’s collectivism vs individualism dimension. Various stakeholders are mentioned, potentially reflecting their cultural backgrounds and impacting their interests in certain projects. The interplay of Hofstede’s dimensions and affordance theory underscores how stakeholder communities influence infrastructure outcomes. The community involves government, users, private sector players, environmental groups, and affected communities. Furthermore, the division of labour concept emerges in the roles of financing agents, policymakers, project managers, and certification bodies, collectively shaping foreign infrastructure debt governance and risk information aggregation. Two perspectives emerged from the community and division of labour concept, namely:

- (a) Perceptions of the ultimate infrastructure decision-makers and risk managers
- (b) Perceptions of stakeholders and peers who facilitate access to low-cost debt

6.5.4.1. Perceptions of the ultimate infrastructure decision-makers and risk managers

The study found that most participants considered the government the ultimate decision-maker concerning accepting, rejecting, or deferring the decision to issue foreign infrastructure debt at a certain monitoring cost, interest rate, or risk premium, considering the risks involved. Other participants thought the Central Bank, the head of the borrowing entity, the financier, or project stakeholders to be the ultimate decision-makers, as illustrated in Figure 6-5.

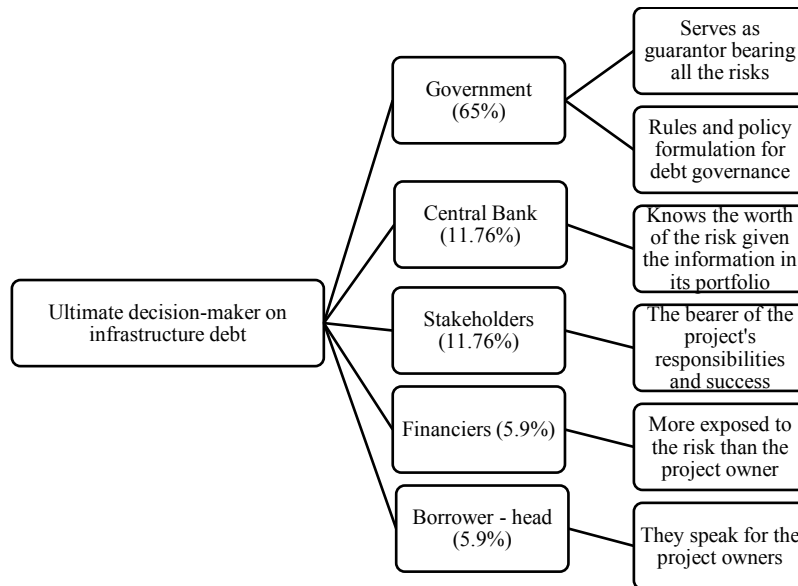


Figure 6-5: Ultimate decision-maker and reasons

Source: Author (2023)

Most participants said the main basis for decision-making roles and responsibility matrices was facilitating access to low-cost infrastructure debt, corroborating implicit perception of the division of labour and power distance. Other bases included project objectives and goals, availability of information for decision-making, and country priorities. Additionally, the participants' main process for developing a decision-making matrix involved public participation between the project executors and the public. The other process was bargaining with investors (Onjala, 2018), which involved consultative meetings with the stakeholders of the projects and the investors. To ensure that no generation is overburdened by debt, end-user tariffs indexed to the interest rate to fund future interest payments are evaluated using the Intergenerational Practice Evaluation Tool. Other tools used include rules and policies that guide the apportioning of end-user tariffs. As the study found earlier, involving infrastructure practitioners in infrastructure planning and investment decision-making is one of the main structures that could lead to low-cost risk monitoring and controlling. The study found that other additional structures include international lending bodies like the IMF, World Bank, and the Kenyan Parliament's key performance objectives. Their role was advisory, regulation, and monitoring of interest rates, approval of infrastructure debt and associated interest rates, and benchmarking for the local government on good infrastructure debt governance practices.

6.5.4.2. Perceptions of stakeholders and peers who facilitate access to low-cost debt

All participants stated that the government and its agencies were the key stakeholders in ensuring that foreign infrastructure debt-side governance and risk information aggregation activities shape access to low-cost infrastructure lifecycle monitoring. The main reason for this response was that the government bears

all the risks. However, it is worth noting that 9 (29%) of the participants stipulated other key stakeholders as the public, foreign lenders, and project executors. This was because, according to them, the public was responsible for paying back the debt via taxes, the foreign lenders needed to manage their return, and project executors should oversee the successful implementation of projects for which the debt had been yielded.

“If we cannot pay the debt [referring to infrastructure debt], Treasury will intervene. [Once project implementation starts], if there is anything serious about funding that can delay completion, then we issue debt to refinance the existing debt.” [Participant 15]

Regarding sharing responsibilities amongst these stakeholders, most participants noted that the roles should be shared equally. Further findings showed that some factors influencing sharing roles and responsibilities among stakeholders identified in past studies included their expertise (Ombagi *et al.*, 2023a), political power (Osiolo *et al.*, 2017), and stakeholder interest in the project (Dorobantu & Müllner, 2019). This finding may be linked to the tensions in the interaction between collectivism and individualism and power distance.

“What motivates me to review monitoring and evaluation reports is that I might encounter a particular challenge in implementing policy guidelines. Sometimes, one can have an urgent risk management problem, and perhaps the next interactive session will take a long time. So, I knew that once I attended the monitoring and evaluation sessions, I could establish contacts at the national government level to guide me appropriately about emergent risks.” [Participant 6]

Cultural norms and attitudes towards roles and responsibilities may constrain the division of labour between public sector officials and private sector practitioners in infrastructure planning, particularly discriminatory alignment if herding preserves sector-specific conventions. The division of labour involves allocating tasks and responsibilities to different actors involved in the infrastructure financing process.

“Now, that is a project that you must share because the spectrum is so wide that if you do not share, if you do not get assistance from your peers and other people, you will be surprised that other people have a better perspective of the sort. So, you must be open and reach out to others. You share widely because, in this age, you must ensure you are up to date with what is happening.” [Participant 29]

The necessity of sharing and collaborating with peers and others to gain diverse perspectives infers a community of practice. It also suggests internalisation and externalisation through the importance of exchanging knowledge and staying informed in a dynamic environment.

“For example, suppose you are in the energy sector. In that case, we have transmission and distribution. All these people must be there [wind plant lifecycle]. You cannot develop a private wind power project without notifying the Ministry of Energy and Treasury. Those are primary stakeholders.” [Participant 19]

6.6. Objective 3: Assess how culture mediates and moderates the relationship between sovereign risk and the development of Kenyan renewable energy and transportation infrastructure projects

6.6.1. Object: Managerial herding and information cascade in the infrastructure context

Herding at the intersection of infrastructure development and sovereign risk refers to the phenomenon where decision-makers or managers tend to follow the actions or choices of others without conducting independent analysis or evaluation. CHAT’s object concept guided the study in establishing socio-cognitive learning goals and how rational or irrational herding emerged in the system.

“But when the public debt management policy was formulated, we knew the government was serious about collaboratively containing the rising sovereign risk and historical fiscal deficits, cost of debt and improving information disclosure.” [Participant 15]

Due to contextual uncertainty, the qualitative research findings revealed that herding could occur across various phases, such as planning, design, construction, operation, and maintenance. While managerial herding arises from a desire to mitigate risk, uncertainty, and ambiguity, managers might lean towards choices endorsed by peers or industry figures when confronted with complex decisions due to cultural constraints. This behaviour stems from the belief that if others have opted for a particular course, it must be the correct or optimal. However, herding has drawbacks, including limited diversity in decision-making and suppressing innovation and creativity. Unthinkingly following the crowd may result in missed innovative solutions if managers overlook alternative approaches. If the herd makes poor choices, it can lead to suboptimal outcomes or project failures.

“We receive debt information from the Treasury. If they have allocated our project funds, I am sure they must have followed some proper procedure to borrow and get permission to allocate money. Because the borrowing is mostly from the National Treasury, I was sure they had considered the sovereign risks and local managerial capacity to implement the project’s macroeconomic situation. [I trust the current policy interventions] because the government has competent staff with international experience.” [Participant 18]

Managers should explore balancing conventions and independent thinking by questioning their preference for certain risk management practices and tools. Diverse viewpoints and transparency can counteract the

negative influence of herding motives on infrastructure lifecycles management and sovereign risk levels. Encouraging stakeholders to challenge assumptions, share information, and conduct thorough evaluations can reduce herd behaviour and enhance project success.

Participant 1 observed that the board must ensure that practitioners implement the right project management rules throughout the infrastructure lifecycle since board members implement the government's infrastructure mandate. Therefore, the board is the financial decision-maker and risk manager.

The cross-border infrastructure debt risk premium was regarded as practitioners' information aggregation and decision-making.

"Since implementing project activities, I need to provide information that guides the board to make good financial decisions and escalate any emergent risks." [Participant 2]

Cultural values may shape infrastructure project outcomes and government objectives for affordable foreign debt. CHAT's object concept suggests that participants aim to align borrowing, management, and stakeholder impact with strategic goals.

Participant 27 affirmed that stakeholders would want to see a positive impact on the cost.

The object is tied to the CHAT community, which pertains to stakeholders' shared interest in positive cost impacts. Infrastructure development (Object) and sovereign risk (Outcome) interconnect with the desired positive cost impact perceived by stakeholders. The managerial object and outcome encompass collective wisdom gained via interaction with peers and stakeholders to ensure cost-effective project delivery.

6.6.2. Outcome: Managerial herding in the infrastructure development activity and sovereign risk

The study defines cultural constraints as dimensions of defensive socio-cognitive learning moderating the relationship between sovereign risk and infrastructure development. Utilising CHAT's outcome concept, it explored how inherent psychological reliance on social groups is a form of managerial interaction with their sociocultural context to cope with infrastructure development project risks, potentially impacting sovereign risk premiums. Managerial herding refers to managers' inclination to emulate others' choices, which, while not directly linked to sovereign risk, could influence how lenders assess local risks based on sociocultural information loss and stifled innovation. Sovereign risk pertains to a government's capacity to meet financial obligations, affecting various aspects of infrastructure projects. The qualitative data validates extant literature, highlighting that culture mediates the interaction between sovereign risk and infrastructure development through the perceived affordance of the sovereign governance tools among managers, such as political stability, regulations, legal frameworks, economic conditions, and investment climate.

Sovereign risk can disrupt infrastructure projects through political instability and regulatory shifts, causing delays or interruptions during planning or construction. Moreover, it might impact projects' long-term viability and financial stability, influencing operation and maintenance. To manage sovereign risk, thorough assessments of the political and economic environment are vital. Rigorous risk evaluations, diligent research, and consideration of political and regulatory aspects help stakeholders make informed decisions and develop strategies for risk mitigation. While managerial herding indirectly influences sovereign risk through decision-making processes, it should not be separated from the activity to which it refers. It influences political stability, economic conditions, and regulations, directly moderating the relationship between sovereign risk and infrastructure project management practices.

6.6.3. Contradictions: Improvement areas in infrastructure lifecycle management practices

Based on the findings from the CHAT elements, the study used the contradictions concept to elicit what experts perceive as infrastructure development improvements to reduce sovereign risk. Participants stated that challenges included: i) the period taken to make decisions was considerably long; ii) overregulation that discourages shareholder involvement; iii) miscommunication or a disconnect in government agencies, thus not using collective wisdom effectively; iv) cultural differences that manifest in the execution of projects; v) change in governments which render earlier agreements void-creating tension between the financier and the practitioners; and vi) dominance of some stakeholders causing rigidity in execution.

“After being on a project that failed due to lack of government funding mid-way, we decided to take a risk-based approach to project management. We believe that a risk-based approach helps the board make decisions faster and address emerging political issues not foreseen in the business case if the government regime changes.” [Participant 10]

Managers use and apply policy information appropriately to overcome some of these challenges. Some benefits of applying policy information in foreign debt governance include keeping projects on track with fiscal changes. The policy information also allows practitioners to ratify policies and guidelines that effectively guide reliable borrowing and repayment.

*According to **Participant 21**, the government should engage practitioners more to mitigate negative political influence to implement the debt management policy and large infrastructure projects successfully.*

In general, participants in the study perceived collective infrastructure governance and risk information aggregation as effective in reducing monitoring costs. They attributed this effectiveness to diverse expertise yielding innovative ideas, enhanced problem-solving skills, streamlined borrowing processes, and risk mitigation benefits. Additionally, participants found project design easier using collective governance

structures. Most stakeholders viewed the influence of politicians and peers on governance as being positive, as they possessed a comprehensive knowledge of lifecycle risks, thereby facilitating collaboration and negotiation for cost-effective loans. However, challenges persist. Participants stated that ambiguities in roles and responsibilities hinder the efficacy of governance. Moreover, inaccurate data and data access constraints led to costly infrastructure risk assessment outcomes.

Despite the progress in implementing the separation of power while decentralising decision-making authority to foster collective governance within the devolved system, most participants (79%) noted the complexity of consultative processes and diverse ideas necessitating consideration before decisions. Participants favoured public participation and full board meetings with minimal political interference to enhance debt governance and information aggregation for accessing low-cost foreign infrastructure debt. External risk audits and management models were least favoured, indicating limited enthusiasm for external monitoring through debt governance rules. These findings highlight the potential of collective governance while addressing challenges related to roles, responsibilities, data accuracy, and decision-making processes to optimise its effectiveness in the infrastructure sector.

Participant 15 highlighted that they report their findings to the board (audit and risk committee), and the board will decide whether the recommendations should be implemented. They further emphasised respecting the board's opinion and only implementing approved actions. Managers cannot implement unapproved changes because they do not want to take responsibility for the outcomes.

The study's in-depth interviews revealed that the Big 4 Agenda significantly impacted participants' perceptions and interactions with politicians and policymakers. The high publicity of the agenda led to diverse knowledge and expertise acquisition. However, potential contradictions arose within the broader infrastructure development community, impacting perceptions, interests, and socio-cognitive learning interactions. Information disclosure and private sector involvement contradictions affected the efficiency and transparency of infrastructure financing. Cultural values constrain knowledge internalisation, shaping decision-making among government and private sector actors. Internalisation involved capacity building, while externalisation was seen in private sector engagement. Historical references in the interview highlighted how cultural factors influenced past government decisions. Combining Hofstede's cultural dimensions and CHAT offered a comprehensive understanding of culture as within-country infrastructure debt governance and risk aggregation. The interview underscored the role of stakeholders' cultural backgrounds, rules, tool-mediated activities, community dynamics, division of labour, and historical context in shaping infrastructure risk premiums. Contradictions arising from cultural differences resonate with the motive to align decisions with political interests and regime changes that affect project financing

and implementation success. Stakeholders internalised and externalised knowledge and strategies, contributing to a rich observational dataset. The interviewer internalised participants' insights to comprehend sovereign risk-creation complexities and cross-cutting policy implications.

Participant 26 noted that one of the things that it did [Big 4 Agenda] was there was now more focus on PPP financing policy and affordable housing because, previously, these things were there but not at a high level, but when the Big 4 came on board...like now we have the director of the PPP projects, and this would be because you will find I will do a similar project using a different method. Still, when you have an administrative arm like PPP and Treasury, they guide you in all processes.

The interview delved into historical aspects of infrastructure financing, referencing past projects, policy shifts, and the impact of Vision 2030 and the Big 4 Agenda. The findings indicate potential contradictions arising from stakeholder differences. The participants' historical references demonstrate their influence on present decisions. The vignettes illustrate the cultural-historical activity theory and clarify practitioners' comprehension, decision-making, and stakeholder interactions in foreign debt governance and information aggregation. Grounded theory guides the study to infer Hofstede's cultural dimensions in elucidating how participant responses suggest preferring certain infrastructure risk management practices and tools. Managerial knowledge contradictions shaping herding and sovereign risk's integration are summarised in Table 6-4, considering CHAT, Hofstede's dimensions, and affordance theory.

Table 6-4: Dimensions of managerial herding in the infrastructure development activity

ANALYSIS LEVEL	CONTRADICTIONS/TENSIONS
SUBJECT	INNATE PSYCHOLOGICAL DEPENDENCE ON GROUPS
	Individual expertise vs collective decision-making
	Risk aversion vs innovation
	Short-term goals vs long-term sustainability
	Homogeneity vs diversity of perspectives
RULES	FORMAL AND INFORMAL RULE AFFORDANCES
	Formal rules vs informal norms
	Stability vs adaptability
	Cultural embeddedness vs universal standards
	Authority vs collaboration
COMMUNITY	INFORMATIVENESS OF PEER-TO-PEER BEHAVIOUR
	Local knowledge vs expert knowledge
	Traditional practices vs modernisation
	Community priorities vs project objectives
	Trust and social cohesion
DIVISION OF LABOUR	EXPLICIT AND IMPLICIT DIVISION OF LABOUR

	Specialisation vs holistic understanding
	Hierarchical structures vs collaborative decision-making
	Task specialisation vs cross-functional knowledge
	Division of labour vs shared responsibility
MEDIATION (CULTURAL AFFORDANCES)	INTERACTION WITH FORMAL AND INFORMAL TOOLS
	Technology as an enabler vs technology as a constraint
	Standardisation vs contextual adaptation
	Tool accessibility and equity
	User-friendly tools vs complexity
	Centralised decision-making vs participatory decision-making.
	Bureaucratic processes vs agile and flexible approaches
	Fragmentation of responsibility vs collaborative governance
	Lack of capacity and resources vs effective implementation
OUTCOME (HERDING/SOVEREIGN RISK)	HERDING AND SOVEREIGN RISK PRICING INFORMATION
	Short-term vs long-term perspectives
	Economic growth vs environmental and social sustainability
	Centralisation vs local empowerment
	Stakeholder engagement vs power differentials
EXTERNALISATION/INTERNALISATION	COPING WITH SOCIO-COGNITIVE LEARNING COMPLEXITY
	Individual knowledge acquisition vs collective knowledge construction
	Tacit knowledge vs explicit knowledge
	Internalisation vs externalisation of learning objectives
	Individual competence vs collective competence
OBJECT (HERDING BEHAVIOUR)	MANAGERIAL HERDING OBJECTIVES
	Project goals vs stakeholder priorities
	Risk mitigation vs cost and time constraints
	Innovation and adaptation vs established practices
	Local context vs global standards
HISTORICITY (EXPANSIVE LEARNING)	SOFT INFRASTRUCTURE DEVELOPMENT OUTCOMES
	Historical practices vs current needs
	Cultural norms vs risk mitigation measures
	Power dynamics and hierarchies
	Cultural diversity and communication development challenges
ZONE OF PROXIMAL DEVELOPMENT (ZPD)	HUMAN CAPITAL DEVELOPMENT
	Individual learning vs collaborative learning
	Expertise vs novice perspectives
	Structured learning vs informal learning
	Individual development vs collective development

Source: Author (2023)

6.7. Chapter summary

This chapter presented the qualitative research findings, applying CHAT, Hofstede's cultural framework, the affordances and herding concept to illuminate how managerial perceptions of rules, community, division of labour, mediation, object, outcome internalisation/externalisation, and contradictions. In-depth interviews with policymakers and key informants in renewable energy, road, and rail transportation project delivery unveiled insights into infrastructure governance and information aggregation experiences, focusing on sovereign risk. The discussions revealed the significance of governance frameworks, regulatory conditions, and critical information disclosure in financing agreements. Overall, this qualitative phase underscores cultural-historical theory as a foundational framework for elucidating social practices of foreign infrastructure debt governance perception, risk information aggregation, and stakeholder roles, rules, and contradictions in moderating the relationship between sovereign risk and the infrastructure development system. The qualitative and quantitative findings are discussed in the next chapter.

Chapter Seven: Discussion of Findings

7.1. Introduction

This chapter discusses the findings based on CHAT and Hofstede's national cultural dimensions. The quantitative and qualitative insights from the primary and secondary data lead to the proposition of a theoretical framework of defensive socio-cognitive learning in the infrastructure development context.

7.2. Quantitative research findings

7.2.1. Objective 1: Identify the key determinants of sovereign risk, debt-side governance, project management, macroeconomic risk, and culture in Kenyan renewable energy and transportation infrastructure projects

7.2.1.1. Theme 1: Sovereign risk determinants

Consistent with studies that found that there are international connections (Klagge & Nweke-Eze, 2020), financialisation and investment constraints (Pueyo, 2018) in Kenyan infrastructure projects, the recent survey shows that economic stability, political stability, debt management policy, sovereign bond spreads, and economic growth determine sovereign risk. Monitoring and indexing tariffs to inflation and exchange rates are vital for predicting the macroeconomic risk exposures of the infrastructure development system. However, Zhu *et al.* (2020) found that the SGR tariff in Kenya could not be increased in line with inflation due to end-user resistance. Oluoch *et al.* (2020) found that unwillingness to pay and poverty hindered renewable energy adoption. It means state-citizen engagement through tariff-setting can limit cash flow generation, affecting asset renewal decline once transitioned to the operational and maintenance phase and constraining debt payment. The current study has extended these perspectives by offering an in-depth understanding of the sociocultural characteristics of the infrastructure development context to allow Kenyan policymakers (Eickhoff, 2022) and financial institutions (Kamau, 2016) to make cost-efficient decisions concerning sovereign risk reduction through infrastructure debt-side, project lifecycle, and macroeconomic risk management practices across time and world economic states.

7.2.1.2. Theme 2: Debt-side governance determinants

The perceived affordances of debt-side governance tools include a well-defined infrastructure investment size policy, a sustainable debt-to-total investment, balanced long-term vs short-term debt maturity, debt management practices complying with covenants, collaboration in environmental, social, and governance, and mainstreaming green economic development policies in infrastructure project management tools. The following seven factors reinforce findings from various studies in Kenyan and international contexts.

7.2.1.2.1. Investment size

The strong correlations between the specified variables – ticket size affects the interest rate (0.6276) and ticket size affects debt inflow (0.6773) – indicate a strong recognition of the role of large-scale infrastructure investment (Dalla Longa & van der Zwaan, 2017) for economic growth and sovereign risk. The survey mirrors studies in the Zambian context linking its recent international sovereign bond repayment default (Gort & Brooks, 2023) to mismanaged large-scale infrastructure investments (Kapindula & Kaliba, 2022). It reveals that infrastructure project finance and management significantly influence sovereign interest rates, external debt inflow and risk perceptions. The secondary data reinforced the survey findings by indicating that aligning large-scale infrastructure investment with well-defined sovereign debt management rules for sustainable development (Onjala, 2018) can reduce project risk premiums by 4%. The study reveals that infrastructure project finance and management practices are potential sovereign risk diversification tools. It is vital to understand how managers and decision-makers prioritise the importance of investment size as a dimension of leveraging economies of scale to mitigate sovereign risk exposures by aligning project portfolio selection decisions with interest rates, debt inflow, and risk assessments.

7.2.1.2.2. Debt-to-equity ratio

The strong correlations for the specified variables – debt-to-equity-ratio-based interest rate (0.7151), debt-to-equity-ratio-based debt flow (0.6810), and debt-to-equity-ratio-based risk views (0.4014) – indicate that these factors are important in determining debt-to-equity ratio in Kenyan infrastructure projects. The secondary data reveals a symbiotic relationship between the debt-to-total investment ratio and economic growth that can be traced to inter-item correlations in the survey data, encapsulating the interplay between national indebtedness, debt management practices, debt structure and project viability. This secondary data corroborated the survey findings by demonstrating the value of strategically managing project debt, including debt management choices, while considering debt structure, maturity, and utilisation. Kenya's high debt-to-total investment (70%) signifies a heavy reliance on external debt financing mirroring infrastructure debt-to-total investment ratios in developed countries like Germany and Italy (Egli, 2020), underscoring the value of strong international connections in mitigating sovereign risk.

7.2.1.2.3. Loan maturity

The strong correlations for the specified variables – maturity influences interest rate (0.6148), and maturity influences debt inflow (0.6924) – imply that effective management of loan maturity has implications for external debt inflow and sovereign risk. The positive coefficients indicate that loan maturity significantly influences interest rates and debt inflow within infrastructure projects, indicating the strategic significance of selecting appropriate loan maturities to manage external debt inflow and sovereign risk. The secondary data revealed that debts' average maturity (29 years) and grace period (7 years) highlight the importance of

effective schedule management to match cash inflow and counter international interest rate fluctuations to attract commercial bank debt financing, which remains low in Kenya (Takase *et al.*, 2021). The average internal rate of return (24.6%) reflects Kenya's favourable investment climate compared to Sub-Saharan countries (Pueyo, 2018). However, infrastructure lifecycle outcomes must meet investor expectations to attract infrastructure PPP funding from local banks (Kamau, 2016). The prevalence of public funding accentuates the need for diversified funding through sovereign infrastructure bonds and PPPs (Hope, 2010) with varying maturities to bolster sovereign debt sustainability (Onjala, 2018).

7.2.1.2.4. Bankruptcy

The correlations for the variables – stalled project due to risk (0.4859), covenant non-compliance (0.1706), and budget overrun (0.4741) determine bankruptcy risks in projects. The weak correlation for stalled projects due to non-compliance with covenants suggests that non-compliance is less penalised than project-specific risk and budget overruns. It affirms the interactive debt governance theory that lenders may be willing to renegotiate covenants (Triantis & Daniels, 1995) but demand higher monitoring costs (Whitehead, 2015). Non-compliance signals creditors about weak infrastructure lifecycle development capacities which can elevate exposures to opportunistic creditor behaviour (Dorobantu & Müllner, 2019).

7.2.1.2.5. Compliance with debt covenants

The correlation among the specified items – covenant compliance (-0.3844), covenant litigation (0.5431), payment renegotiation (-0.0934), carbon disclosure in the value chain (0.2898), carbon emission reduction (-0.1398), penalty due to staff pollution exposures (0.7532), and schedule delay due to politics (0.1386) determine compliance. The negative coefficients imply stronger compliance, payment renegotiation, and carbon emission reduction have positive outcomes. The positive coefficients imply that litigation events, low carbon disclosure, staff pollution exposure penalties, and political influence on schedule delays are the main compliance challenges. Compliance with debt covenants emphasises the effectiveness of national debt management tools, resilience against political risks, economic instability, and corruption as a two-way street of collaborative infrastructure selection and delivery between lenders and borrowers (Ferchen & Perera, 2019). The secondary data attested to the survey insights, offering a broader knowledge framework for Kenyan decision-makers to leverage the identified variables in prioritising action key drivers and addressing compliance, challenges, and opportunities.

7.2.1.2.6. Environmental, social, and governance

The correlation for the specified variables – climate change limits debt inflow (0.3309), climate change influences interest rates (0.1932), there is a rising avoidable carbon emission (0.3085), community action due to pollution (0.6752), and customer pollution exposure penalty (0.5597) – determine the ESG factors

within infrastructure projects. The positive coefficients suggest that these ESG risks should be prioritised. ESG risks accentuate the linkage between expected internal rates of return by equity and debt investors (Pueyo, 2018) and climate risk disclosure requirements (Sang *et al.*, 2022), suggesting the integration of financial expectations and climate impacts into project planning and design (Lala *et al.*, 2022). However, the way in which managerial interaction with stakeholders and decision-makers reinforce ESG's integration in infrastructure lifecycle development in relation to aspects such as climate change, carbon emission, green bonds, and community engagement to mitigate sovereign risk remains unknown.

7.2.1.2.7. Green economic development policy

The strong correlations “Green Bonds Programme Kenya” (0.7518) and “Green Economic Strategy and Implementation Plan” (0.7568) underscore the necessity of integrating green economic development policies into infrastructure debt-side governance. Azam and Haseeb (2021) found that renewables determined foreign direct investment in BRICS. However, Baimwera *et al.* (2017) found there was low carbon-finance uptake in Kenya, reflecting the contradictions of policy practice. While managers recognise the role of green economic policy on external debt inflow and costs, they may face challenges balancing economic and ecological goals. Complex policymaking collaborations (Ombagi *et al.*, 2023a), high transaction costs, regulatory uncertainty, and market volatility hinder engagement (Pueyo, 2018). Due to limited local policymaking expertise (Ndiritu & Engola, 2020), dependence on global markets (Klagge & Nweke-Eze, 2020) hinders carbon credit trading stability. Overcoming these challenges entails assessing managerial interactions with their sociocultural context to understand potential challenges when interacting with government, private sector, local communities and international bodies. Such an understating may lead to designing managerial capacity-building initiatives for green policy clarity that can reduce policy implementation costs and streamline regulatory processes within Kenya.

7.2.1.3. Theme 3: Project management determinants

Infrastructure loan agreements contain guidelines for monitoring key managerial performance indicators. This section discusses the ten project management knowledge areas that can influence sovereign risks.

7.2.1.3.1. Lifecycle integration

The positive correlations among development (0.521), construction (0.490), operational (0.303), maintenance (0.452), and termination phases (0.459) reflect an integrated approach to managing risks in project phases. Notably, the development and construction phases exhibit stronger correlations, signifying their potential significance in shaping external debt strategies due to the high upfront capital requirements (Pueyo, 2018) and significant uncertainty. Lifecycle integration reveals that development phase borrowing decisions are associated with risks in the subsequent phases – construction, maintenance, operations, and

termination – including potential schedule delays that can be linked to long commercial or concessional debt administrative processes (Pueyo, 2018). Collaboration and dispute resolution are vital lifecycle risk determinants that resonate with effective stakeholder engagement. While cross-sector collaboration proves advantageous (Pueyo, 2018), variables related to stakeholder disputes and vandalism signal challenges linked to managerial inability to integrate local vs global infrastructure management rules when collaborating with various local stakeholders and establishing robust dispute-resolution mechanisms. Kenyan project managers can benefit from integrating stakeholders' risk-taking norms, such as citizens, policymakers, and external debt providers, with infrastructure lifecycle management practices to mitigate sovereign vulnerability and enhance sustainable outcomes.

7.2.1.3.2. Scope management

The correlations observed among the specified variables – expansion or upgrade-oriented interest rate (-0.428), expansion or upgrade-oriented debt inflow (-0.565), and litigation due to project management default (0.350) – suggest that managers are key decision-makers who recognise the importance of infrastructure scope management. The negative correlations suggest that there is a lower likelihood of litigation due to management default with effective scope management. Noteworthy variables positively correlated with scope management in the secondary dataset encompass the number of jobs created, integrating ICT in infrastructure project management, design change, community-based initiatives, and government funding delay. These variables align with the unique social dimensions of infrastructure projects (Pueyo, 2018), encompassing social, economic, and financial challenges (Carmody *et al.*, 2022). They highlight the need to elucidate how managers understand multi-perspective scope management.

7.2.1.3.3. Quality management

The moderate correlations for the variables selected to measure infrastructure quality, lower interest refinancing due to project management (0.444), and carbon emission influences debt inflow (0.307) suggest an interplay between refinancing, management practices, and carbon risk in infrastructure quality management to mitigate sovereign risk. The positive coefficients imply that effective quality management is linked to the potential of securing low-interest external debt refinancing and augments the significance of environmental risks as a strategic approach to debt management by designing resilient infrastructure (Njogu, 2021), thereby contributing to lower sovereign risk premiums. The secondary data complemented these primary data findings by indicating that harmonising infrastructure's carbon footprint with refinancing risk is vital since carbon has gained prominence in global infrastructure risk pricing amidst mounting climate change and evolving construction standards to promote SDGs by mitigating infrastructure gentrification (Khanani *et al.*, 2021). Its significance underscores how carbon emissions delineate infrastructure quality in Kenya, as noted by empirical studies that cited Environmental Impact Assessment

(EIA) policy and practice gaps (Njogu, 2021). Managers understand quality management risks but face complexity in evaluating carbon emission and its broader effects, implementing cleaner technologies and climate-resilient infrastructure designs to predict sustainability impact, comprehending cross-sectoral low-carbon technologies, e.g. how the interplay between low renewable energy utilisation, budget absorption, cost overrun, and poor quality elevate carbon emissions and shorten the useful life of infrastructure systems (Daniel & Muchelule, 2023). Studies found that some of the quality management challenges in Sub-Saharan Africa, BRICs, and other global areas include poor urban planning, energy inefficiency, unsustainable material selection practices to curb carbon emissions, ineffective waste management and monitoring to ensure accountability; lack of knowledge about carbon offsetting to balance emissions; and weak policies, regulations, stakeholder engagement, and long-term planning to enforce cross-sectoral emissions mitigation (Adebayo *et al.*, 2021; Vazquez, 2020; Washbourne, 2022; Yilmaz & Changming, 2020). Kenya's quality infrastructure commitment is evident through the Paris Agreement's Nationally Determined Contributions (NDCs) (Sarkodie & Ozturk, 2020) to bolster the role of carbon emissions in infrastructure design by using eco-friendly designs aligned with climate objectives.

7.2.1.3.4. Risk management

The positive correlations observed among the specified variables insurance guarantee (0.674), multilateral or bilateral partial risk guarantees (0.692), risk transfer to a third party (0.613), risk acceptance (0.647), revenue diversification (0.602), credit risk management policy (0.493), and financial risk management training (0.437) offer insights into the relationship between infrastructure risk management strategies and the tools used to mitigate sovereign risk. Notably, multilateral or bilateral partial risk guarantees and insurance guarantees exhibit stronger coefficients, highlighting the potential significance of standardised risk mitigation tools that local and global financial institutions use in addressing infrastructure uncertainty and affordable risk transfer mechanisms in Kenyan infrastructure projects. However, standardisation does not always work. Complexity is traceable to variables in the secondary data associated with infrastructure funding delays, budget overruns, and financial audit delays, revealing adaptive risk management practices, tools and strategic planning can prolong loan negotiations, distinguishing the commercial and concessional debt structuring complexity (Pueyo, 2018). Understanding how managers identify potential risks and devise adaptive mitigation strategies (Gregory & Sovacool, 2019) is important.

7.2.1.3.5. Stakeholder management

The positive correlations among utility off-take guarantee (0.306), fuel supply guarantee (0.294), currency convertibility and transferability guarantee (0.587), law and regulatory changes guarantee (0.584), debt repayment guarantee (0.468), tariff rate guarantee (0.521), and revenue guarantee (0.498) shed light on the intricate relationship between stakeholder collaboration strategies shaping sovereign risk mitigation by

capturing risk mitigation assurance mechanisms, tools, and guarantees the government uses to intervene regarding infrastructure project management uncertainty. Moreover, the secondary dataset's positive correlations between land acquisition disputes, employee disputes, and vandalism expose stakeholder management conflicts disrupting infrastructure lifecycle goals. Further aspects of stakeholder engagement emerged from the secondary data tied to the significance of community-based initiatives and institutional capacity building, highlighting the value of fostering strong local engagement and community participation (Renkens, 2019). While managers suggest cross-sectoral collaborative learning (Pueyo, 2018) and adaptive community engagement practices may address infrastructure enchantment (Harvey & Knox, 2012), persistent stakeholder disputes demonstrate social practices associated with institutional policy and managerial practice contradictions when interacting with stakeholders, potentially due to different perceptions of affordances within the current policy and stakeholder engagement tools.

7.2.1.3.6. Procurement management

The positive correlations among commodity price options (0.699), fixed-price contracts (0.578), forward contracts (0.557), future contracts (0.495), performance bonds (0.641), and interest rate swaps (0.673) reveal crucial insights into the interplay between the financial risk management tools and hedging strategies managers utilise in procurement management to mitigate sovereign risk. Compliance with environmental, social, and governance regulations emerged from the secondary data variables linked to procurement management, emphasising environmental impact assessments and clean development mechanism (CDM) registration to adhere to the Constitution of Kenya 2010 rules on sustainable infrastructure development. Eberhard *et al.* (2017) found that Kenya's project planning, procurement, contracting, and licensing policies and responsibilities are well-defined. This exposes a need for frameworks that evaluate human-centred failures in aligning procurement management practices with relevant regulations to acquire certification and use appropriate procurement rules. This study proposes a framework to guide managers in infrastructure projects to learn about human-centred relational risks that can be integrated into procurement practices to bolster sovereign risk mitigation efforts.

7.2.1.3.7. Schedule management

Correlations, notably schedule delays due to management issues (0.552) and counterpart failures (0.568), reveal that infrastructure managers link poor collaboration with increased risks. These findings align with literature identifying rampant schedule delays emerging from counterpart failures (Pueyo, 2018). Secondary data confirms this perception, showing positive correlations between delays, cost overruns, audit delays, payment issues, and cross-sector collaborators. Such trends could signal temporal and financial management challenges. Delays and overruns might erode lender confidence, discouraging local banks from funding infrastructure PPPs and suggesting capital mismanagement (Kamau, 2016). Inflated risk

premiums due to expected delays inflate borrowing costs, potentially requiring government project viability guarantees (Densford *et al.*, 2018). Unaddressed delays amplify country risk, deterring foreign investors and external debt (Eberhard *et al.*, 2017). The secondary data highlights the significance of schedule management efficiency and timeliness concerning lender approval time, government funding delays, and employee disputes, underscoring the importance of streamlined approval processes and timely fund allocation. Persistent schedule delays, leading to cost overruns, reveal a gap in research regarding the contextual determinants of adaptive schedule management necessary to restore lender confidence, lower perceived risk, and facilitate favourable borrowing terms for sustainable infrastructure development, which this study addresses by considering cultural factors. Effective schedule management, transparent reporting, and risk mitigation are recommended (Onjala, 2018). The study emphasises efficient approval processes, fund allocation, and working conditions for schedule management. Continuous delays may cause overruns, revealing a gap in research on how managers address scheduling to regain lender confidence, lower risk perception, and facilitate favourable borrowing terms, a gap addressed here through cultural consideration.

7.2.1.3.8. Cost management

Cost management implications were assessed by evaluating how cost overruns occur due to schedule management (0.400), profitability effect on interest rates (-0.518), and profitability influences debt inflow (-0.628). The negative correlation implies that schedule management may be prioritised over profitability considerations. Moreover, cost management interlinks schedule and cost overrun in infrastructure lifecycle management. Schedule delays (average of 3 years) and cost overruns (average of 79.40%) expose the complexity and the need to improve cost management practices. The consensus in most studies is that thorough project planning, execution, and monitoring mitigate schedule delays and budget deviation (Takase *et al.*, 2021). However, the persistent cost overruns due to delays in certain phases signal unknown complexity, demanding a human-centred cost management framework incorporating risk assessment, stakeholder engagement, and adaptive management strategies.

7.2.1.3.9. Communication management

The correlations for the variables – information-based market access (0.080), well-documented risk management (0.312), and decision-making support tools (0.475) – indicate an increasing recognition of the utilisation of decision-making support tools and well-documented practices. Githaiga (2021) states that communication in modern projects has become sophisticated, and social media platforms have reshaped interpersonal information transmission (Brautigam, 2020). Communication risks in the secondary data analysis resonates with disclosure. A notable average of 85.50% for climate risk disclosure shows that managers in Kenya value transparency (Onjala, 2018). Sound risk disclosure approaches, including climate and socio-cognitive learning risks associated with debt-trap diplomacy memes in infrastructure

development debt management, can yield informed decisions and enhanced managerial socio-cognitive learning about risk management strategies (Brautigam, 2020). This highlights the need to utilise practice-based theories to evaluate how limited disclosure emerges in infrastructure development projects.

7.2.1.3.10. Resource management

The strong correlations for viability gap guarantees (0.618) and limited cash generation (0.573) capture the significance of resource management practices in infrastructure projects. The positive coefficients indicate that viability gap guarantees and cash inflow are strategic resource mobilisation tools that governments utilise in infrastructure projects that can enhance benefits realisation. Regional infrastructure resource allocation (Otieno, 2023) gaps can be traced to variables highlighting the importance of including community-based initiatives (average of 3) and institutional capacity building (average of 2) to bolster lifecycle viability. This attests to the regional resource pooling suggestion by Hope (2010) and an enhanced focus on soft infrastructure development components proposed by Kolstad and Wiig (2011). Limited investment in knowledge transfer limits human capital development, operational and training, and organisational learning capability, endangering sustainable sub-national infrastructure development (Wissenbach & Wang, 2017) and straining state-citizen engagement (Osiolo *et al.*, 2017).

7.2.1.4. Theme 4: Macroeconomic risks determinants

The insights suggest that financial market development, addressing public debt, and embracing sustainable practices offer a conducive environment for successful infrastructure projects.

7.2.1.4.1. Financial market development

The moderate correlations for the variables – global interest rate fluctuations (0.3790), global exchange rate fluctuations (0.2672), limited financial market development (0.2782), under-developed capital market (0.2471), transparent reporting (0.4353), local currency exchange rate (0.4908), USD interest rate changes (0.5379), commodity price changes (0.4646), and inflation (0.4464) – determine financial market development considerations shaping sovereign risk premiums in Kenyan infrastructure projects. The positive correlations suggest that these financial market dynamics (Odhiambo, Rambo, & Okello, 2020a; Rambo & Lucas, 2016) may significantly influence sovereign risk pricing in infrastructure projects by linking investment incentives like tax reliefs and tariff rates to international macroeconomic risks. The secondary data shows a negative correlation for short-term debt to reserves and a positive correlation for the exchange rate, implying currency translation risks. While these insights show what infrastructure managers consider to effectively assess and mitigate macroeconomic risks, diversify strategies, and manage exchange rates and inflation, they do not offer insights into how their uncertainty management orientation influences aggregate financial risk management outcomes across time.

7.2.1.4.2. Public debt management

The moderate correlations for the specified variables – a sufficient public debt management policy (-0.3096), effective macroeconomic risk mitigation (-0.2286), national indebtedness limiting debt access (0.0129), sound public debt management practices (-0.1379), long-term debt (0.5372), short-term debt (0.5752), economic growth (0.2022), national debt management tools (0.4727), non-politics-led project failure (-0.3407), economic stability and sustainability (-0.4653), collaborative debt management (-0.4523), and corruption (0.3906) – highlighting the public debt management attributes determining sovereign risk premiums in Kenyan infrastructure projects. The negative coefficients indicate that these factors are associated with reduced risk, while the positive coefficients indicate that these factors can elevate sovereign risk premiums (Onjala, 2018). The survey findings show managers recognise the importance of debt management policies, macroeconomic risk mitigation, project failure avoidance, economic stability, and corruption reduction in sovereign risk premiums. Public debt management policy implications emerge, advocating for transparent public debt management, financial market reforms, sustainable infrastructure alignment, capacity building, integrated risk management frameworks, and enhanced managerial education about public debt management. Acknowledging these insights and policymaking considerations, it is worth evaluating how Kenya can create a conducive managerial learning environment for resilient infrastructure, leveraging public debt and political goodwill.

7.2.1.4.3. Carbon risk management

The moderate correlation coefficients for the variables – carbon risk perception by the lender (0.4948), carbon risk perception by the public (0.5268), carbon adaptability mechanisms affect debt costs (0.5934), carbon credit prices affect debt costs (0.3451), clean development mechanism registration affects debt costs (0.4484), carbon risk perception by citizens (0.4675), carbon adaptability mechanisms affect debt inflow (0.5770), carbon credit prices affect debt inflow (0.5096), clean development mechanism registration shapes debt inflow (0.4249), carbon risk-based lender exits (0.0318), investment in carbon risk research and development (-0.2150), aligning carbon policies with national sustainability policies (-0.0452), and carbon risk management policy (0.0344) – encapsulate carbon risk management practices in infrastructure projects with considerations related to sovereign risk premiums. The positive coefficients imply that these carbon risk management aspects are critical. In contrast, the weak negative coefficients imply these factors potentially have risk-reducing effects. The secondary data (Comp1) corroborates the primary data findings by exhibiting a strong positive correlation for carbon futures price, crude oil futures price, corruption index, external debt to imports, GDP per capita, exchange rate, and inflation, suggesting a unified pattern of

macroeconomic and international carbon risk policy factors that influence infrastructure management, particularly under specific economic conditions across time.

7.2.1.5. Theme 5: Cultural dimension of the Kenyan infrastructure development context

While infrastructure debt-side governance, project management, and macroeconomic risk account for the affordances of formal governance tools as well-defined managerial roles and responsibilities, a more recent study used Hofstede's (2013) cultural framework to show that cultural distance explains variability in adapting formal tools and practices within the sovereign risk rating context (Dang & Partington, 2020). The current study adapted ambiguity tolerance (Budner, 1962) and Hofstede's cultural framework to elicit the cultural attributes of the Kenyan infrastructure development context. Descriptive and factor analysis statistics highlight inclinations towards high ambiguity tolerance, high power distance, collectivism, femininity, high uncertainty avoidance, intermediate long-term vs short-term orientation, and indulgence vs restraint, the implications of which are discussed in the following sections.

7.2.1.5.1. Ambiguity intolerance

Ambiguity intolerance is the comfort managers experience when faced with uncertain or multi-interpretable situations (Budner, 1962). High ambiguity tolerance indicates ease in navigating ambiguity. The varying strengths of correlations in Table 5-19 in Chapter Five offer insights into managerial propensity to confront ambiguity in Kenyan infrastructure projects. The positive correlations show that high ambiguity intolerance determines managerial willingness to confront infrastructure decision-making with incomplete information or poorly structured problems, and the negative correlation suggests a potential opposing influence.

7.2.1.5.2. Power distance

Power distance refers to accepting unequal power distribution (Hofstede, 2013). The positive coefficient for "unequally distributed power" components implies a perception of a hierarchy. Encouraging open communication and skill enhancement can diminish such perceptions. The correlations for "teach practitioners how to manage projects" emphasise skill development's potential. Balancing decision-making through managerial empowerment, as opposed to replacement, is suggested. Addressing concerns about "accept and follow lender rules" underscores the need for inclusive governance to align actions with stakeholders' expectations. "Create individual risk control initiatives" highlights the importance of risk management empowerment. Tailoring strategies and transparent communication about risk assessment can align teams effectively. These findings provide valuable guidance for fostering collaborative, informed, and inclusive multicultural infrastructure project development environments.

7.2.1.5.3. Individualism vs collectivism

Individualism vs collectivism delineates independence vs group cohesion (Hofstede, 2013). In collectivist cultures, like Kenya, communal harmony and loyalty are emphasised. The positive coefficient for “limited cross-sectoral collaboration” suggests a link between individualism and the preference for working in specific sectors. A strong correlation for “strictly follow sub-sector rules” supports the dimension of collectivism, where adhering to established rules and norms in specific sectors is emphasised. The strong coefficient for “rules compliance and age determine outstanding practitioners” highlights the collective aspect, where age and compliance with rules shape perceptions of excellence. The positive correlation with “immoral for the government not to guarantee payment” indicates a collectivist perspective, emphasising the government’s role in infrastructure development to foster societal well-being. Overall, the findings corroborate the interplay between individualism and collectivism in Kenyan infrastructure projects, reflecting cultural tendencies of valuing individual autonomy but strongly leaning towards group cohesion. It reflects managers with diverse attitudes, encouraging collaboration and flexible rule adherence. However, it is important to elucidate how these attributes help managers recognise individual vs collective experience, adapt leadership, and address the stakeholder conflicts identified in many projects if one considers that managers value aligning government involvement and ethical decisions with local expectations. These managers also emphasise tailoring training and project design to accommodate individualistic and collectivist needs. Sensitively engaging stakeholders would enhance project success within the unique Kenyan national culture and multicultural infrastructure sub-sector context.

7.2.1.5.4. Masculinity vs femininity

Masculinity vs femininity refers to the extent to which a society emphasises and values traditional masculine traits (such as assertiveness, competitiveness, and achievement) versus feminine traits (such as nurturing, cooperation, and quality of life) (Hofstede, 2013). The positive coefficient for “empathy for failure and envy for success” suggests a balance between masculine assertiveness and feminine empathy, possibly reflecting a blend of these traits within this infrastructure project development context. The weak positive coefficient for “motivated by a relaxed and friendly environment” might indicate a less prominent role for this dimension in the project’s cultural context in considering gender-sensitive management approaches promoting a positive work atmosphere. The strong positive correlation for “consensus decision-making” aligns with feminine traits of collaboration and nurturing, reflecting the significance of inclusive decision-making (Hofstede, 2013) processes and participative approaches fostering cooperation and valuing diverse viewpoints. The moderate correlation for “benefits realisation for men and women” indicates a consideration for gender equity in project outcomes. The weak coefficient for “the importance of lenders’ support during a financial crisis” might suggest that this dimension has limited influence in the

Kenyan infrastructure development context. These findings offer insights into the coexistence of masculine and feminine traits in Kenyan infrastructure projects, reflecting a nuanced balance of assertiveness, empathy, collaboration, and gender inclusivity.

7.2.1.5.5. Uncertainty avoidance

Uncertainty avoidance is an aversion to uncertainty – high uncertainty avoidance cultures value structure and clear guidelines, while low avoidance cultures tolerate uncertainty/ambiguity (Hofstede, 2013). The positive coefficient for “the importance of being organised and avoiding ambiguity” suggests a preference for structured processes. The coefficient for “reward for high competence and expert leadership” indicates that valuing individual expertise and competence might resonate with managing career uncertainty. The coefficient for “benefits sharing between lenders and borrowers” implies a potential relationship between local vs international risk-sharing mechanisms and attitudes toward uncertainty and affordable infrastructure risk mitigation tools. The variable “voicing infrastructure failures publicly is wrong” hints at cultural tendencies to avoid negative publicity during uncertainty. The low correlation for “respect for project management rules and customs” suggests that adherence to established rules may not strongly relate to uncertainty avoidance in this context, reinforcing the high ambiguity tolerance findings. These findings suggest that despite the high uncertainty avoidance, effective uncertainty management strategies in Kenyan infrastructure projects encapsulate a preference for structured approaches, expert leadership recognition, transparent risk-sharing, cultural sensitivities, and adaptable rules.

7.2.1.5.6. Long-term vs short-term orientation

Long-term vs short-term orientation emphasises planning for the future versus seeking immediate results (Hofstede, 2013). An intermediate score suggests a balanced approach valuing sustainable planning and short-term adaptability. The positive correlation for the “ability to identify evolving risk” suggests that focusing on identifying risks that may evolve is important. The positive correlation for “the capacity to manage risks” implies that a long-term perspective might be associated with the capacity to manage short-term and long-term risks. The positive correlation for the “ability to question board decisions” indicates that a willingness to question decisions aligns with a potential long-term orientation in holding those charged with governance accountable for risks. The low correlation for the “board influence on management behaviour” suggests that the board’s influence on management behaviour may not strongly align with long-term orientation, potentially limiting the tendency toward instant gratification. The low correlation for “macroeconomic risk contribution to project failure” hints that macroeconomic risks might not significantly relate to long-term vs short-term orientation. A balanced approach to embracing short-term and long-term goals in such projects involves a focus on evolving risks, comprehensive risk

management, open questioning of decisions, and a balanced view of the impact of macroeconomic risks on project outcomes.

7.2.1.5.7. Indulgence vs restraint

Indulgence vs restraint captures a culture's stance on gratifying desires versus adhering to norms (Hofstede, 2013). An intermediate score implies a balance between personal enjoyment and conforming to societal norms and values. The positive correlation for the "preference for long-term versus short-term gratification" suggests that a greater focus on long-term rewards aligns with indulgence rather than restraint. The strong positive correlation between "time perception's importance in decision-making" and "general time-oriented optimism in life" indicates a consistent trend of valuing the significance of time in decisions and an optimistic attitude towards the future. These findings suggest that the infrastructure professionals in Kenya may exhibit indulgence tendencies, valuing future-oriented decision-making and maintaining a positive outlook toward long-term goals. This supports the notion of inclination towards a balanced indulgence vs restraint culture, where individuals prioritise enjoying life while planning ahead.

In summary, the factor analysis findings hold implications for project managers seeking to enhance planning, execution, and risk management. Moreover, the hypothesis is that cultural constraints interact as moderator variables in human activity (Schwartz, 1997), signifying unique socio-cognitive learning traits in Kenyan infrastructure projects in shaping the zone of proximal managerial development (Vygotsky & Cole, 1978). These traits can significantly impact project management team dynamics, communication, and decisions (Liu *et al.*, 2015). The implications stemming from these insights underscore the necessity for balanced financing, improved management practices, diversified funding sources, robust risk management, and cultural sensitivity. By aligning cultural implications, successful project outcomes and sustainable development in Kenya's infrastructure context can be fostered (Mayfield & Mayfield, 2012). The following section explains the relationship between cultural values and demographic characteristics.

7.2.2. Objective 2: Examine the relationship between culture and managerial demographics in Kenyan renewable energy and transportation infrastructure contexts

The relationship between culture and demographics illustrates human-centred leadership attributes and decision-making among managers within Kenyan infrastructure development projects. Acknowledging variations in this group is paramount to elucidate the social dimensions of professional debt governance, project management, and macroeconomic risk mediated by the managerial inclination to align with social groups under risk and uncertainty by herding. Herding blocks private or new information flow from joining the public pool of knowledge, which limits collaborative learning. Section 7.2.2.1 elucidates the relationship between culture and demographics, and 7.2.2.2 articulates how the relationship might mediate

managerial herding and information cascade as culturally constructed social groups that help managers cope when experiencing risk and uncertainty within the Kenyan infrastructure context.

7.2.2.1. The relationship between culture and managerial demographics

7.2.2.1.1. Culture and gender

Male managers in Kenyan infrastructure projects lean towards lower power distance, individualism, and femininity relative to females. Considering that the sampled managers overall lean towards high power distance, this could mean that male managers are more likely to challenge or question hierarchical power structures than their female counterparts. They may advocate for more balanced power dynamics in teams, which could dislodge corrupt infrastructure selection and implementation (Ferchen & Perera, 2019) due to political power. The individualistic tendencies of male managers make them more likely to be herd leaders who prioritise personal achievements and autonomy, potentially leading to a more competitive work environment (Hofstede, 2001). Since the full sample leans towards collectivism, there could be a subtle tension between the individualistic tendencies of male managers and the prevailing collectivist culture. Moreover, managers generally lean towards femininity, suggesting that male managers align more closely with feminine traits like cooperation and nurturing, possibly contributing to a harmonious work environment for the leaders (Hofstede, 1980). These behaviours might contribute to more balanced power dynamics, a blend of individualistic and collectivist tendencies, and prioritising cooperative and nurturing traits in infrastructure management teams. While the survey data interpretations were based on self-reported information, the secondary data validated the culture's stability over time.

7.2.2.1.2. Culture and age

The age-cultural relationship reveals generational influences of cultural values on preferred interpersonal information dissemination (Schwartz, 1997) modes. Older managers exhibit pronounced collectivist tendencies that could be influenced by generational infrastructure implementation experiences and cultural upbringing (Harvey & Knox, 2012). The alignment with the prevailing collectivist culture (Hofstede, 2013) in Kenyan infrastructure projects highlights their adjustment to this ethos. Their propensity for collaboration and collective objectives underscores the benefits of cooperation between seasoned and novice managers, fostering a cooperative multicultural work environment and knowledge exchange. Additionally, older managers' collectivist orientation could enhance the mentorship of novices and knowledge sharing, contributing to a nurturing atmosphere and harmonious teamwork. This inclination might shape leadership styles, prioritising consensus and team cohesion (House *et al.*, 2002). The theoretical implications for the psychological dependence on social groups encompass generational shifts and dynamic age-culture interactions (Berry *et al.*, 2011). These culture-age interactive insights can be operationalised through mentorship programmes, intergenerational communication platforms, diversity awareness initiatives,

flexible leadership, and inclusive decision-making. Recognising individual and collective contributions, promoting cultural research, and adapting to evolving cultures can enhance organisational and collaborative policymaking (Ombagi *et al.*, 2023d). This nuanced understanding of the age–culture intersection guides inclusive and collaborative work environments across generations.

7.2.2.1.3. Culture and experience

The regression analysis of Kenyan infrastructure projects highlights the substantial influence of managerial experience on three cultural dimensions: individualism vs collectivism, masculinity vs femininity, and long-term vs short-term orientation. Most sampled managers strongly favoured collectivism and femininity while maintaining a balanced stance on long-term vs short-term orientation (Hofstede, 2013). Firstly, the positive regression coefficients mean that greater managerial experience mediates collaboration along cultural traits, eliciting experience’s formative role. Secondly, the effect of professional development is evident, with experienced managers valuing individualism, embracing masculine traits, and emphasising long-term planning. The alignment of managers with collectivism and femininity signals an organisational culture that values collaboration and nurturing (Hofstede, 2013). The positive relationship with experience indicates that experienced managers are more attuned to collectivism and femininity norms. Their balanced stance on long-term vs short-term orientation showcases their adept decision-making, considering immediate goals and long-term sustainability.

Furthermore, a strong alignment between experienced managers and prevailing cultural values suggests an acculturation process (Berry *et al.*, 2011), where managers adapt behaviours to match the division of labour expectations, fostering a cohesive organisational learning environment. Theoretical implications stress cultural adaptiveness and dimensionality (Hofstede, 2013). Management and policy implications from this finding entail experience-based leadership development, mentorship, hiring practices, flexible decision-making, cultural diversity training, and long-term planning. Recognising and leveraging the influence of experience on cultural dimensions can nurture inclusive, harmonious, and productive work environments, thereby, driving sustainable growth and decision-making.

7.2.2.1.4. Culture and international experience

The regression analysis revealed that international experience significantly shapes managers’ perceived cultural constraints and the directions of discriminatory alignment as herding. Specifically, international exposure negatively affects power distance, individualism vs collectivism, and masculinity vs femininity while positively influencing indulgence vs restraint (Hofstede, 2013). Given that managers lean towards high power distance, collectivism, and femininity, with balanced indulgence vs restraint, the negative relationship could suggest that international exposure prompts managers to adopt less hierarchical, more individualistic, and less masculine values. This cultural shift signifies openness to diverse perspectives and

a willingness to challenge norms. A positive link between international experience and indulgence vs restraint implies that globally exposed managers favour immediate gratification while focusing on long-term infrastructure goals (Hofstede, 1980) like Vision 2030 goals, which could result from exposure to varied cultures and international SGD standards.

Moreover, international exposure could lead managers to advocate for inclusive practices, challenge power dynamics, and introduce global best practices, reducing the tension between local and international infrastructure project management standards. Such leadership diversity enhances managerial adaptability, cross-cultural communication, and team cohesion. These results demonstrate an interplay of stakeholder engagement theory implications, encompassing cross-cultural psychology (Hofstede, 2011), managerial herding (Keynes, 1936), and cultural-historical activity theory (Vygotsky & Cole, 1978). Infrastructure managers can benefit from recognising international experience as a skill, promoting diverse leadership, providing cultural training, and facilitating knowledge sharing. Recognising and supporting international exposure can enrich cultural awareness, leadership, and inclusivity within Kenyan infrastructure projects.

7.2.2.1.5. Culture and infrastructure funding sources

The regression analysis of Kenyan infrastructure project managers revealed significant associations between funding types (public vs private sector), cultural dimensions, and sector-specific traits. The negative coefficients between public sector funding, power distance, and individualism vs collectivism suggest that public sector managers favour flatter power structures and collective decision-making. In contrast, positive relationships between the renewable energy sector and power distance, masculinity vs femininity, and indulgence vs restraint imply a propensity towards hierarchical power structures, traditional gender roles, and openness to immediate indulgence. These findings may explain the low PPP funding and management strategies (Kamau, 2016). Public sector managers may emphasise stakeholder engagement and inclusivity for comprehensive decision-making, while private sector managers might prefer centralised structures for governance efficiency. Renewable energy sector managers may stress clear communication and role delineation to minimise ambiguity (Herman *et al.*, 2010). Hence, managerial alignment with high ambiguity tolerance, power distance, collectivism, femininity, and uncertainty avoidance reveals human-centred decision-making in high-risk and uncertain infrastructure development environments. These findings advocate for tailored management strategies, sector-specific recognition of distinct decision-making traits in Kenyan infrastructure projects. Implications involve recognising herding motives to promote diversity and inclusivity within decision-making teams, fostering cultural sensitivity, and emphasising mentorship and collaborative learning methods. Integrating insights from cultural-historical theory about expansive learning and stakeholder management theory underscores the importance of

stakeholder collaboration, transparency in articulating risks, diversity and inclusivity in leadership, and mentorship programmes to boost collaborative decision-making in infrastructure projects.

7.2.2.1.6. Culture, job tenure, and infrastructure project risk perceptions

Their tolerance for ambiguity (Frenkel-Brunswik, 1948) influences the propensity of managers who prefer black-or-white scenarios to abandon infrastructure projects in high-risk scenarios, including long-term vs short-term orientation and inclination towards indulgence versus restraint (Hofstede, 2001). Managers comfortable with ambiguity tend to persist in challenging projects, leveraging their ability to navigate uncertainty to devise innovative management approaches. Those with a long-term view endure short-term setbacks, reinforcing a focus on future benefits. Balancing indulgence and restraint equips managers to handle risky projects effectively. Regarding the propensity to desert projects due to limited funding, cultural constraints such as ambiguity tolerance, power distance, individualism vs collectivism, masculinity vs femininity, and uncertainty avoidance play pivotal roles. Managers tolerant of ambiguity are quicker to recognise funding constraints, potentially leading to infrastructure project desertion and talent shortfalls (Ndiritu & Engola, 2020). Power distance impacts responses, with individualistic and masculine managers more prone to desertion, while collectivist and feminine traits encourage the discovery of alternative strategies through collaborative exploration of solutions. Higher uncertainty avoidance increases the likelihood of desertion, as managers averse to uncertainty tend to abandon underfunded projects that could suggest career uncertainty. Hence, organisations should promote adaptive management, emphasising ambiguity tolerance, long-term forecasting and decision-making to navigate risk and uncertainty. Recognising the cultural dimensions' influence on decision-making can guide strategies catering to diverse managerial herding motives. Efforts to dislodge herding motives promote independent risk analysis and transparent communication. Leveraging principles from cultural-historical theory can lead to mentorship programmes and collaborative decision-making structures.

7.2.2.1.7. Culture and professional project management certification

The results reveal that managers with professional certifications negatively relate to key cultural values: ambiguity tolerance, power distance, individualism versus collectivism, masculinity versus femininity, and long-term versus short-term orientation. This suggests that certified managers may lean towards risk aversion, conformity, and adherence to established norms (Hofstede, 2013). The alignment between high power distance, collectivism, and femininity with the negative relationship implies that certified managers conform to their community of practice's prevailing norms (Wenger, 2000) as protective learning goals. They may exhibit collaborative and nurturing behaviours consistent with conforming to practices recommended by their certification body. The balanced leanings of certified managers in long-term vs short-term orientation and indulgence vs restraint indicate a measured approach to collaborative learning

that balances immediate career gratification with long-term benefits. The positive relationship between professional certification and indulgence vs restraint suggests a preference for controlled decision-making influenced by regulatory standards and established practices. Organisations can leverage the behaviour of certified managers by promoting certification since it can dislodge the negative effect of herding motives of perceiving others as having superior knowledge. The tendency of certified managers to balance long-term and short-term objectives can foster stability, conformity, and adaptive and agile leadership teams for enhanced project management resilience.

Organisations should encourage diversity in collective decision-making teams, independent analysis, and open discussions to mitigate herding behaviour. Leveraging cultural-historical theory can guide mentorship programmes and collaborative structures, facilitating effective collaboration among managers with different orientations. Management practices should incorporate decision reviews, comprehensive risk assessment training, and innovation initiatives. Policies should advocate for decision diversity, inclusive mentorship, flexible structures, and cultural sensitivity training. The implications include counteracting certification-led herding due to risk aversions associated with perceiving oneself as less knowledgeable. By integrating these strategies, organisations can establish a more resilient, inclusive, and well-informed decision-making environment within Kenyan infrastructure projects.

7.2.2.1.8. Culture, board membership, and managerial level

Senior-level managers are negatively associated with the individualism vs collectivism dimension, leaning towards collectivism, collaboration, and shared goals (Hofstede, 2001). Middle-level managers may lean more towards individualism (Hofstede, 1980). Board membership is negatively linked to short-term orientation, indicating a focus on long-term perspectives (Hofstede, 2013). Cultural traits, like ambiguity tolerance, power distance, collectivism, femininity, and uncertainty avoidance, align with these relationships, suggesting managers' cultural leanings are tied to their roles. Collectivism aligns with senior management, fostering collaborative decision-making and teamwork. The balanced stance of managers on long-term vs short-term orientation and indulgence vs restraint promotes comprehensive decision-making. Practical implications include leveraging collectivism for collaborative leadership, aligning decisions with board visions, diverse teams, and transparent communication about personal risks. Stakeholder management theories advocate mentorship, cross-functional collaboration, stakeholder engagement, and aligning communication for successful project outcomes. The analysis highlights the interplay between management roles, cultural dimensions, and decision-making tendencies. Integrating theoretical frameworks enhances decision-making and project success to mitigate sovereign risk creation by promoting learning, collaboration, and stakeholder engagement.

7.2.2.2. How culture and demographics shape managerial herding and information cascade

This study responds to prior calls for human-centred infrastructure design and management frameworks (Gregory & Sovacool, 2019). It is achieved by introducing seven cultural managerial herding personas that characterise how managers interact with rules, community of practice, and division of labour in the Kenyan infrastructure development context. The personas are analysed to uncover how they influence collaborative learning to mitigate infrastructure project risk when critical information losses occur through managerial herding behaviour. While herding may have some benefits, such as stability and coordination, it causes information loss by curtailing critical thinking, innovation, and human capital development. By integrating Hofstede's cultural and affordances concept into CHAT, the study shows that culture constrains managerial motives to conform or engage in herding, including risk aversion, social proof, and career reputation risks.

7.2.2.2.1. Ambiguity intolerance

7.2.2.2.1.1. Sociocultural herding persona

Managers with high ambiguity tolerance navigate uncertainty and take calculated risks, prioritising potential rewards and strategic importance in infrastructure decisions. They may favour high-risk projects aligned with objectives like low-carbon financing and innovation. The tendency to abandon underfunded projects may stem from a belief that inadequate financial resources hinder innovative risk-return strategy development. Effective governance should balance adopting novel practices and ambiguity navigation, fostering innovation amidst flexibility and optimal risk aversion to bolster innovative decision-making.

7.2.2.2.1.2. Interaction with ambiguity tolerance as a mediating cultural tool

Ambiguity-tolerant managers often pursue novel learning objectives by accepting well-funded, high-risk projects, likely driving overinvestment in unsustainable infrastructure projects (Ferchen & Perera, 2019). This mirrors Hofstede's (2010) low uncertainty avoidance associated with high-risk debt options. However, overemphasising high-risk infrastructure investments and schedule management can create low-quality vulnerabilities (Ansar *et al.*, 2016). Ambiguity tolerance could drive overconfidence in risk management and influence career choices, as seen in the renewable energy sector. It may impact policy design and implementation, similar to Kenya's ineffective FiT policy design and implementation outcomes linked to limited technical capacity (Ndiritu & Engola, 2020). Ambiguity intolerance must be coupled with expert engagement, stakeholder collaboration, streamlined regulations, and an innovation culture. Furthermore, the study highlights that ambiguity intolerance is a cultural tool for managers to communicate knowledge with peers that could lead to imitation and herding. While ambiguity tolerance can promote innovative decision-making and learning, high ambiguity tolerance can lead to overconfidence, negatively impacting collaborative risk-taking, decision-making, and peer learning. Addressing ambiguity intolerance can foster

collaborative learning about effective decision-making, risk assessment, information seeking, learning orientation, psychological safety culture, and leadership culture (Gray & Ulbrich, 2017).

7.2.2.2.1.3. Interaction with the policy and regulatory rules

Ambiguity-tolerant managers in the Kenyan context may exhibit adaptability and flexibility when interacting with infrastructure policy and regulatory rules, leveraging their willingness to navigate risks and uncertainties. This interpretation underscores their proactive relationship building and advocacy that is to confront ambiguity effectively. Embracing ambiguity, these managers may perceive policy gaps as opportunities for innovation and problem-solving rather than barriers. They could stay informed through industry forums and engage with government agencies to influence policymaking outcomes (Ombagi *et al.*, 2023a). If managers build strong relationships with stakeholders, it can aid in navigating ambiguities and clarifying regulatory compliance processes. These practices align with the need for agile and adaptive management strategies in a complex regulatory landscape. These findings challenge previous claims of lower regulatory risks in Kenya, highlighting the importance of culture as a human-centred interpretation of compliance strategies. Ambiguity-tolerant managers may prioritise compliance culture, advocating for policy reform through public consultations and collaborative efforts. They could enhance global infrastructure investor confidence and economic stability by fostering transparency and accountability. However, managers must balance adaptability and compliance, seeking legal and regulatory guidance to ensure actions remain within the legal framework and mitigate risks linked to policy ambiguity.

7.2.2.2.1.4. Interaction with the community and division of labour

Ambiguity tolerance complements the ability of managers to interact with diverse stakeholders within the community of practice, including management peers, government decision-makers, international investors, and citizens. Evaluating ambiguity tolerance can bolster the policy suggestions (Sarkodie & Ozturk, 2020) to educate the public about energy conservation and renewable energy valuation (Oluoch *et al.*, 2020) by enabling a selection of appropriate managers to engage diverse stakeholders to enhance the division of labour between stakeholders in the infrastructure lifecycle management community. The study proposes that managerial ambiguity intolerance might inhibit the willingness to interact with citizens in shaping information for tariff-setting, considering household affordability and willingness to pay while mitigating plant lifecycle costs (Osiolo *et al.*, 2017). Ambiguity intolerance might influence risk-taking behaviours by curtailing experimentation, learning, adaptability, and flexibility in cross-cultural community and labour divisions. However, ambiguity-tolerant managers foster collaboration, value effective communication, and actively build resilient networks, thereby enhancing risk management and innovation (McLain, 2009).

7.2.2.2.2. Power distance

7.2.2.2.2.1. Sociocultural herding persona

Emphasising equality in Kenyan multicultural infrastructure projects indicates an egalitarian public sector with participatory decision-making. Sub-sample analysis indicates higher power distance in the renewable energy sector, suggesting that hierarchical stakeholder engagement and centralised decision-making are found in the renewable energy sector. In contrast, the transportation sector likely has flatter structures and equitable power distribution, consistent with decentralised policymaking. Low power distance can lead to more decentralised decision-making and openness to input, reducing strict adherence to hierarchical power structures. Evaluating power distance can guide managers to navigate nuanced power dynamics influenced by gender, experience, and contexts in infrastructure management.

7.2.2.2.2.2. Interaction with power distance as a mediating cultural tool

Managerial inclination towards hierarchical identities in infrastructure governance structures mediates their socio-cognitive learning objectives and involvement in constructing infrastructure lifecycle management knowledge. The inclusion of power distance in regression models demonstrates its influence on various aspects of sovereign risk perceptions and infrastructure project management. The positive coefficient for power distance suggests that high power distance may amplify herding, potentially due to risk perceptions in principal-agent relationships. This aligns with studies depicting misaligned incentives affecting debt management in the energy sector due to political influence on project governance (Twesigye, 2022). Furthermore, power distance may shape managerial responses to carbon risk management and voluntary carbon risk disclosure, and leaders' styles play a crucial role in mediating power distance effects. Participative and inclusive leadership can mitigate herding behaviour by promoting open communication, autonomy, and collaboration. In summary, high power distance cultures may foster herding behaviour if managers conform to the opinions of higher-ranking individuals. An inclusive culture can reduce negative power distance effects, encouraging independent decision-making and diverse contributions.

7.2.2.2.2.3. Interaction with the policy and regulatory rules

Managers influenced by high power distance may approach infrastructure policy and regulatory rules with great demand for specific outcomes from authorities and decision-makers. They could prioritise compliance with these policies as authoritative directives, often seeking guidance and approvals from regulatory bodies. While complying even with ambiguous policies is likely (Onjala, 2018), they may maintain hierarchical communication, hesitating to challenge authorities openly. Instead, they resolve issues using hierarchical channels to build harmonious relationships, which blocks new knowledge construction. They may actively seek information from official sources to ensure compliance and stay informed about policy changes.

However, they should balance respect for authority with constructive engagement in policymaking to avoid excessive deference and transmit contrarian perspectives that can be used to improve project delivery.

Some managers with power over others override rules. One could argue that they use dominion over others to perpetuate the limited transparency and accountability that was observed by Onjala (2018). Managers should acknowledge the fine line between respecting hierarchy and leveraging evidence-based contrarian views to contribute to effective and equitable infrastructure policies and regulatory rules.

7.2.2.2.4. Interaction with the community and division of labour systems

This study's findings expand upon Chiyemura *et al.*'s (2023) observations about state–agency tensions in project implementation, suggesting that greater asymmetries of power among managers and stakeholders in infrastructure projects may escalate sovereign risk due to contradictions within the community of practice (Wenger, 2000) and labour division (Vygotsky & Cole, 1978). Managers with high power distance tend to defer to higher-ranking individuals, potentially influenced by political interests (Twesigye, 2022), rather than proposing alternative decisions based on a contextual understanding of risks as state–citizen mediators (Osiolo *et al.*, 2017). This could undermine collective decision-making diversity, inclusion, and community engagement efforts in infrastructure development projects by reproducing a discriminatory centralised state power dynamic (Achiba, 2019; Renkens, 2019). Such managers emphasise clear roles, centralisation, and top-down communication, limiting participatory decision-making and innovation potential. They prioritise loyalty and obedience, potentially hindering stakeholder empowerment. While maintaining stability, this curtails effective socio-cognitive learning and adaptive risk mitigation. Thus, balancing power distance is vital to fostering informed, participatory, and innovative infrastructure development in Kenya.

7.2.2.2.3. Individualism vs collectivism

7.2.2.2.3.1. Sociocultural herding persona

In the Kenyan infrastructure development context, males appear less inclined toward collective goals and more individualistic, prioritising self-interest. Older individuals exhibit slightly lower collectivism and higher individualism than their younger counterparts. However, experience fosters a focus on collective interests, cooperation, and social harmony. Public sector-owned projects emphasise collective interests and community welfare over individual gain and competition. Strengthening public sector governance may be an important strategy to dislodge herding motives of following the majority or leaders to reduce the risk of being blamed for poor decisions because managers can justify their choices based on the collective action of fostering people-centred interests within the public sector governance framework.

7.2.2.2.3.2. Interaction with collectivism vs individualism as a mediating cultural tool

In infrastructure management, managerial interaction with collectivism vs individualism plays a crucial role in shaping herding. Collectivism is predominant among managers in Kenyan infrastructure projects. It implies Kenya's collectivism mediates decision-making, information sharing, peer influence, leadership style, and incentives. Collectivism among these managers means prioritising group cohesion, consensus, and harmony, often associated with herding to preserve in-group unity (Cohen & Short, 1958). They tend to conform and avoid conflict, which might hinder challenging prevailing practices or voicing dissent. While information sharing is emphasised, and decisions are often made collectively, peer influence is strong, further promoting conformity (Hofstede, 2013). Leadership styles and incentives can enhance herding in collectivist cultures if rewards are tied to the leaders' objectives and politically influenced conformity objectives (Twesigye, 2022). The main risk is that the lessons learned process in project management may be ceremonial, failing to transform project management practices in future projects.

Conversely, individualistic managers may prioritise independence and autonomy, making decisions based on their risk assessment and own knowledge (Hofstede, 1980). Peer dynamics influence them less, and they prioritise personal interests, which could make them herd leaders if their independent or innovative ideas become successful. Independent thinking is encouraged by leadership emphasising individualism, resulting in reduced herding. In summary, whether collectivist or individualistic, cultural orientation significantly mediates herding as defensive socio-cognitive learning in infrastructure project management that affects collaborative decision-making, information sharing, peer influence, leadership, and incentives.

7.2.2.2.3.3. Interaction with the policy and regulatory rules

Collectivist managers prioritise group interests and consensus-building (Hofstede, 2013). Collectivism is useful in implementing the separation of power while decentralising decision-making authority in Kenya's devolved governance systems if it bolsters equitable infrastructure development resource distribution. However, excessive reliance on collectivism among leaders could lead to a long and cumbersome search for unanimous consent (Ansell *et al.*, 2017). Moreover, collectivism exacerbates corruption when weak governance structures disproportionately benefit specific in-groups through hidden resource allocation (Otieno, 2023). The infrastructure development context appears to be a weak rule of law enforcement context because it affords managers concealment of resource allocation practices. Corruption denotes concealing a detached object from other observers due to specific motives. The finding that Kenya can reduce project risk premium by 9% through anti-corruption measures suggests that if culture-mediated herding through collectivism leverages this reliance on social proof to cascade corrupt practices, Kenya must look into the behavioural pooling effect of collectivism. Collectivism implies that if many people make the same choice, it is likely the correct one. Hence Kenya can leverage its collectivism to understand

how corrupt practices cascade within the infrastructure development contexts as a gap between policy and practice perpetuated by sub-groups in collaborative project management contexts.

Conversely, individualistic managers could prioritise personal goals, independence, and achievement within policy frameworks. They could seek policy reforms aligning with business goals that resonate with their common knowledge about project success. It is important to note that while managers exhibit varying degrees of collectivism and individualism in Kenyan infrastructure projects, the full sample leans towards collectivism (Hofstede, 2013). Striking a balance between individual and collective interests is crucial for sustainable infrastructure development outcomes. Managers should consider broader societal impacts, navigate tensions between personal and communal development goals, and comprehend the interplay of culture, governance, and individual values for effective decision-making and policy implementation.

7.2.2.2.3.4. Interaction with the community and division of labour support system

Collectivism-oriented managers in infrastructure contexts emphasise alignment with project goals, yet tensions can arise when in-group norms contradict stakeholder priorities (Tysiachniouk *et al.*, 2020). For instance, Zhu *et al.* (2022) recommend shared values for community acceptance of infrastructure projects. Such values bolster effective stakeholder coordination, collective decision-making dynamics, and conflict resolution, shaping the infrastructure development community. While collectivism-oriented managers may prioritise collaboration, teamwork, and shared risk management (Liu *et al.*, 2015), their collaboration motives exemplify herding as defensive socio-cognitive learning. Individuals align their actions with their in-group objectives to mitigate personal risk and avoid negative consequences within the in-group, which can lead to fragmented governance. They value relationship building and stakeholder consensus-seeking, fostering inclusive decision-making with diverse perspectives (Hills, 2002) as long as it protects in-group objectives, which may not often resonate with equitable infrastructure development objectives. Although this approach promotes a cohesive workplace environment, enhances communication, cooperation, and productivity, and considers community needs and welfare, it can reinforce herding if people often look to the behaviour of others as a cue for appropriate action, especially in uncertain situations. There is a need for a framework that combines individual growth with collective objectives, enhancing inclusivity, shared responsibility, and division of labour that fosters positive infrastructure development outcomes.

7.2.2.2.4. Masculinity vs femininity

7.2.2.2.4.1. Sociocultural herding persona

Males tend to have lower levels of masculinity and higher levels of femininity than females in the infrastructure development context. As individuals gain more experience in their respective fields or domains, they may become more assertive, competitive, and independent in their approach, reducing

herding likelihood. International management experience may contribute to a broader and more adaptable approach to leadership and management styles because exposure to different cultural norms and practices can influence individuals to incorporate more flexible and inclusive behaviours, which may deviate from traditional masculine traits. As individuals spend more time working on a specific project, they may develop characteristics and behaviours that align less with traditionally masculine traits by becoming more collaborative, cooperative, and team-oriented.

7.2.2.2.4.2. Interaction with masculinity vs femininity as a mediating cultural tool

Examining managers' interactions in the infrastructure context through the lens of masculinity and femininity is vital, with these terms being about cultural dimensions rather than biological traits. Longer tenure is associated with reduced masculinity, as experienced individuals often exhibit greater collaboration and empathy, which are traits associated with femininity (Hofstede, 2001). Those prone to abandon projects due to limited funding tend to display masculinity, whereas those seeking professional certification lean towards femininity, valuing diverse expertise and informed professional decision-making (Hofstede, 2001). In the renewable energy sector, masculinity-related herding behaviour is more likely due to industry competitiveness. Leadership styles, communication patterns, risk-taking, innovation, team dynamics, hierarchical structures, and work-life balance preferences may influence herding behaviour in infrastructure project settings (House *et al.*, 2002). Masculine cultures favour assertive, competitive, and hierarchical leadership, reducing the likelihood of herding and potentially conceiving herding leaders, while feminine cultures prioritise cooperative and participatory leadership, potentially conceiving herding followers. Communication patterns vary, with masculinity favouring direct communication, conceiving authoritative herding leaders in contexts like renewable energy. At the same time, feminine cultures promote open and inclusive communication, which could reduce herding tendencies since individuals can express their opinions. Risk-taking and innovation align more with masculinity, while feminine cultures tend to prioritise cooperation and stability. Team dynamics in masculine cultures emphasise individual recognition, potentially reducing herding, whereas feminine cultures prioritise teamwork, increasing herding likelihood. Hierarchical structures align with masculinity, and flat structures with femininity in the context of herding tendencies. Work-life balance goals influence career choices, favouring traditional sectors over innovative ones in feminine cultures, potentially reducing herding as managers prioritise team well-being. In summary, cultural dimensions of masculinity and femininity significantly shape managerial behaviours and herding tendencies in infrastructure management across various facets.

7.2.2.2.4.3. Interaction with the policy and regulatory rules

Managerial masculinity vs femininity attributes determine approaches to infrastructure policy and regulation. Masculinity-driven managers may prioritise efficiency, competition, and achievement. They

could adopt goal-oriented strategies, seeking competitive advantages and emphasising results-driven compliance with key policy guidelines (Dalla Longa & van der Zwaan, 2017). They may lobby and engage with associations to shape policies favouring competition and growth. Conversely, femininity-influenced managers focus on stakeholder collaboration, social and environmental impact, and ethical compliance. They may prioritise engaging diverse stakeholders, sustainable practices, and community well-being. They aim for transparent, fair, and socially responsible compliance, collaborating to influence policymaking for equity and sustainability. Ombagi *et al.* (2023a) highlight managerial collaboration's influence on policymaking outcomes. These findings show how gender orientations shape infrastructure policymaking approaches, reflecting varied priorities and values.

7.2.2.2.4.4. Interaction with the community and division of labour support system

Kenyan renewable energy and transportation infrastructure managers exhibit a combination of masculinity and femininity orientation, emphasising achievement, results-oriented approaches, assertiveness, collective decision-making styles, and collaboration dynamics. Masculinity-oriented managers in renewable energy may value personal achievement, competitiveness, and technical task management efficiency, potentially contributing to overinvestment tendencies. They emphasise tangible outcomes, assertive decision-making, and task completion. Despite this, collaboration and teamwork could still be important, potentially fostering healthy competition and individual accountability and benefiting the infrastructure community. These results underline the influence of gender-based cultural orientations on infrastructure project management approaches and their implications for sovereign risk in renewable energy and transportation sectors.

7.2.2.2.5. Uncertainty avoidance

7.2.2.2.5.1. Sociocultural herding persona

The study infers that job tenure's negative regression coefficient with uncertainty avoidance indicates that individuals become less prone to herding by conforming to others' actions as a way of learning without direct experience to reduce personal trial-and-error risk as they spend more time on an infrastructure project. Experience seems to reduce the need to conform to cope with uncertainty. Conversely, the positive coefficient suggests that those likely to abandon projects due to limited funding exhibit a stronger aversion to uncertainty, prioritising stability over adaptability, making them more prone to herding, particularly mimicking those perceived as successful or knowledgeable. Kenya must prioritise adequate infrastructure development resource allocation to avoid talent shortfall and retain project managers.

7.2.2.2.5.2. Interaction with uncertainty avoidance as a mediating tool

Managerial interaction with uncertainty avoidance mediates herding in infrastructure contexts, impacting risk perception, leadership style, decision-making, adaptability, trust in ICT systems, and organisational

structure. High uncertainty avoidance leads to risk aversion, favouring standardised risk mitigation over adaptation and innovative decisions to avoid uncertainty. Low uncertainty avoidance encourages calculated risk-taking while adhering to benchmarks, promoting adaptive management. High uncertainty avoidance prioritises stability and conformity, possibly leading to inefficient herding by resisting change. Leadership style and organisational culture play significant roles: leaders embracing uncertainty foster adaptive management, while risk-averse leaders may drive herding by promoting conformity.

7.2.2.2.5.3. Interaction with the policy and regulatory rules

Managers with high uncertainty avoidance prefer structured, regulated environments with clear rules and have a desire to avoid ambiguity (Hofstede, 2013). They could emphasise compliance by ensuring adherence to guidelines and comprehensively understanding regulations. Risk mitigation is a priority, involving identifying and managing compliance-related risks, while proactive engagement with regulatory authorities ensures up-to-date information. Seeking legal counsel and advocating for stability align with their aversion to uncertainty. Documentation and record-keeping are emphasised for transparency and audits. Balancing compliance and adaptability are key; though they prefer clear rules, adapting to evolving policies is crucial. Collaboration with legal experts and staying updated on regulations help navigate uncertainties effectively.

7.2.2.2.5.4. Interaction with the community and division of labour support system

High uncertainty avoidance suggests that a preference for stability and established procedures driven by uncertainty avoidance can shape traditional vs innovative management approaches. It could lead to:

- A desire for clear guidelines: seeking structured processes to minimise ambiguity in scope and schedule management, promoting stability and predictability
- Emphasis on risk mitigation: cautious, methodical decision-making with thorough risk assessments and contingency planning for stability
- Preference for proven approaches: favouring established practices over untested methods to reduce uncertainty and match cash flow generation
- Clear communication of expectations by providing explicit instructions and goals to reduce uncertainty in performance
- Resistance to change: preferring stability, potentially limiting openness to innovation and cross-functional knowledge sharing
- External validation: seeking expert advice to minimise uncertainty via external knowledge sources

Uncertainty avoidance influences managerial risk perceptions and choices, impacting sovereign risk by reinforcing stability and adherence to established scope and schedule management practices.

7.2.2.2.6. Long-term vs short-term orientation

7.2.2.2.6.1. Sociocultural herding persona

The study found relationships between experience, professional certification, board membership, and short-term orientation in infrastructure development. Experience correlates with focusing on long-term outcomes, valuing planning, and potential impacts. Abandonment-prone individuals prioritise long-term infrastructure project viability over short-term gains. Seeking certification reflects long-term objectives. Board members prioritise project success, resisting herding. These findings underscore the role of experience, certification, and board membership in promoting long-term planning and sustainability in infrastructure contexts.

7.2.2.2.6.2. Interaction with long-term vs short-term orientation as a mediating tool

Boards with a long-term orientation value sustainable decision-making, strategic investments, risk-taking, and performance evaluation based on long-term goals. This culture encourages managers to align their actions with long-term objectives, promoting herding and focusing on enduring benefits and strategic outcomes. Conversely, short-term-oriented managers may prioritise immediate results, quick fixes, and resource allocation based on short-term gains, potentially contributing to herding that prioritises short-term conformity and gains. For instance, Laikipia County's road infrastructure collaboration illustrates how long-term resource allocation leads to successful implementation (Densford *et al.*, 2018), while regions with short-term orientation may face corruption and disparities. Incentive structures in long-term-oriented boards may encourage risk-taking and innovation, fostering herding that challenges prevailing practices. Performance evaluation tied to long-term goals reinforces alignment with strategic outcomes.

Additionally, managers focused on long-term resilience consider the projects' viability and external pressures, resisting short-term demands and promoting herding that safeguards the organisation's long-term sustainability. In contrast, short-term-oriented cultures may lead to herding behaviour driven by immediate gratification and conformity to short-term pressures. The interplay between time orientation and managerial behaviours demonstrates the complexity of decision-making in infrastructure communities and the need to balance short-term gains with long-term sustainability.

7.2.2.2.6.3. Interaction with the policy and regulatory rules

Long-term-oriented boards and managers in the infrastructure sector may prioritise sustainability, future planning, and stakeholder collaboration. Moreover, they may emphasise strategic planning, sustainable practices, and long-term policy advocacy. This strengthens the positive relationship between green economic development policy and sovereign risk opinions. Managers focus on strategic infrastructure

project planning, sustainability, stakeholder collaboration, and future-focused advocacy. Conversely, short-term-oriented managers prioritise rapid implementation, compliance for immediate benefits, cost-benefit analysis, and reactive adaptation within existing policies and rules. Balancing both orientations is vital for sustainable growth and compliance, ensuring immediate project success while considering long-term consequences, sustainability, and stakeholder interests, thus mitigating sovereign risk. The study's findings demonstrate that managerial and cultural orientations interact with infrastructure policy and regulatory rules to shape decision-making and project outcomes. This highlights the intricate interplay between time perspectives, cultural dimensions, and managerial behaviours within the infrastructure community.

7.2.2.2.6.4. Interaction with the community and division of labour support system

Including long-term vs short-term orientation opinions in the baseline model enhances understanding of relationships between debt-side governance determinants and sovereign risk in infrastructure projects. Short-term-oriented managers may prioritise completing projects quickly over long-term quality, potentially diminishing the significance of debt-side governance factors. However, this contrasts with the restrained cultural norm in China, indicating complex motivations (Ansar *et al.*, 2016). Managerial time orientation can affect the relationship between carbon risk management and sovereign risk. Short-termism implies quick, results-driven decision-making, resource optimisation, and reactive problem-solving.

In contrast, long-term orientation emphasises strategic planning, sustainable development, relationship building, and continual improvement. Such orientations influence managers' behaviours in the infrastructure community and regarding the division of labour through long-term decision-making, risk management, and project objectives. The study highlights the intricate interplay between cultural factors, time orientation, and managerial behaviours, shedding light on how these elements shape sovereign risk perceptions and decision-making processes in infrastructure development.

7.2.2.2.7. Indulgence vs restraint

7.2.2.2.7.1. Sociocultural herding persona

Indulgence positively relates to international experience, fostering openness and innovation. Restraint correlates with prudent resource allocation amid limited funding risks, emphasising stability and collective success. Indulgence-driven managers, particularly certified ones, prioritise personal freedom over conformity, reflecting expertise and confidence. The relationship underscores the connection between professional certification and indulgence within infrastructure management's herding behaviour context.

7.2.2.2.7.2. Interaction with indulgence vs restraint as a mediating cultural tool

Indulgent managers may gravitate towards short-term gratification and impulsive resource allocation governance structures (Otieno, 2023), while more restrained managers value long-term sustainability,

disciplined planning, and risk assessment. The indulgence may lead to impulsive risk-taking, like corruption, but could also drive innovation, while restraint values cautious decision-making. Time perception shifts between present-oriented indulgence vs future-oriented restraint, and organisational culture influences behaviour alignment. Leadership also plays a role, with indulgent leaders encouraging immediate gratification and restraint-promoting leaders emphasising disciplined and long-term goals. This nuanced understanding of cultural dimensions and their impact on managerial behaviours contributes to interpreting the findings' implications for decision-making, resource allocation, risk-taking, innovation, time perspective, organisational culture, and leadership effects within the infrastructure sectors.

7.2.2.2.7.3. Interaction with the policy and regulatory rules

Indulgence-oriented managers prioritise the desire for gratification, personal freedom, and life enjoyment in policy implementation. They may drive innovation, advocate for business freedom, embrace adaptability, and balance compliance with autonomy. This approach fosters creative compliance with regulations, supports deregulation for growth, and adapts strategies to changing policies. Restraint-oriented managers emphasise discipline, structure, and adherence to norms. They could strictly comply with regulations, mitigate risks, respect authority, and prioritise documentation. These managers ensure adherence to the prescribed guidelines, minimise uncertainties through risk assessment, and uphold hierarchical structures. Their focus on documentation and compliance processes ensures clear audit trails. These distinct orientations influence managers' interactions with infrastructure policies and regulatory rules, shaping decision-making and business practices. The study highlights that cultural dimensions influence managerial behaviours and responses to regulatory environments, ultimately impacting sovereign risk assessment. The findings reveal the importance of considering indulgence and restraint values in understanding the complex dynamics between culture, policy, and infrastructure development.

7.2.2.2.7.4. Interaction with the community and division of labour support system

Indulgence is oriented towards flexibility, individual expression, and work-life balance preference (Hofstede, 2013). Managers with this orientation may welcome new ideas, support individual creativity, and prioritise employee well-being objectives in infrastructure projects. Conversely, restraint orientation focuses on discipline, long-term planning, stability, harmonious teamwork, and controlling desires. The results imply that managers oriented towards restraint could stress adherence to initial infrastructure development rules, risk assessment, and group goals over emergent issues. These orientations mediate managerial approaches in the infrastructure community and division of labour through decision-making processes and peer interactions when new issues emerge, ultimately affecting sovereign risk assessment.

7.2.3. Objective 3: Assess how culture mediates and moderates the relationship between sovereign risk and the development of Kenyan renewable energy and transportation infrastructure projects

Culture constrains managers to mimic the decisions of others as a defensive socio-cognitive process of ignoring their private information about the attractiveness of alternatives to avoid social exclusion. Therefore, this analysis explored culture's direct and indirect effect on project risk premium – controlling for debt governance, project management, and macroeconomic risk – using primary data collected through a survey and secondary data. In primary data analysis OLS models, it was expected that the cultural characteristics that managers in infrastructure projects imbue mirrored national culture, yielding positive and significant coefficients. Panel data models regressed the interaction terms of cultural distance and sovereign bond spreads on project risk premium. Positive and statistically significant coefficients indicated herding towards market consensus about Kenya's sovereign risk, while negative and statistically significant coefficients indicated herding away from or dispersing from market consensus. PDI, MAS, and LTO yielded positive and significant coefficients, suggesting these dimensions may reinforce herding towards market consensus about sovereign risk within the Kenyan infrastructure development context.

Conversely, IDV, UAI, and IVR yielded negative coefficients, suggesting herding towards within-country knowledge structures. Hence, this assessment validated culture as a moderator of the relationship between sovereign risk and infrastructure development through managerial herding motives. Culture-mediated herding is a form of defensive socio-cognitive learning where managers align their actions with a social group to mitigate personal risk and avoid negative consequences, as deviating from the norm can lead to social disapproval or exclusion. In this context, herding serves as a protective strategy driven by culture as a socio-cognitive learning artefact. The problem in this study is that herd behaviour adversely affects the managerial incentive for acquiring information, and herding motives diminish the value of any acquired information that could be used to reduce infrastructure risks. From a social standpoint, if managers in infrastructure projects care about their sovereign information filtering role, then inefficiencies associated with herding can diminish. This is elaborated on in the ensuing sub-sections.

7.2.3.1. Ambiguity intolerance

Including ambiguity intolerance (AT) in the baseline modelled relationship between project risk premium and debt-side governance introduces a cultural dimension of managerial perceptions. Ambiguity-tolerant managers may favour longer maturity to mitigate refinancing risk or repayment flexibility, leading to a stronger positive regression coefficient. The weakened positive coefficient for covenant compliance implies that ambiguity-tolerant managers may seek compliance flexibility, possibly explaining deviations from procurement regulations in projects like the SGR, as Zhu *et al.* (2020) observed. A negative debt-to-equity coefficient and positive investment size coefficient indicate that ambiguity-tolerant managers prefer large

investments with less debt reliance. This could indicate that they are inclined to limit lender monitoring and leverage more discretionary managerial decision-making powers. High ambiguity tolerance could lead to underestimating lifecycle risks, causing schedule delays and cost overruns. Ambiguity-tolerant managers may adopt adaptable and collaborative mindsets, embracing technology and innovative solutions. However, their propensity for accepting high-risk projects may raise sovereign risk due to herding towards a global consensus on the evolution of economic states (Klagge & Nweke-Eze, 2020). Effective communication can improve transparency in evaluating contextual risk exposures, mitigate misunderstandings, and enhance trust, potentially resulting in more favourable borrowing terms and greater investor participation.

7.2.3.2. Power distance

Adding power distance (PDI) to the baseline model assessing the relationship between sovereign risk and debt-side governance reveals mediating effects. Power distance weakens regression coefficients for loan maturity, covenant compliance, and green economic development policy. This effect extends to the relationship between sovereign risk and project management, where power distance strengthens schedule management coefficients while weakening lifecycle integration, scope, and cost management coefficients. This may suggest that power asymmetries are reproduced in managerial practice (Gambino & P  rier, 2020). Power distance displaces baseline coefficients for sovereign risk and macroeconomics (e.g., finance market development, public debt management, carbon risk or voluntary carbon risk disclosure), validated by the secondary data model. The coefficients for (SBS $\times$ PDI) were statistically significant and positive at the 10% level, revealing that the positive spillover effect is sustained when SBS interacts with PDI. The positive regression coefficient indicates that power distance between the Kenyan infrastructure project managers and outsiders may reinforce herding towards market-led consensus about sovereign risk perception in large infrastructure projects. Stakeholders in high power distance environments like Kenya herd towards market consensus by following the majority or authoritative leaders involved in approving projects, attenuating the international market's social influence on sovereign risk spillover.

Asymmetric power could be traced in Kenya's SGR project's collateral misperception (Brautigam, 2020), highlighting the impact of power over others on information sharing, decision-making, and risk aversion. The shared high power distance culture between Kenya and China influenced schedule management, but tensions between cost management and profitability emerged. High power distance strengthens the relationship between authoritative figures and market players, potentially reducing the impact of financial market development on sovereign risk misperceptions. It defines managerial accountability, transparency, and governance concentration, overshadowing the influence of loan factors. Groupthink in high power distance contexts can undermine the impact of loan factors. These interactions reveal power distance's role in redefining risk perception, information flow, and group dynamics and moderating professional

infrastructure project management knowledge and sovereign risk perception. Assessing power dynamics and information asymmetry in infrastructure projects is crucial for mitigating sovereign risk mispricing.

7.2.3.3. Individualism vs collectivism

In collectivist cultures (IDV) prioritising harmony and consensus (Hofstede, 2013), managers may conform to maintain social cohesion, potentially overlooking climate risks in infrastructure design. The significance of ESG factors in the model, when collectivism vs individualism is considered, implies that collectivism enhances managers' inclination to prioritise sustainability and social responsibility as sovereign risk factors. However, the absence of climate-sensitive policies and plans in Kenya's road infrastructure design raises sovereign risk due to vulnerability to climate hazards (Njogu, 2021). The panel data models showed that the coefficient for (SBS×IDV) was statistically significant and negative at the 5% level, revealing that the positive spillover effect reverses when SBS interacts with IDV. This could mean herding towards culturally constructed in-group goals that may align expectations, communication, and understanding, leading to a lower risk premium. These cultural differences might lead to more careful risk assessment, due diligence processes, and effective project management, subsequently influencing lower perceived project risk.

Collaborative decision-making with local stakeholders in infrastructure design widens ESG viewpoints, shifting priorities from financial goals to environmental and socioeconomic aspects (Njogu, 2021). This resonates with findings that wildlife ecosystem distortion due to road infrastructure designs impact economic activity and elevates sovereign risk (Lala *et al.*, 2022). Land disputes in Kenya, Russia, and Brazil reveal tensions between local and global ESG standards interpretation, prioritisation, and implementation (Li *et al.*, 2020; Renkens, 2019; Tysiachniouk *et al.*, 2020). Collectivism may moderate financial factors' influence on the lifecycle cost analysis, highlighting the importance of ESG in mitigating sovereign risk in infrastructure development. The level of individualism or collectivism moderates the relationship between sovereign risk and certain project management practices, including lifecycle integration, quality, scope, and cost. When collectivism vs individualism is added to the baseline model, it influences the relationship between sovereign risk, financial market development, and public debt management. The relationship between carbon risk management and sovereign risk remains consistent regardless of collectivism vs individualism, suggesting that collectivist tendencies may not influence carbon risk management.

7.2.3.4. Masculinity vs femininity

Hofstede (2013) characterises Kenya's culture as masculine (MAS), but the study uncovers a more feminine culture in transportation infrastructure risk perceptions. The study integrated masculinity vs femininity into the baseline model, revealing that it moderates sovereign risk's relationship with debt-side governance. The coefficients for (SBS×MAS) were statistically significant and positive at the 10% level, revealing that the

positive spillover effect is sustained when SBS interacts with masculine traits and reinforces herding towards market-led sovereign risk consensus. The moderation model shows the complex interplay between international and local knowledge integration in infrastructure lifecycle management when aggressiveness and assertiveness dominate risk management. As Khanani *et al.* (2021) illustrated, road development projects can trigger gentrification, displacing communities and altering social dynamics as execution risks. As seen in Brazil and Mexico (Backhouse & Lehmann, 2020), aggressive stakeholder engagement is undesirable during infrastructure development. It can elevate land acquisition disputes, leading to schedule delays, cost overruns, and inefficiency. Displacement disrupts social stability, impacting sovereign risk via reduced investor confidence and economic growth. Inclusive policies and urban planning are essential in mitigating these risks. Gendered decision-making weakens the influence of loan factors on sovereign risk when considering masculinity vs femininity, potentially signalling a shift toward sustainable infrastructure development, as seen in the significance of green economic development policy. Masculinity vs femininity alters the significance of lifecycle integration, scope, schedule, cost, and quality management. Teipelke (2014) observed that when large infrastructure projects were delivered ahead of schedule, the cost was enormous, indicating a trade-off between scope, cost, and schedule management objectives and revealing the impact of gender-oriented values on formal vs informal learning, influencing regression coefficients. The study shows the intricate link between cultural orientations, infrastructure development, and sovereign risk, emphasising gendered decision-making and sustainability's role in planning and management.

7.2.3.5. Uncertainty avoidance

Incorporating uncertainty avoidance (UAI) introduces a novel perspective on sovereign risk pricing determinants in infrastructure projects. Defined by Hofstede (2013), this dimension reflects stakeholders' responses to uncertainty through centralised information systems, shaping risk management approaches. Including it in the baseline model enhances comprehension of links between sovereign risk and factors like loan maturity and covenant compliance. It highlights the significance of green economic policy, influenced by uncertainty avoidance norms, emphasising sustainability and risk mitigation. The coefficient for (SBS×UAI) was statistically significant and negative at the 5% level, revealing that the positive spillover effect reverses when SBS interacts with UAI. This negative coefficient in the secondary model suggests potential herding towards within-country culturally constructed social groups motivated by cautious market risk assessment. Eickhoff (2022) confirmed these effects on risk perception and discussions about mega projects and global debt. Uncertainty avoidance also sheds light on cultural dimensions' interplay with project management, impacting scope and schedule (Pueyo, 2018). Large-scale infrastructure projects with overruns raise uncertainty and financial risks, affecting the risk premium investors seek. The role of language and social media in risk perception is evident in Sauer *et al.* (2022), showing their relevance in

market risk communication due to risk aversion. The integration of uncertainty avoidance enriches understanding of the cultural influence on cross-border collaboration through risk perception, communication, and sustainable development norms, impacting sovereign risk pricing.

7.2.3.6. Long-term vs short-term orientation

Integrating short-term vs long-term orientation into the baseline regression model illuminates shifts in decision-making criteria. The relationship coefficients between sovereign risk and other debt governance variables weaken. At the same time, the significance of ESG strengthens, suggesting that managerial time horizons capture a significant portion of debt-side governance's effect on sovereign risk, influencing prioritisation. The heightened significance of ESG factors reflects managers' emphasis on sustainable development and responsible infrastructure planning practices (Dalla Longa & van der Zwaan, 2017). This finding extends studies lacking cultural constraints. For instance, Daniel and Muchelule (2023) noted Kenyan road projects' sustainability inadequacies, contrary to informed decision-making concepts. The coefficients for (SBS×LTO) in the moderation panel data model were statistically significant and positive at the 5% level, revealing that the positive spillover effect is sustained when SBS interacts with LTO. This indicates that herding towards market-led consensus about sovereign risk in infrastructure projects could lead to a higher risk premium due to cross-cultural risk perception and decision-making differences. Zhu *et al.* (2020) emphasise holistic evaluation for projects like BRI, which the current study addresses by introducing culture into the risk premium evaluation. Regulatory pressures also elevate the significance of ESG. Otele (2023) cautions against governance issues during land compensation, which impacts ESG outcomes. Sang *et al.* (2022) reveal SGR corridor transformations, highlighting ESG's role in mitigating sovereign risk. Integrating short-term vs long-term orientation and ESG factors emphasises how time perspectives, global dynamics, and regulations shape sovereign risk in infrastructure projects.

7.2.3.7. Indulgence vs restraint

Incorporating the indulgence vs restraint variable into the baseline model has significant implications for the association between sovereign risk and debt governance, project management, and macroeconomic risk. This addition weakens loan maturity and covenant compliance's positive coefficients while strengthening the influence of the green economic development policy on sovereign risk. The moderation effect in the secondary data model shows that the coefficient for (SBS×IVR) was statistically significant and negative at the 5% level, revealing that the positive spillover effect reverses when SBS interacts with IVR. Consistent with the hypothesised outcomes, this suggests herding away from the market-led consensus about sovereign risk mediated by within-country culture-based socio-cognitive learning. Managers inclined toward indulgence may prioritise flexibility, innovation, and growth, aligning with the green economic policy's principles. The increased significance of the policy aligns with sustainable development goals (SDGs) and

the growing emphasis on ESG considerations driven by market demand, reputation, regulations, stakeholder pressures, and infrastructure design (Owuor & Elliott, 2023). This shift dilutes the influence of loan-related factors on sovereign risk, indicating that borrowers embracing indulgence values and sustainability can reduce sovereign risk premiums and interest rates. The study reveals that indulgence vs restraint significantly influences the sovereign risk and infrastructure project management relationship. The impact of indulgence vs restraint on cost management and its effect on sovereign risk is evident. This cultural orientation reshapes cost management, likely defining managers' perception of sovereign risk. IVR influences financial market development, public debt management, and voluntary carbon risk disclosure's effect on sovereign risk.

7.3. Qualitative research findings

7.3.1. Objective 1: Identify the key determinants of sovereign risk, debt-side governance, project management, macroeconomic risk, and culture in Kenyan renewable energy and transportation infrastructure projects

7.3.1.1. Theme 1: Sovereign risk premium determinants

The determinants of sovereign risk premiums, a critical aspect of international finance, encompass credit ratings, economic stability, political and fiscal policies, central bank credibility, external debt levels, exchange rate stability, geopolitical influences, global economic conditions, market sentiment, liquidity, historical default history, and their interplay. Participants recommended closely monitoring these variables when assessing the infrastructure development risk of holding a country's debt, contributing to the dynamic nature of sovereign risk premiums in global financial markets.

7.3.1.2. Theme 2: Debt-side governance

Participants identified factors shaping debt-side governance to foster access to low-interest sovereign debt, including the project size, the debt-to-equity ratio, transparent reporting, and debt management behaviour. Guarantees by the government were seen to reduce interest rates, while factors like cash flow and maturity influenced rates. Stakeholder collaboration, information sharing, and community engagement were highlighted as essential for effective debt negotiation.

7.3.1.3. Theme 3: Project management

This theme explored project management practices where participants emphasised that quality shortfalls, procurement practices, stakeholder engagement, and politics influence interest rates. Political affiliations and regime changes were identified as potential drivers of complexity in infrastructure planning, impacting rate outcomes. ESG tensions were emphasised. Participants identified carbon risks, social unrest, and limited transparency in infrastructure planning and selection as key determinants of interest rates.

Stakeholder engagement and operational risk management were crucial for decision-making and interest rate negotiation.

7.3.1.4. Theme 4: Macroeconomic factors

This theme delved into macroeconomic risks, identifying factors like inflation, exchange rates, and GDP growth as key determinants of interest rates. Mitigation tools, such as government guarantees and risk insurance, were identified to reduce interest rates by shielding investors against inflation, exchange rates, and commodity price fluctuations. The study notes the interconnectedness of managerial decision-making, stakeholder engagement, and market risk factors in shaping the infrastructure financing and lifecycle management landscape.

7.3.1.5. Theme 5: Cultural dimensions

- Power distance refers to the extent to which less powerful members of a society accept and expect that power is distributed unequally (Hofstede, 2013). The distribution of key informants and policymakers is a balanced representation. Still, the higher percentage of male participants than females shows a higher power distance as males dominate the sample.
- Individualism vs collectivism focuses on the degree of interdependence a society maintains among its members (Hofstede, 2013). The individualistic aspect might be reflected in the varying sectors participants are involved in, indicating diverse career paths. On the other hand, the cultural context in Kenya might lean more towards collectivism, as suggested by the relatively high percentage of international experience among participants and the tendency towards peri-urban and urban areas for engagement.
- Masculinity vs femininity explores how much society values stereotypically “masculine” traits such as competition and achievement versus “feminine” traits like cooperation and quality of life (Hofstede, 2013). The dominance of male participants could suggest a higher masculinity orientation.
- Uncertainty avoidance refers to a society’s tolerance for uncertainty and ambiguity (Hofstede, 2013). The willingness to engage in geothermal, wind, and other renewable energy sectors indicates a lower uncertainty avoidance, as these sectors often have newer technologies and practices.
- Long-term vs short-term orientation contrasts values associated with persistence against short-term adaptability (Hofstede, 2013). The participants’ experience, with an average of 18.39 years, and their international experience could suggest a more long-term-oriented culture.
- Indulgence vs restraint deals with a society’s willingness to gratify basic human desires (Hofstede, 2013). Indulgence can be inferred from international management experiences.

7.3.2. Objective 2: Examine the relationship between culture and managerial demographics in Kenyan renewable energy and transportation infrastructure contexts

The characteristics of participants (policymakers and informants) corroborate the herding and information cascade insights observed in the quantitative data regarding culture and demographic composition considering their cadre, gender, infrastructure sector involvement, years of experience, education level, and international infrastructure project management experience and the context (rural or urban) of their engagement in large Kenyan infrastructure projects.

The cadre distribution revealed a balanced representation, with 54.84% being key informants and the remaining 45.16% being policymakers. Gender-wise, male participants were predominately evident, accounting for 70.97% of the sample, while female participants constituted 29.03%. The dominance of male participants and potential higher power distance (Hofstede, 2011) reflected in the vignettes indicate that participants might tend to follow decisions made by male key informants or policymakers. This could lead to herding behaviour, where individuals might prioritise the opinions or decisions of those perceived to have more power or authority.

The distribution of participants across different sectors might lead to sector-specific herding when considering the sectors in which participants were involved. For instance, the distribution varied, with geothermal (32.26%), road (25.81%), wind (22.58%), and rail (12.90%) being the prominent sectors, which suggests that if one sector (e.g., geothermal) receives positive attention from external lenders and the central government, participants from other sectors might start following the decisions made in the dominant sector, leading to herding behaviour.

Job tenures and information cascades could be inferred in the years of experience, averaging 18.39 years, with the maximum years of experience reported at 27 years and the minimum at 8 years. Participants with longer experience might be considered more reliable information sources. If a participant with more years of experience makes a certain decision or recommendation, others might cascade by basing their decisions on this if experience translates to correctness.

Education levels can be sources of information cascade if individuals with higher education levels are seen to have superior knowledge. Their decisions or recommendations might trigger an information cascade, where others assume that advanced degrees lead to better judgment. Education level diversity was observed, with 45.16% holding master's degrees, 38.71% having bachelor's degrees, and 16.13% possessing PhD degrees. Moreover, 61.29% of participants had international experience, while the remaining 38.71% did not. This finding contrasts the survey findings where participants with international experience were low. It could be that participants with international experience might be perceived as having exposure to

advanced practices, making them hold senior positions. Their decisions might lead to herding behaviour, as others follow what are seen as “globally accepted” strategies or actions.

The participant distribution between urban vs peri-urban vs rural settings could be linked to social career selection patterns that mimic infrastructure project planning and selection decisions synonymous with herding and information cascade behaviours. Participants from urban settings might be seen as more connected and knowledgeable, potentially leading to an information cascade from these participants to those in peri-urban or rural areas if one considers the context of participants’ engagement, which demonstrated a distribution of 58.06% in peri-urban areas, 25.81% in urban settings, and 16.13% in rural locations. This seems to resonate with the finding about discriminatory infrastructure planning favouring urban settings rather than rural ones, which creates socioeconomic inequality.

7.3.3. Objective 3: Assess how culture mediates and moderates the relationship between sovereign risk and the development of Kenyan renewable energy and transportation infrastructure projects

The vignettes elicited relationships between cultural constraints and managerial behaviour, underscoring the importance of understanding how cultural constraints influence discriminatory alignment to make informed decisions and navigate the complexity of infrastructure development. The vignettes on ambiguity tolerance suggest that fostering an environment embracing ambiguity can enhance collaborative infrastructure management and sovereign risk mitigation. The vignettes on power distance showed that power asymmetry between lenders, the government, local stakeholders, and external financiers were influenced by cultural norms, affecting infrastructure governance and regional development since Kenya enacted its devolved governance system (Otieno, 2023). The vignettes on individualism vs collectivism highlighted the role of stakeholders’ collective interests in shaping infrastructure outcomes mediated by the division of labour. In the masculinity vs femininity vignettes, the masculine culture’s emphasis on efficiency and achievement was balanced with other cultural constraints and effects on external loan negotiation. The uncertainty avoidance vignettes demonstrated that high uncertainty avoidance culture influenced local banks’ and practitioners’ risk management preferences and behaviours (Kamau, 2016). The long-term orientation vs short-term orientation vignettes showed that the focus on long-term sustainability and impact assessment was aligned with the country’s long-term orientation to modernise remote regions. However, stakeholder resistance persists (Harvey & Knox, 2012). Lastly, the indulgence vs restraint vignettes revealed the interplay between embracing innovative tools and maintaining transparency and governance practices in decision-making.

These cultural dimensions and demographic attributes can influence managerial herding, and information cascades in the Kenyan renewable energy, road, and rail infrastructure development context. The composition of the sample in terms of power dynamics, individualistic vs collectivist tendencies,

competitiveness, openness to uncertainty, orientation toward long-term goals, and indulgence vs restraint collectively influence how participants react to new information, adopt strategies, and contribute to decision-making processes, either by fostering herding behaviour or promoting diversity of perspectives.

- Power distance: male participants' dominance and policymakers' prevalence in the sample reflect a high power distance culture. This cultural attribute might contribute to a hierarchical decision-making process (Hofstede, 2013), where managers may be more inclined to follow the lead of higher-ranking individuals, potentially leading to herding behaviour. With their authoritative roles, policymakers could influence information cascades by setting the tone for decision-making and information dissemination.
- Individualism vs collectivism: the collectivist culture could lead to varying interpretations of information and divergent decision-making, inhibiting the formation of a unified information cascade (Harvey & Knox, 2012). Moreover, female participants and those with PhD degrees may introduce more collectivist tendencies, as observed among senior managers, promoting collaborative decision-making and information sharing.
- Masculinity vs femininity: the prevalence of male participants, especially among policymakers, shows a masculine culture valuing gendered assertiveness and achievement (Hofstede, 2013). This cultural dimension may contribute to a competitive environment, where individuals might engage in herding behaviour to align with perceived successful strategies. Focusing on efficiency and negotiation skills in the infrastructure sector also reinforces a masculine cultural trait of valuing practicality and effectiveness.
- Uncertainty avoidance: the distribution of experience levels across the sample indicates a range of familiarity with the infrastructure domain and novelty. The dominance of bachelor's and master's degrees with higher experience levels might reflect a low uncertainty avoidance culture, where participants are more comfortable with ambiguity and risk-taking. This cultural trait could mitigate the tendency toward herding, as individuals might be more open to exploring novel approaches and resisting conformity.
- Long-term orientation vs short-term orientation: the emphasis on sustainability and the long-term impacts of projects aligns with a long-term orientation culture (Hofstede, 2013). This could encourage participants to consider broader implications beyond immediate gains, potentially discouraging herding behaviour driven by short-term considerations. However, the contrasting viewpoints regarding international experience might reflect varying orientations, influencing how individuals prioritise long-term strategies.

- Indulgence vs restraint: the participants' diverse educational backgrounds and experiences suggest a mix of indulgence and restraint. Those with higher educational attainments lean toward restrained decision-making, valuing discipline and responsibility. This might counteract herding tendencies associated with indulgence, where participants might unquestioningly follow popular decisions.

7.4. Integration of the quantitative and qualitative research findings

The integration involves a comprehensive theoretical synthesis of quantitative and qualitative research findings within the context of large infrastructure development in Kenya. Seamlessly integrating the cultural-historical activity theory (CHAT) framework and Hofstede's cultural dimensions leads to an opening up of the intricate interplay of managerial socio-cognitive learning complexity, herding, information cascade, and sovereign risk. The CHAT framework offers a lens through which the multifaceted dimensions of human activity can be understood in their historical contexts. Simultaneously, Hofstede's cultural dimensions shed light on societal norms and values influencing behaviours and perceptions. The integration of these frameworks generates a comprehensive theoretical and empirical understanding of how cultural dimensions and demographic attributes collectively conceive managerial herding behaviour, information cascades, and sovereign risk to contribute to the scholarly pursuit of comprehending the intricate dynamics of sovereign risk premiums and large infrastructure project management within a cultural context. This approach significantly contributes to the depth of understanding regarding how managerial socio-cognitive learning complexities intertwine with cultural nuances, shaping critical outcomes in the dynamic domain of Kenyan infrastructure projects. The synthesis also underscores the importance of considering both dimensions to unravel the underlying mechanisms driving herding behaviour and information cascades, thereby enriching the scholarly discourse surrounding large-scale infrastructure development and sovereign risk management.

7.4.1. Theoretical elaboration of a dialectical relationship between sovereign risk and the large-scale infrastructure development system through culture-mediated managerial herding behaviours

These theoretical managerial socio-cognitive learning implications, rooted in quantitative and qualitative analyses to evaluate herding and information cascade, can enhance decision-making in Kenyan infrastructure projects, fostering resilience and cultural sensitivity in interpersonal information transmission modes and leading to informed sovereign risk and infrastructure lifecycle management. In pursuit of low risk in infrastructure management practices, managers interact with policy and peers to meet the desired socio-cognitive learning goals that could influence infrastructure outcomes. Engeström (2001) notes that tools, including culture, mediate workplace learning. Figure 7-1 summarises the cultural implication of managerial socio-cognitive learning.

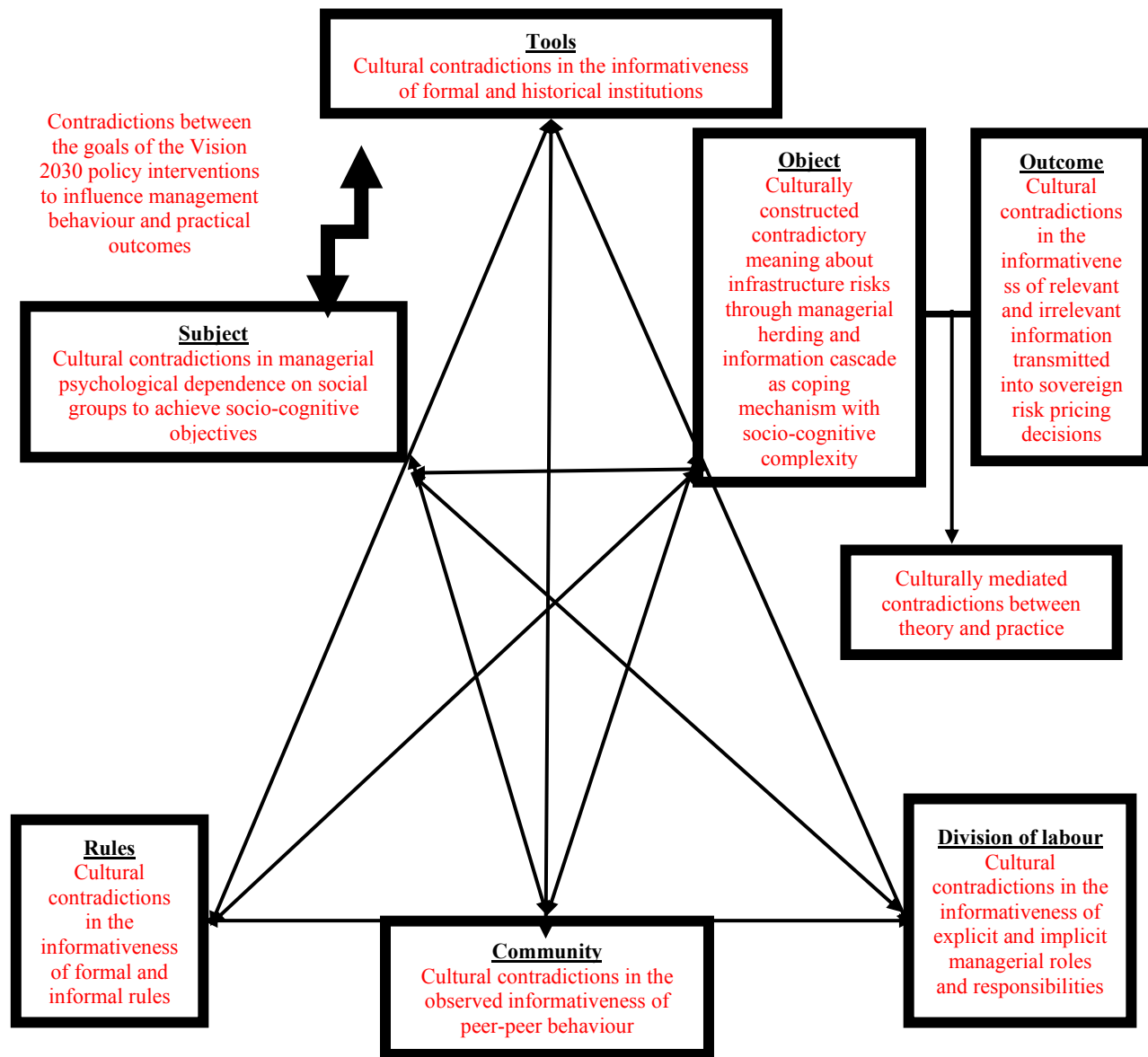


Figure 7-1: Cultural implication of managerial socio-cognitive learning motives

Figure 7-1 illustrates how internal tensions and contradictions emerge and evolve within and between the three components (subject, object, and community) and their mediators (tools, rules, and division of labour). These contradictions provide a powerful theoretical mechanism for describing the complex transitions and transformations in multicultural group learning environments moderating the embeddedness of herding behaviour, information cascades, and sovereign risk spillover susceptibility, as discussed in Table 7-1.

Table 7-1: Summary of the theoretical elaboration of a dialectical relationship between sovereign risk and the infrastructure development activity

LEVEL	SOCIO-COGNITIVE LEARNING CONTRADICTION	HERDING/INFORMATION CASCADE INTENSIFIERS
SUBJECT	PSYCHOLOGICAL DEPENDENCE ON SOCIAL GROUPS	SOCIO-COGNITIVE LEARNING MECHANISM
PDI	Individual expertise vs collective decision-making Individuals may have specialised knowledge and expertise in specific areas. However, decision-making should involve collective input and consensus.	Suppose individual expertise is overemphasised and decision-making becomes centralised around a few experts or powerful political leaders. In that case, herding can emerge due to social proof as individuals conform to the decisions and recommendations of the experts, potentially suppressing the diversity of perspectives and innovative ideas about sovereign risk in the infrastructure management context.
AT/UAI	Risk aversion vs innovation There is a need to balance risk aversion and explore the potential for innovative infrastructure lifecycle management solutions to improve sovereign risk outcomes.	If risk aversion dominates the decision-making process, herding can emerge due to a historical information cascade as individuals conform to those conservative approaches and avoid taking risks, potentially stifling creativity and innovative thinking in sovereign and infrastructure risk mitigation strategies.
LTO	Short-term goals vs long-term sustainability Infrastructure projects often have immediate objectives, but sustainable risk mitigation requires considering long-term implications.	Suppose short-term goals are prioritised at the expense of long-term sustainability. In that case, herding can emerge if the incentive structure orientates managers towards meeting short-term performance benchmarks as individuals conform to the immediate project objectives, potentially neglecting the long-term impacts of risk mitigation and sustainability.
PDI/IDV/MAS/UAI/IVR	Homogeneity vs diversity of perspectives Cross-border infrastructure development projects involve individuals from diverse backgrounds, and incorporating diverse perspectives is crucial for effective risk mitigation.	If homogeneity of perspectives prevails, herding can emerge if the desire for social proof leads individuals to conform to the dominant or majority viewpoint, potentially excluding alternative perspectives and innovative approaches to risk mitigation.
RULES	FORMAL AND INFORMAL RULES	SOCIO-COGNITIVE LEARNING COPING MECHANISM
IDV	Formal rules vs informal norms Formal and informal norms and practices shape learning and behaviour in infrastructure project finance and management	If informal norms and practices are disregarded or not aligned with formal rules, herding motivated by in-group social cohesion can emerge as individuals who feel like minorities conform to informal norms that may contradict the prescribed policy rules.

	because their public nature often relies on formal policy rules and procedures.	
AT/UAI	Stability vs adaptability There is a need to balance stability and continuity in socio-cognitive learning to foster adaptability to changing circumstances and emerging risks in the infrastructure lifecycle and sovereign risk dynamics.	Herding can emerge to achieve established risk and reward benchmarks as individuals conform to the status quo and resist necessary adaptations if there is a strong focus on maintaining stability and adhering strictly to established rules, particularly under political regime influence.
ALL	Cultural embeddedness vs universal standards The cultural contexts may influence socio-cognitive learning and behaviour in infrastructure project finance and management because they often operate within universal management standards and best practices.	Suppose cultural contexts and values are not adequately considered or are overshadowed by universal debt and infrastructure project management standards or covenants. In that case, herding can emerge as individuals conform to external expectations without addressing cultural nuances.
PDI	Authority vs collaboration Authority and structures influence socio-cognitive learning because governments initiate most infrastructure projects, which requires balancing collaboration and participatory decision-making.	Suppose authority is overly emphasised and collaboration is not encouraged. In that case, herding can emerge as individuals conform to the directives of authority figures without meaningful engagement or collective decision-making in order to protect their careers.
COMMUNITY	INFORMATIVENESS OF PEER-PEER BEHAVIOUR	
PDI/IDV	Local knowledge vs expert knowledge Managers must recognise the value of local knowledge and expertise developed within the infrastructure project finance and management community since projects often involve the input of external experts.	Suppose local knowledge and expertise are disregarded or overshadowed by expert knowledge. Herding can emerge as individuals conform to external expertise, which they perceive as superior knowledge, without incorporating valuable insights from the local community.
LTO/IVR	Traditional practices vs modernisation Traditional practices within a community are important in infrastructure projects because new technologies and participants often introduce modern approaches that may conflict with or replace traditional practices.	Suppose traditional practices and knowledge are disregarded or devalued in favour of modernisation. Herding can emerge due to social proof as individuals conform to dominant infrastructure modernisation rhetoric or practices, neglecting the valuable traditional knowledge.

IDV	Community priorities vs project objectives Community priorities and needs in infrastructure project finance and management can be affected if decisions are driven solely by project performance objectives, which may not always align with community priorities.	Suppose community priorities are not adequately considered or addressed. In that case, herding can emerge as individuals conform to the project objectives as primary performance benchmark evaluation frameworks without addressing the community's specific needs.
IDV/MAS/UAI	Trust and social cohesion Trust and social cohesion within a community are important for effective learning and cooperation since infrastructure projects can disrupt existing social dynamics and trust relationships.	Suppose there is a breakdown in trust or social cohesion due to perceived unfairness, lack of transparency, or inadequate community engagement. In that case, herding can emerge as individuals conform to the opinions or actions of others in their in-groups out of distrust or dissatisfaction.
DIVISION OF LABOUR	EXPLICIT AND IMPLICIT DIVISION OF LABOUR	
IDV/IVR	Specialisation vs holistic understanding Infrastructure project management often requires individuals to focus on specific roles and tasks. However, they must recognise the importance of specialisation and holistic understanding in acquiring expertise.	If specialisation is prioritised over holistic understanding, herding can emerge as individuals conform to their specific roles and responsibilities without considering the broader context or implications of their actions on cross-border and cross-functional knowledge.
PDI	Hierarchical structures vs collaborative decision-making Collaborative and socially distributed decision-making processes can improve infrastructure project finance and management, often involving hierarchical structures and authority.	If hierarchical structures dominate decision-making processes and collaboration is limited, herding can emerge as individuals conform to the decisions or directives of higher-ranking individuals without meaningful participation or input.
IDV/IVR	Task specialisation vs cross-functional knowledge Infrastructure technological complexity emphasises the importance of cross-functional knowledge and the ability to understand and collaborate across different areas of expertise because project finance and management often involve highly specialised roles and tasks.	Suppose individuals become too narrowly focused on their specialised tasks and lack a broader understanding of the project's multidisciplinary aspects. In that case, herding can emerge from historical managerial information cascades as individuals conform to their limited expertise without considering the implications for other project components.
IDV	Division of labour vs shared responsibility The need for large-sized debt and specialised technologies highlights the importance of shared responsibility and collective	Suppose the division of labour leads to a fragmented sense of responsibility, and individuals focus only on their assigned tasks without a shared sense of

	ownership in socio-cognitive learning in infrastructure projects, which often involve the division of labour and assigning specific responsibilities to individuals or teams.	ownership. In that case, herding can emerge as individualists conform to their responsibilities without considering the collective outcome.
MEDIATION	INTERACTION WITH FORMAL AND INFORMAL TOOLS	
PDI/IDV	Technology as an enabler vs technology as a constraint Policy tools and ICT mediate in socio-cognitive learning in the infrastructure project development context as affordances that enhance collaborative infrastructure project finance and management.	Suppose policy tools and ICT are perceived as constraints rather than enablers. In that case, herding can emerge as individuals conform to the limitations and requirements imposed by the tools without critically assessing their potential or adapting them to the project's specific needs.
ALL	Standardisation vs contextual adaptation Context mediates socio-cognitive learning behaviour in infrastructure lifecycle management as an affordance that often involves uncertainty when interacting with standardisation and predefined tools and templates.	If standardisation is prioritised over contextual adaptation, herding and information cascade can emerge as individuals conform to the standardised tools and processes without considering the unique contextual factors that may require adaptation or customisation.
ALL	Tool accessibility and equity Equitable access to tools and resources fosters effective learning as an affordance to mitigate resource constraints. Infrastructure projects may involve disparities in resource accessibility among project participants.	Suppose there is unequal access and distribution of decision-making support tools and resources. In that case, herding can emerge as individuals conform to the available tools and resources, potentially disadvantaging those with limited access.
AT/UAI	User-friendly decision-making tools vs complexity Managers need user-friendly decision-making tools and interfaces for effective learning and utilisation because infrastructure project management may involve complex collaborative tools and systems.	Suppose decision-making tools and systems are overly complex or difficult to use. Herding can emerge as individuals conform to limited functionalities or rely on others for guidance (peer-to-peer learning), avoiding independent exploration or critical engagement.
PDI/IDV	Centralised decision-making vs participatory decision-making Centralised and participatory decision-making in government and institutional structures can create tension because some policies and institutions may prioritise top-down decision-	If centralised decision-making dominates the governance structure, herding and information cascading can emerge as individuals conform to the directives of central authorities, potentially limiting the inclusion of diverse perspectives and innovative solutions in risk mitigation efforts.

	making. In contrast, others may advocate for participation and stakeholder involvement.	
PDI	Bureaucratic processes vs agile and flexible approaches Tensions emerge between bureaucratic processes and agile, flexible approaches in government policies and institutional frameworks. Bureaucratic processes may prioritise procedural adherence and formalities, while infrastructure lifecycle and sovereign risk mitigation require adaptive and responsive strategies.	Suppose bureaucratic processes are inflexible and impede timely decision-making and innovation. In that case, herding and information cascade can emerge as individuals conform to rigid protocols and avoid deviating from established procedures, potentially hindering effective infrastructure and sovereign risk mitigation efforts.
PDI/IDV	Fragmentation of responsibility vs collaborative governance The tension between the fragmentation of responsibility and collaborative governance in government policies and institutional structures shapes socio-cognitive learning. Infrastructure projects often involve multiple cross-border stakeholders with distinct responsibilities, leading to fragmented decision-making and coordination.	Suppose responsibilities are fragmented and collaboration is lacking. In that case, herding can emerge as individuals prioritise their narrow interests and responsibilities, potentially neglecting the broader risk mitigation objectives of the project. It can lead to suboptimal coordination and a lack of integrated risk management strategies.
AT	Lack of capacity and resources vs effective implementation The tension between the lack of capacity and resources and the need to implement government policies and institutional frameworks shapes infrastructure policy legitimisation and implementation effectiveness. Insufficient capacity and resources can hinder the implementation of risk mitigation strategies.	Suppose the lack of capacity and resources is not adequately addressed. In that case, herding can emerge as individuals focus on self-preservation and resource allocation, potentially overlooking the effective implementation of risk mitigation measures. It can undermine the effectiveness of risk mitigation efforts in infrastructure lifecycles across time and economic states.
OUTCOME	HERDING AND SOVEREIGN RISK INFORMATION	
LTO	Short-term vs long-term perspectives CHAT recognises the importance of considering short-term and long-term outcomes in decision-making in infrastructure projects because they often have long-term implications for sovereign risk.	If short-term perspectives dominate decision-making processes, herding can emerge as individuals conform to immediate priorities inadequately evaluating long-term infrastructure management costs and benefits, potentially exacerbating sovereign risk.

UAI/LTO/IDV	Economic growth vs environmental and social sustainability Balancing economic growth with environmental and social sustainability is important in infrastructure project lifecycle management to mitigate potential risks that can impact the environment and communities.	Suppose economic growth is prioritised at the expense of environmental and social considerations. In that case, herding due to risk and reward incentive structure can emerge as individuals conform to decisions prioritising short-term economic gains, potentially exacerbating environmental degradation and social inequality.
PDI	Centralisation vs local empowerment Empowering local communities and stakeholders and involving them in infrastructure decision-making is important.	Suppose decision-making power is concentrated in central authorities without empowering local communities. In that case, herding can emerge as individuals conform to decisions imposed from above without meaningful participation or local input, potentially exacerbating social tensions and resistance.
PDI/IDV	Stakeholder engagement vs power differentials The importance of inclusive stakeholder engagement and recognising power differentials among stakeholders requires adaptive socio-cognitive learning strategies. Infrastructure projects involve various stakeholders with different levels of influence and interests.	Suppose power differentials are not adequately acknowledged and addressed. In that case, herding can emerge as individuals conform to the decisions and interests of powerful stakeholders, potentially marginalising the voices and concerns of less influential stakeholders and exacerbating conflicts and risks.
EXTERNALISATION/ INTERNALISATION	INTERACTIONS WITH THE CONTEXT	
IDV/IVR	Individual knowledge acquisition vs collective knowledge construction The cross-border and cross-cultural nature of managerial socio-cognitive learning in infrastructure contexts requires recognising the value of individual knowledge acquisition and collective knowledge construction. Infrastructure projects require individuals to acquire and internalise knowledge while contributing to collective learning.	Suppose individual knowledge acquisition is prioritised over collective knowledge construction. In that case, herding driven by performance goals can emerge as individuals conform to their perspectives and resist integrating diverse knowledge and experiences from other team members, potentially hindering innovation and effective risk mitigation.
PDI/AT/UAI	Tacit knowledge vs explicit knowledge The cultural-historical theory recognises the significance of tacit knowledge (personal, experiential) and explicit knowledge	Suppose the focus is predominantly on explicit knowledge transfer and documentation. In that case, herding can emerge as individuals conform to prescribed procedures and best practices without tapping into the tacit

	(codified, documented) in socio-cognitive learning in infrastructure projects because they involve the transfer and internalisation of both types of knowledge.	knowledge held by team members, potentially limiting innovation and adaptation.
PDI/IDV/IVR	Internalisation vs externalisation of learning objectives The importance of internalisation (individual learning) and externalisation (socialisation and external representation of knowledge) in learning is central to understanding human activity based on the cultural-historical theory in infrastructure projects, which typically involve individual learning and knowledge externalisation for wider dissemination.	If internalisation is prioritised over externalisation, herding can emerge as individuals conform to their learning processes without actively contributing to the externalisation and sharing knowledge, potentially limiting organisational learning and inhibiting collective risk mitigation efforts.
IDV	Individual competence vs collective competence In infrastructure projects, individual competence, expertise, collective competence, and collaborative problem-solving are important socio-cognitive learning determinants. Collaborative decision-making involves a combination of individual and collective efforts.	Suppose individual competence is prioritised over collective competence. In that case, herding can emerge as individuals conform to their expertise and resist collaborative problem-solving or integration of diverse perspectives, potentially limiting the effectiveness of risk mitigation strategies.
OBJECT	MANAGERIAL HERDING OBJECTIVES	
IDV	Project goals vs stakeholder priorities The existence of different priorities and interests among stakeholders involved in infrastructure projects requires project goals to constantly be aligned with the expectations and priorities of various stakeholders.	Suppose project goals are narrowly defined without considering stakeholders' diverse perspectives and priorities. In that case, herding can emerge as individuals conform to the predefined goals, potentially neglecting important stakeholder concerns and increasing the risk of conflicts and resistance.
AT/UAI/LTO	Risk mitigation vs cost and time constraints Managers must learn to balance risk mitigation efforts with cost and time constraints in evolving sovereign and infrastructure project lifecycles. Risk mitigation measures may require additional resources and time.	Suppose cost and time constraints are prioritised over thorough risk mitigation. In that case, herding can emerge as individuals conform to expedited decision-making or cost-cutting measures, potentially compromising the effectiveness of risk mitigation strategies and increasing the likelihood of negative outcomes.
AT/UAI/IVR	Innovation and adaptation vs established practices:	Suppose adherence to established practices takes precedence over innovation and adaptation. In that case, herding can emerge as individuals conform to

	Infrastructure projects may require both innovation and adherence to established standards to address the tension between innovation and adaptation on the one hand and adherence to established practices and procedures on the other.	existing norms and resist exploring new approaches, potentially limiting the effectiveness of risk mitigation strategies and stifling innovation.
IDV	Local context vs global standards: The tension between local context and global standards in the infrastructure project lifecycle requires global governance and management standards to be contextualised to suit local conditions.	Suppose global standards are rigidly applied without considering the local context. In that case, herding can emerge as individuals conform to the prescribed standards, potentially neglecting important local factors and increasing the risk of project failure or negative outcomes.
HISTORICITY	SOFT INFRASTRUCTURE DEVELOPMENT	
LTO	Historical practices vs current needs: Information cascades can create tension between historical practices and current needs in infrastructure projects. Historical practices may be deeply ingrained in the culture and may not align with the current risk mitigation requirements.	Suppose historical practices are unquestioningly followed without considering their effectiveness in mitigating sovereign risk. In that case, herding can emerge as individuals conform to the established ways of doing things, potentially overlooking more effective strategies and innovations.
IDV	Cultural norms vs risk mitigation measures: Cultural norms and values sometimes conflict with sovereign and infrastructure risk mitigation measures. Cultural norms may prioritise other community aspects over formal risk management.	Suppose cultural norms and values are given more weight than risk mitigation measures. In that case, herding can emerge from in-group information cascades as individuals conform to cultural expectations, potentially neglecting or downplaying risk management practices.
PDI	Power dynamics and hierarchies: While CHAT recognises the importance of context, Hofstede's cultural framework recognises the presence of power dynamics and hierarchies in social network systems within those contexts. Power differentials can influence decision-making and knowledge sharing.	Suppose power dynamics and hierarchies reinforce top-down decision-making and discourage open dialogue and knowledge sharing. In that case, herding can emerge as individuals conform to the directives of those in power, potentially stifling critical thinking and innovation.
LTO/IDV	Cultural diversity and communication development challenges: CHAT and Hofstede's cultural frameworks recognise the challenges that can arise from cultural diversity and	Suppose cultural diversity is not adequately addressed, and communication challenges are not effectively managed. In that case, herding can emerge as

	communication differences. Cultural diversity can lead to misunderstandings and communication barriers.	individuals stick to their cultural or linguistic groups, potentially limiting effective collaboration and knowledge sharing.
ZONE OF PROXIMAL DEVELOPMENT (ZPD)	EXPANSIVE LEARNING AND DEVELOPMENT	
IDV	Individual learning vs collaborative learning CHAT recognises the importance of individual and collaborative learning within the ZPD in infrastructure projects because they involve individuals with varying knowledge and skills, requiring a balance between individual development and collaborative problem-solving.	Suppose individual learning is prioritised over collaborative learning. In that case, herding can emerge as individuals conform to their learning processes and resist collaboration, potentially limiting the project team's collective knowledge construction and risk mitigation efforts.
IDV/UAI/AT	Expertise vs novice perspectives The diversity of expertise and perspectives determine the ZPD in infrastructure projects involving a mix of experienced professionals and novices who are learning and developing their skills.	If expertise is valued over novice perspectives, herding can emerge as individuals conform to the opinions and approaches of experienced professionals, potentially marginalising the input and development of novices. It can limit innovation, hinder the identification of emerging risks, and impede the overall effectiveness of risk mitigation efforts.
AT/UAI/IDV	Structured learning vs informal learning Structured and informal learning within the ZPD in cross-border and cross-cultural infrastructure project development contexts involves formal training programmes and informal learning through on-the-job experiences and interactions.	Suppose structured learning is emphasised at the expense of informal learning. In that case, herding can emerge as individuals conform to formal training programmes and neglect the rich learning opportunities provided by informal interactions and experiences. It can limit the depth of learning, hinder the transfer of tacit knowledge, and limit the adaptability of the project team.
IDV	Individual vs collective development The CHAT framework emphasises the interconnectedness of individual and collective development, suggesting that infrastructure project finance and management require individuals to develop their skills while contributing to the collective goals of the project.	If individual development is prioritised over collective development, herding can emerge as individuals focus solely on their own advancement and resist collective problem-solving and knowledge sharing. It can hinder the project team's collective learning and risk mitigation capacity.

7.5. Chapter summary

This chapter provided an in-depth theoretical elaboration of the research objectives that guided the study. It has explained how managerial experiences influence the relationship between sovereign risk and infrastructure development activity. The discussion has yielded theoretical propositions based on the CHAT framework with Hofstede's cultural framework and the affordance theory as mid-range theoretical filters. The propositions in Table 7-1 underscore the need for the proposed human-centred infrastructure design and implementation framework described in Chapter Eight.

Chapter Eight: Proposed Human-Centred infrastructure Design and Implementation Framework

8.1. Introduction

This chapter discusses how the research achieves its fourth objective. It illustrates that human-centred infrastructure design and implementation transcends the dichotomy of analysing managerial practices into three levels, including micro (actor), meso (organisational routines) and macro (institutional). It reconciles the past and future as inseparable and simultaneously evolving human capital development phenomena in the relationship between sovereign risk and the infrastructure development system.

8.2. Framework development

The framework was developed based on the seminal work of Norman (1988), a cognitive scientist and usability engineer, about human-centred design. The study focuses on managers as the main end-users of the Kenyan infrastructure development policy. It asserts that policy design and implementation tools should prioritise these end-user needs, abilities, and limitations by leveraging four steps to understand managerial experiences: observation, ideation, prototyping and testing. (i) Observing all managers was not feasible. Therefore, the researcher reviewed the literature linking sovereign risk to infrastructure development as iterative feedback loops for developing a conceptual framework of human activity. Since affordances are measured relative to the perceiver, a semi-structured questionnaire and in-depth interviewing were used to gather the affordances of the infrastructure development environment relative to managerial behaviour, preferences, and perceptions of challenges within the Kenyan infrastructure development activity system (ii) integrating formal processes confining managers to well-defined roles and responsibilities with cultural constraints into ideation captured the social practice of exchanging information in collaborative decision-making settings (iii) developing a prototype of formal and cultural constraints unifying individual agency, social interaction, and institutional structures enabled the basic unit of analysis to be the infrastructure development activity, (iv) testing the moderating role of cultural constraints in the relationship between sovereign risk premium and the infrastructure development activity elaborated on the factors constraining managerial interactions in their context to herding. These principles ground the proposed framework in empirical evidence and inform the KPIs for transformative human-centred development for continual monitoring and evaluation of project managerial practices.

Figure 8-1 illustrates the infrastructure development activity triangle. As discussed in Chapter 3, the activity elements do not reveal what the infrastructure development environment affords a manager. Hence, the study used the affordances concept to reflect the possible relationships among managers and the object (infrastructure development) as properties of the infrastructure development world. Mitigating debt-side governance, project management, and macroeconomic risk are formal processes confining managerial behaviour to well-defined roles and responsibilities. It integrates culture into the system as a constraint prohibiting some activities and encouraging others. These features elicit culture

as a valuable aid that managers utilise to navigate the unknowns and complexities of everyday life. Cultural values are powerful antecedents of managerial socio-cognitive learning motives denoting a shared conceptual model, appropriate feedback loops, and conventions within an ecological niche that can generate personal reputational risks when managers violate them. While managers know these facts, they lack a theory of affordances to encompass formal processes and cultural values in a system unifying individual agency, social interaction, and institutional structures.

Moreover, tensions and contradictions can emerge within and between the three components (subject, object, community) and their mediators (tools, rules, division of labour). Each triangle in Figure 8-1 denotes mediated interactions between the concepts at each connection. Bidirectional arrows depict dialectical interactions between managers and their environment. The numbers show potential sources of contradictions denoting problems, ruptures, breakdowns, and clashes within the activity system. Activity theory sees contradictions as transformative development sources that can be leveraged to improve the governance and performance of infrastructure projects. As a result, the subjects in this study are managers as deeply embedded decision-makers in the infrastructure development activity.

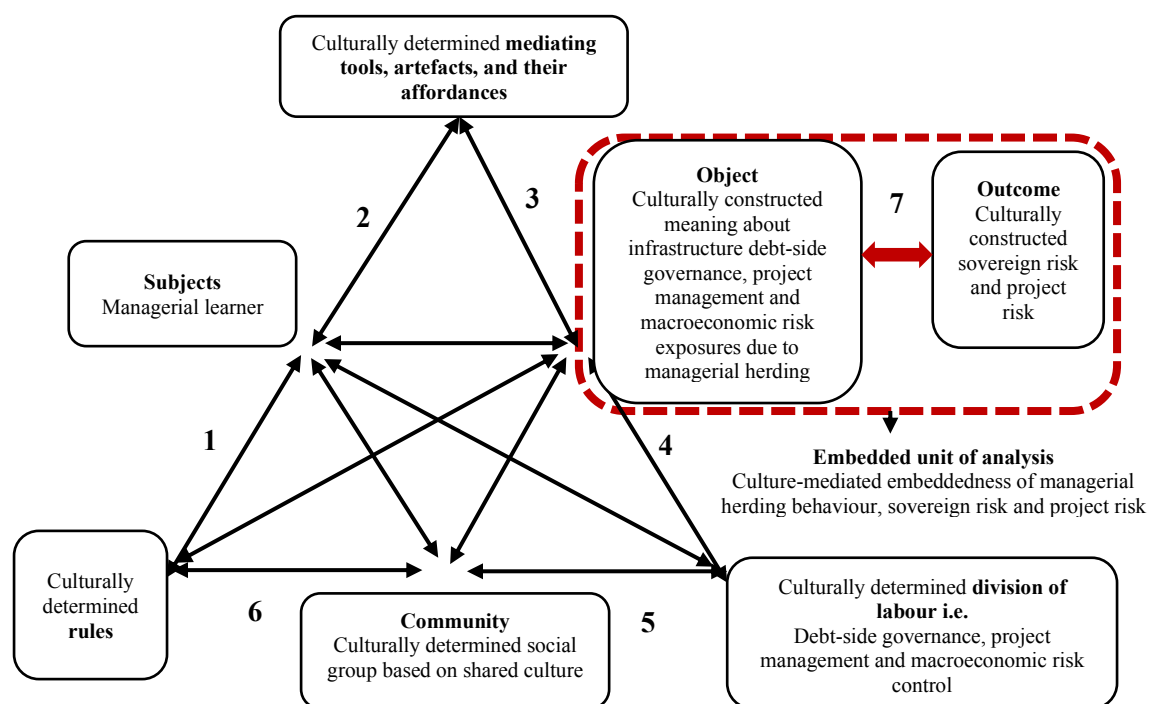


Figure 8-1: Framework for culture-mediated socio-cognitive influence on the relationship between sovereign risk and infrastructure development through managerial herding

Herding implies that managers reproduce project management approaches and procedures. However, its antecedents and consequences are unknown. The concept that cultural constraints are conventions shared by a cultural group exemplifies culture as an antecedent of herding whose consequences entail constraining managerial socio-cognitive learning motive to reproduce old practices from predecessors

or imitate peers. At the micro-level, individual managers may hold different beliefs and values shaped by their cultural backgrounds, leading to divergent perspectives on project goals and priorities. At the meso-level, human-centred data can be used by senior infrastructure managers and leaders for quality improvement and monitoring key performance indicators. The macro-level captures the overall multicultural infrastructure development activity. Government leaders and decision-makers can use human-centred data to inform infrastructure policy design regarding the spatial distribution of infrastructure projects and offer a conducive regulatory environment for public-private partnerships. It is worth noting that the levels are interrelated, where the macro-level informs and is informed by cultural influences at the meso- and micro-levels. The meso-level informs and is informed by cultural influences at the micro-level. Figure 8-2 displays the concurrent interdependent relationships.

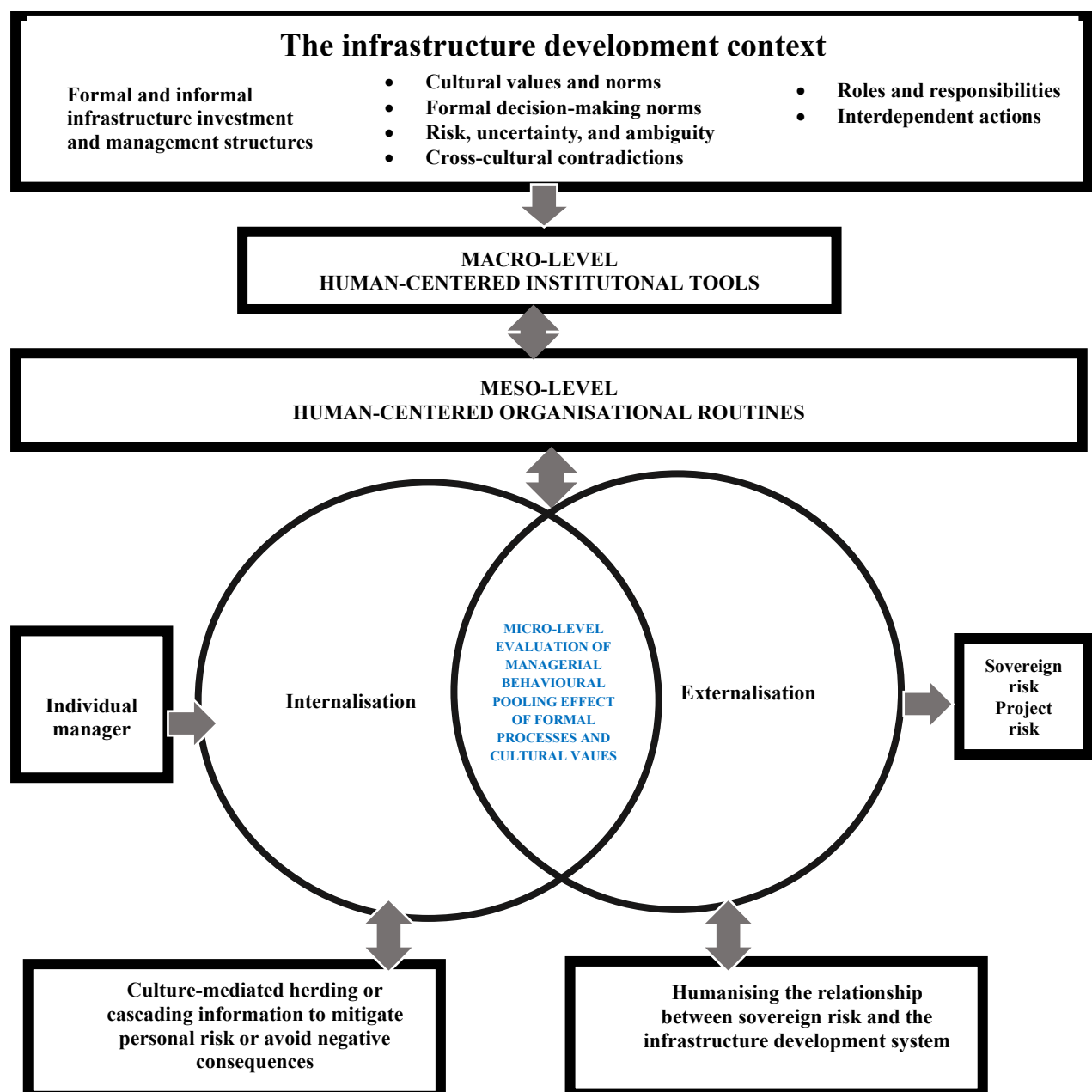


Figure 8-2: Human-centred interactions between micro, meso and macro level risk outcomes

Figure 8-3 summarises significant variables from the quantitative analysis of the relationship between infrastructure development, sovereign risk and project risk as per the conceptual framework (*Node 7*)

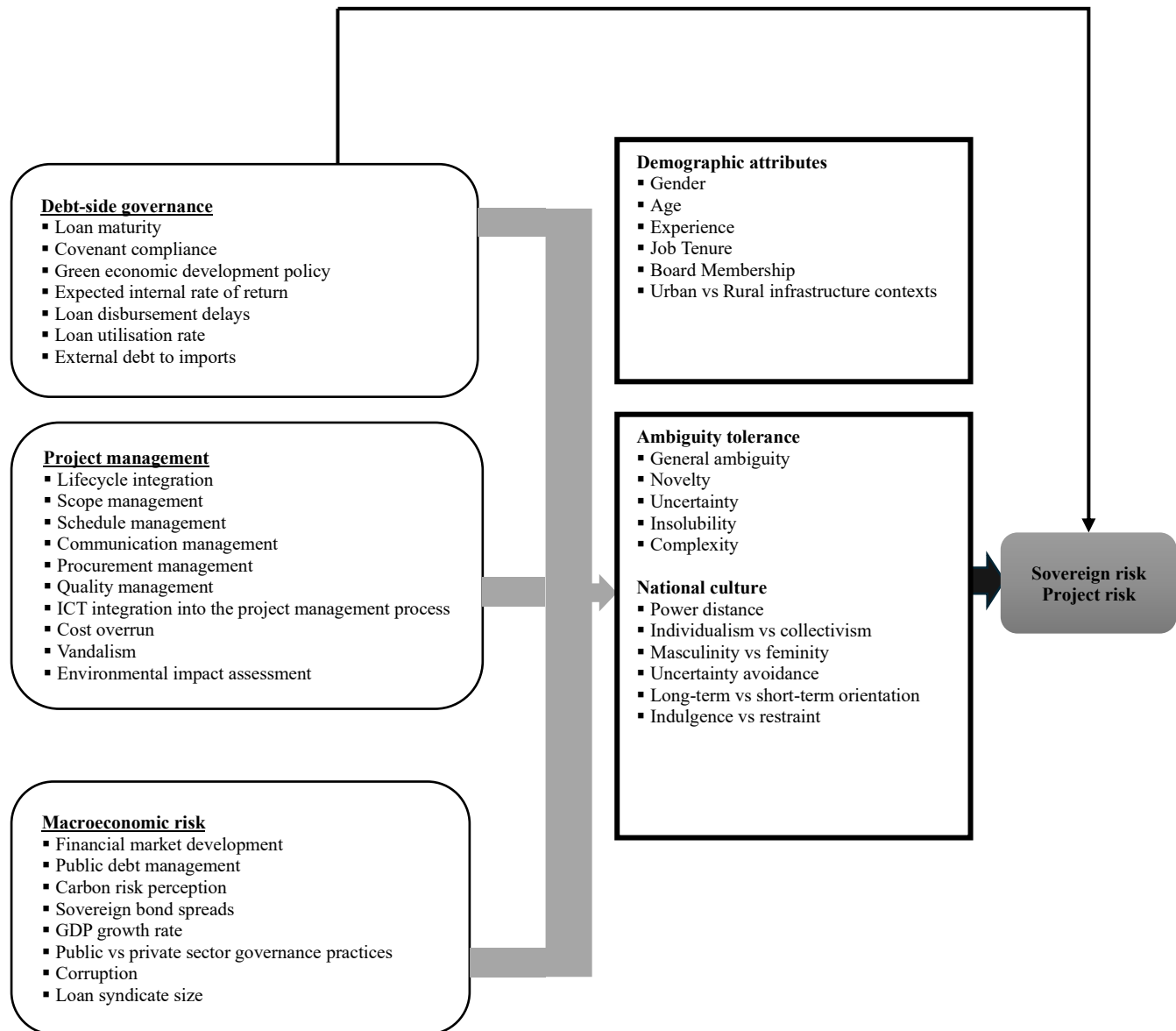


Figure 8-3: Variables for the formal processes and cultural dimensions influencing the relationship between sovereign risk and the infrastructure development system

In line with its explanatory sequential mixed method, the study recast the quantitative findings into a qualitative analytic phase of the conceptual framework (Node 1-6) to elicit managerial interactions with their infrastructure development environment as social practice. Figure 8-4 summarises the main dimensions of managerial socio-cognitive learning constraints that emerged from the coding structure. They demonstrate that the managerial capacity to embrace cultural constraints is an essential soft

competency for transformative human capital development. It can complement the government in identifying what to change and how to support managers to mitigate emerging infrastructure risks.

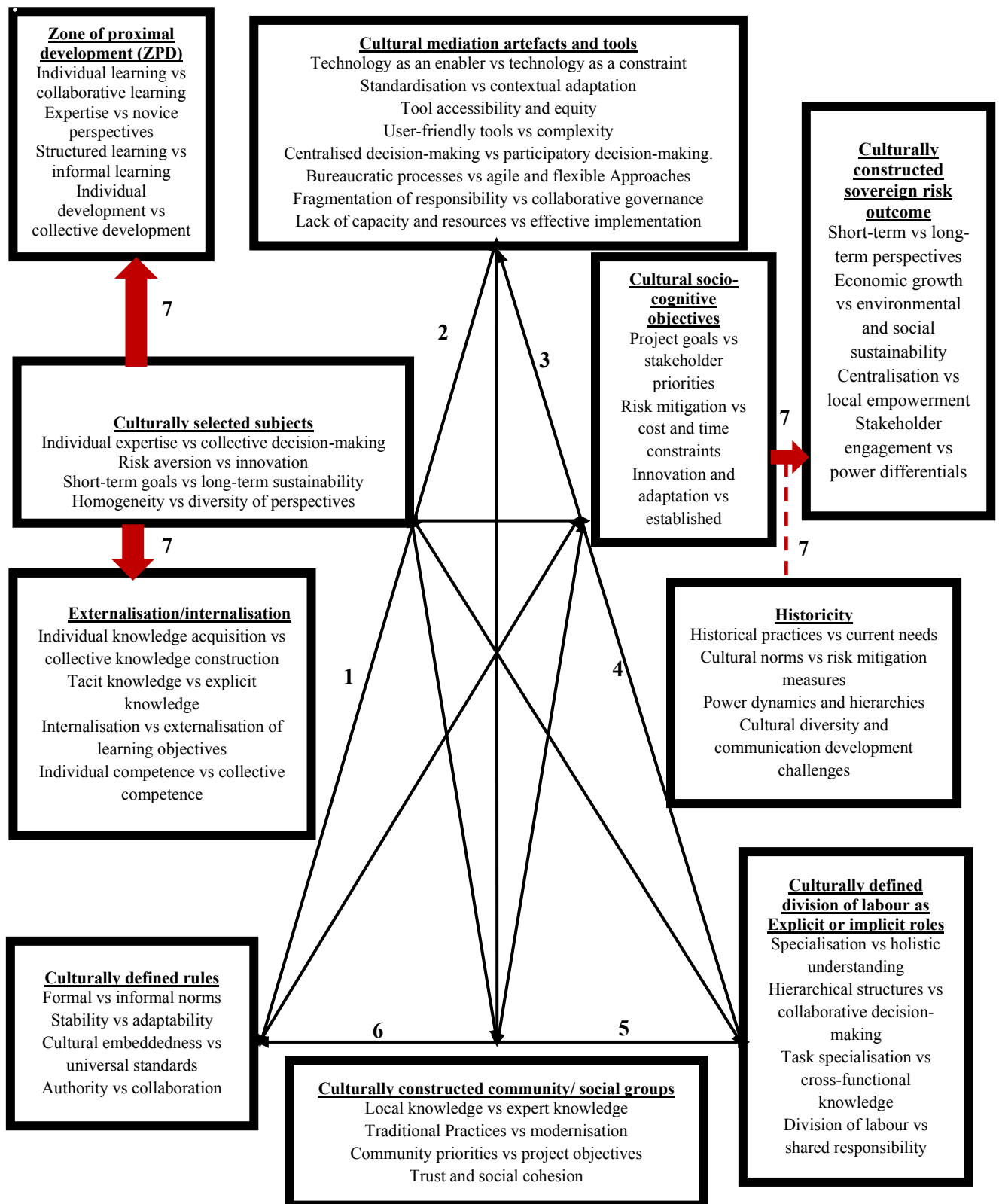


Figure 8-4: Dimensions of managerial socio-cognitive learning constraints influencing the relationship between sovereign risk and the infrastructure development system

The study proposes a human-centred infrastructure design and implementation framework integrating the variables from the quantitative and qualitative analysis. The proposed framework aims to.

- Provide a managerial practice-based framework for analysing social network interactions in the relationship between sovereign risk and infrastructure development activity.
- Identify the perceived affordances and cultural constraints among managers that significantly pool managerial behaviour within the infrastructure development context.
- Identify the emerging defensive socio-cognitive learning dimensions of managers from the behavioural pooling effect of the infrastructure development context.
- Recommend human-centred interventions to dislodge their defensive socio-cognitive learning for collaborative governance and performance of managers in infrastructure projects.
- Propose KPIs of transformative human-centred development and sovereign risk outcomes for evaluating collaborative learning among managers in the infrastructure development system.

The following steps illustrate how the human-centred design principles in Section 8.2 were employed. Developing a managerial practice-based framework for analysing social network interactions in the relationship between sovereign risk and infrastructure development was guided by the first principle of understanding problems from a managerial perspective in two ways. Theoretical application entailed building a functional framework unifying individual agency, social interaction, and institutions as a basic unit of analysing how managerial activities influence the relationship between sovereign risk and the infrastructure development system. The study adopted the activity framework as a practised-based theoretical lens illustrating the social network layout of the infrastructure development activity. However, this framework does not reveal what the elements in the social network afford a manager action possibilities. The study used the perceived affordances concept to elicit the possible actions the infrastructure development environment affords a manager based on sixteen (16) hypotheses.

Identifying the perceived affordances and cultural constraints among managers that significantly pool managerial behaviour within the infrastructure development context was based on a semi-structured survey questionnaire and in-depth interviews. These human-centred data collection tools gathered the perceived affordances among managers to address the proposed framework's second aim. Moreover, integrating cultural psychology constructs into the activity framework addressed the second principle of integrating sociocultural considerations into ideation to capture the social dimension of the problem context or the behavioural constraints that managers experience. Hofstede's six national culture dimensions and Burdner's ambiguity intolerance scale were adopted to identify cultural constraints in the Kenyan infrastructure development context.

The identification of defensive socio-cognitive learning dimensions of managers from the behavioural pooling effect of the infrastructure development context addressed the third human-centred design

principle of prototyping. The behavioural pooling prototype included formal and cultural variables to unify individual agency, social interaction, and institutional structures. Integrating formal and cultural variables informed the pragmatic research philosophy to combine different approaches in identifying managerial herding motives through the activity as the basic unit of analysis. The prototype captures the feedback loops between the formal factors' behavioural pooling effect and culture's behavioural pooling effect as constraining managerial capacity to generate new knowledge. The inclination to preserve deep-seated practices instead of challenging them limits exploring or exploiting innovative infrastructure development practices in Kenya. Since different cultural dimensions may interact, the study avoids rigidly associating learning dimensions with specific values to allow for contextual adaptability of the framework in different organisations. Besides, the behavioural pooling effect of culture is unobservable. Hence, herding reflects the observable behavioural pattern.

The fourth design principle of testing the mediating and moderating influence of cultural values in the relationship between sovereign risk and infrastructure development led the study to utilise quantitative and qualitative research methods. It entailed recasting the quantitative research findings in Table 8.3 into a qualitative research method to elaborate on how culture constrains managerial interactions with their context to herding behaviour. Thematic analysis of participant responses elicited 31 dimensions of culture-mediated socio-cognitive learning. According to Festinger (1954), this type of interaction is an inclination to appraise one's abilities and opinions by conforming to social patterns.

The study used the recommendations in the existing literature to propose human-centred interventions to dislodge defensive socio-cognitive learning among managers for collaborative governance and the performance of managers in infrastructure projects. Various studies have recommended collaborative learning approaches without leveraging herding as the potential obstacle. However, they instigate herding without identifying its dimensions. The evidence from the integrated findings prompted the study to propose human-centred interventions to dislodge herding motives. The proposed tools leverage internal organisational tools and structures for decision-making to demonstrate how managers can take advantage of the fact that different managers tend to have imperfectly correlated judgement errors to facilitate collaborative decision-making processes, gather a wide range of information and mitigate false conclusions generated from herding motives. Finally, proposing KPIs of transformative human-centred development and sovereign risk outcomes was relevant for evaluating collaborative learning among managers in the infrastructure development system as simultaneously evolving phenomena in line with the concept of human-centred design. It acknowledges infrastructure design and implementation as an evolving activity. Consequently, the framework includes monitoring and evaluation as the fifth element. This step elicited 16 KPIs grouped into indicators of transformative human-centred development, project-level and sovereign risk outcomes. These KPIs complement the people-centred governance objective in Kenya's Vision 2030 development blueprint.

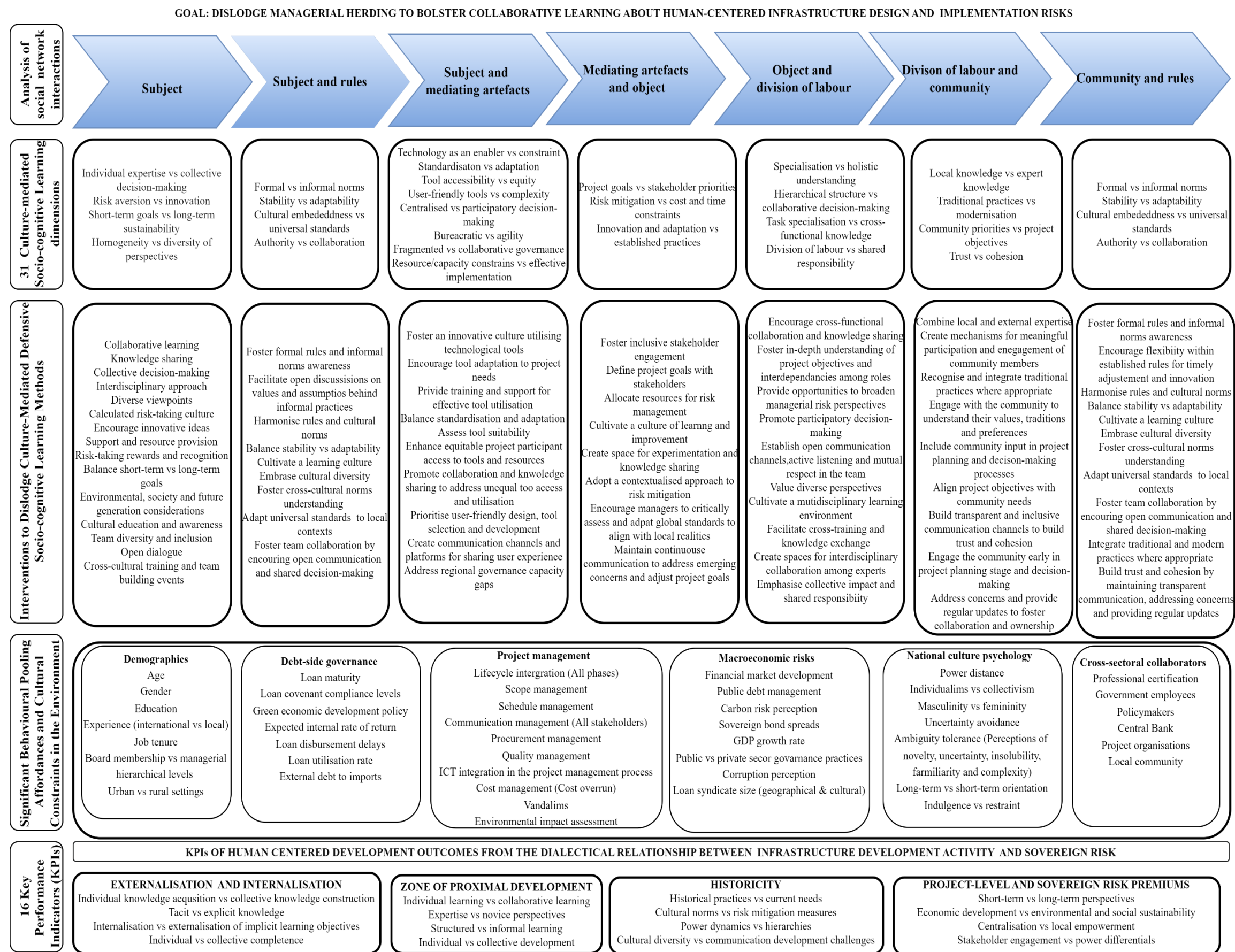


Figure 8-5: A human-centred infrastructure design and implementation framework

8.3. Framework validation and verification

Validation and verification of the proposed “Human-Centred Infrastructure Design and Implementation Framework” were crucial to ensure its reliability and effectiveness in the real world. The following steps addressed validation and verification.

8.3.1. Theoretical validation process

According to Norman (1988), the most critical step in human-centred design is formulating an appropriate conceptual model that ensures everything is consistent. The first step was conceptual development, which subjected the conceptual framework to logical consistency checks and multiple iterations to refine its internal coherence. It entailed conducting a comprehensive literature review to identify gaps, compare existing frameworks, and ensure that the proposed framework offers novel insights. Theoretical grounding entailed drawing on the Cultural-Historical Activity Theory of expansive learning at work proposed by Engeström (2001). It is a micro-foundational theory of human activity with the core elements of eliciting the infrastructure development activity. The second step was grounded in affordance theory (Gibson 1979) as an ecological lens to identify what the infrastructure development environment affords managers as possible actions and what managers perceive as possible. The third step was to consider the powerful influence of cultural constraints on managerial actions (Norman, 1999). As a result, Hofstede *et al.*, (2010b) national culture dimensions and Budner's (1962) ambiguity tolerance theory were adopted to identify the sociocultural characteristics of the Kenyan infrastructure development context. The final step considered how conventional socio-cognitive learning theories describe cultural constraints on human activity. Keynes (1936) conceived herding as a response to uncertainty and individuals' perceptions of ignorance, where people follow the crowd because they think the rest is better informed. According to Festinger (1954), herding is an inclination to appraise one's abilities and opinions by conformance to social patterns. Consequently, culture was conceptualised as an antecedent of herding due to its social cognitive property of constraining learning motives to conventions. Since cultural motives cannot be observed, herding was their observed social behavioural consequence. Grounding the proposed conceptual framework in established theoretical principles of human behaviour ensured each construct in the framework was clearly defined and operationalised, specifying its attributes and dimensions and applicability in the real-world. Furthermore, expert input from academia confirmed the theoretical soundness of the framework.

8.3.2. Empirical validation

A survey was administered to project managers over six months, and longitudinal data tracked changes in behaviour and decision-making across time and economic states. In-depth interviews were conducted with key stakeholders to gain qualitative insights into the framework's impact. The findings indicated notable

culture-mediated socio-cognitive dimensions of herding whose interventions can enhance project implementation outcomes if the diversity of thought is enhanced in infrastructure project delivery.

8.3.3. Iterative theory refinement

Based on empirical validation findings, the framework underwent iterative refinement. This entailed adjusting the cultural context using Hofstede's cultural dimensions, Budner's ambiguity tolerance scores, and fine-tuning efficiency mitigation strategies to better align with the infrastructure project context with debt-side governance, project management and macroeconomic risk. Moreover, longitudinal data offered an objective assessment to complement subjective survey data, while thematic analysis allowed theory to emerge. This iterative approach ensured the framework remained adaptable to changing sociocultural and professional knowledge construction circumstances.

8.3.4. Verification process

Practical verification encompassed empirical testing based on an explanatory sequential research method that combined quantitative and qualitative data analysis sequentially. This means real-world surveys and secondary data from ongoing infrastructure projects were analysed. In the first phase, simulations based on OLS, logit, and panel data regressions were conducted to assess how the framework performed under various managerial scenarios based on survey data. Initial verification results with primary data through OLS and logit regressions indicated promising outcomes, with adjustments made to fine-tune the framework's parameters for optimal performance based on longitudinal data analysis through panel data regressions. In the second phase, thematic qualitative analysis verified the quantitative model findings.

8.4. Chapter summary

This chapter presented a human-centred infrastructure design and implementation framework. The framework development process acknowledges the need to consider human-centred variables in eliciting the cause-effect relationship between sovereign risk and infrastructure development. The infrastructure development activity system was adopted to reconcile the gap between micro-, meso-, and macro-levels of eliciting sovereign risk as a managerial capacity to respond to uncertainty and individuals' perceptions of their ignorance where people follow the crowd because they think that the rest of the crowd is better informed. This essential soft competency can complement the government's efforts in identifying what to change from a policy perspective and how to support managers in the infrastructure development context in mitigating emerging risks. The study reveals that the micro-, meso-, and macro-level analysis levels of sovereign risk determinants become blurry when research applies practice-based social theories. At a micro-level, human-centred data is leveraged by managers in infrastructure development projects to achieve meso-level objectives of driving organisational performance improvement. At the macro level, the focus shifts to

the outcomes of managerial practices within the national infrastructure industry. This chapter presents a comprehensive human-centred framework for infrastructure design and implementation to reconcile multiple decision-making analysis levels and incorporate a managerial personal risk perspective to promote collaborative decision-making and improve project performance to mitigate unintended consequences in infrastructure development.

Chapter Nine: Conclusions and Recommendations

9.1. Introduction

This chapter aims to report the conclusions and recommendations generated from the previous chapters. The research objectives and explanatory sequential mixed-method approach used in the findings and their implications for the proposed framework are presented.

9.2. Summary of the integrated quantitative and qualitative research findings

The study integrated human-centred design and behavioural science theory to examine the relationship between sovereign risk and infrastructure development activity. It applied a sequential method to integrate four theories to overcome the shortcomings of each and formulate an infrastructure development activity unifying individual managerial agencies, social interactions and institutional structures. The proposed conceptual framework enabled the recasting of the quantitative research phase findings into a qualitative analysis of managerial socio-cognitive learning motives to avoid separating the human-centered motives underpinning practice from the managerial behaviour influencing sovereign and project risk outcomes. The micro-foundational theoretical framework was the Cultural-Historical Activity Theory of expansive learning at the workplace (Engeström 2001). Its core elements grounded the study in managerial practice. The affordances hypothesis (Gibson 1979) provided an ecological theoretical lens that revealed tensions between what the Kenyan infrastructure development environment affords managers as possible actions and what managers perceive as possible actions. Culture emerged as a socio-cognitive learning constraint because its social and cognitive properties of preserving conventions blocks expansive learning motives.

Based on Hofstede *et al.* (2010b), national culture, and Budner's (1962) ambiguity tolerance constructs, the study validates cultural constraints as antecedents of herding. Their significant regression coefficients elicited its potentially powerful influence on managerial motives to preserve conventions (Norman, 1999). These negative consequences can inhibit the acceptance and translation of lessons from past projects into transformative learning opportunities. It can constrain managerial learning to reproduce old infrastructure project management approaches and procedures or follow the crowd due to the perception that the rest of the crowd is better informed. This inhibits the managerial capacity to challenge conventions or innovate to improve project governance and performance. Herding personas developed to elucidate the powerful influence of cultural constraints in the relationship between sovereign risk and infrastructure development in Kenya corroborated findings in other collaborative project contexts, while others were novel.

The main conclusion is that studies examining the relationship between sovereign risk and infrastructure development should adopt interdisciplinary social theory to account for the powerful influence of cultural constraints alongside the managerial perception of the affordances of infrastructure debt-side governance,

project management and macroeconomic risk management tools, which has largely been ignored in empirical research focusing on Sub-Saharan African nations. Empirical researchers attributed the rising sovereign risk to moral hazards perpetuated among decision-makers in the infrastructure development activity and debt-trap diplomacy in foreign policy implementation. Regarding debt-side governance, the finding is that Kenya can reduce its project risk premium by 15.47% by reducing sovereign bond spreads. It can be achieved by improving sovereign governance to influence its credit rating positively. From a project management perspective, the focus should be improving managerial capacity to address scope, quality, communication, and stakeholder engagement. The macroeconomic risk findings revealed that Kenya can reduce its project risk premium by 9% by enforcing anti-corruption measures and prioritising carbon risk. The study found a significant moderating influence of cultural perceptions among managers and cultural distance between Kenya and its lenders on the relationship between sovereign risk, project risk and infrastructure development activity. From a debt-trap diplomacy perspective, the finding suggests that the human-centred infrastructure design and implementation capacity that the borrower affords a predatory lender goes along with what the predatory lender affords the borrower. The human-centred infrastructure design and implementation capacity that the borrower affords the predatory lender cannot be separated from the risk premium that the lender demands. Kenya has made tremendous progress in its people-centred governance objectives. However, more gender diversity and inclusivity efforts are needed to increase female participation in infrastructure project leadership roles and private sector participation. Kenya needs to leverage cultural constraints to mitigate managerial herding.

From a within-country cultural analysis of borrower behaviour, managerial herding constrains sustainable lending to Sub-Saharan African nations by failing to facilitate human-centred risk mitigation. From an investor perspective, managerial herding behaviour constrains sustainable lending to Sub-Saharan African nations for the much-needed infrastructure development debt by failing to facilitate it when lenders penalise perceived information asymmetry through premiums. These findings offer policy and practical insights for governments, investors, and infrastructure developers to consider culture in strategies related to human capital investment, governance, law, and regulation to mitigate information loss that occurs when policy users ignore them when evaluating risk due to cultural biases. The study contributes substantially to the literature on how collaborative learning among managers can improve the governance and performance of infrastructure projects by focusing on cultural constraints as sources of information loss, which has largely been ignored. The following sections summarise the key findings to support the conclusion.

9.2.1. Objective 1: Key determinants of sovereign risk, debt-side governance, project management, macroeconomic risk, and culture in Kenyan renewable energy and transportation infrastructure projects

9.2.1.1. Theme 1: Sovereign risk

Managers in Kenyan infrastructure organisations observe that an environment with rising inflation, political instability, corruption, economic instability, rising long-term debt, global commodity price, USD interest rate changes, exchange rate volatility, and declining economic growth rate does not afford them support. Secondary data corroborate these perceptions, revealing an upward trend in sovereign bond spreads and project risk premiums from 2011 to 2020, especially in 2013 with a political regime change and 2014 with its first international sovereign bond issuance and the SGR loan – the largest bilateral infrastructure loan. According to managerial perceptions, implementing the Kenyan Green Bonds Programme (GBPK) and the Green Economy Strategy and Implementation Plan (GESIP) of 2016–2030 can lower Kenya’s sovereign risk exposures. It indicates that Kenya has made the right step by mainstreaming green development policies such as Renewable Energy Act 2014 and Energy Act 2015 and 2019 for sustainable energy infrastructure development. Kenya should leverage these managerial attitudes to develop an implementation framework for integrating green infrastructure investments into the broader sovereign risk diversification strategy.

9.2.1.2. Theme 2: Debt-side governance

Managers’ perceptions in Kenyan infrastructure organisations highlight vital debt-side governance issues: project size (total investment), debt proportion, compliance with loan covenants, climate risk disclosures, environmental, social, and governance prioritisation such as mitigating pollution to enhance employee and community welfare and streamlining the land disputes handling process to mitigate cost overruns in the infrastructure development and construction phase. Secondary data corroborate these findings, identifying project risk premiums, sovereign bond spreads, and prolonged loan administration processes, evidenced by disbursement delays as the most persistent information exchange challenges. Key considerations include aligning loan utilisation rate, maturity and grace period, expected internal rate of return, and climate risk disclosure with the green bonds program due to its risk-reducing effect while enhancing the stability and success of infrastructure projects in Kenya.

9.2.1.3. Theme 3: Project management

The key finding is that lifecycle integration in an infrastructure development activity hinges on adequate and timely external debt access for development and construction phases, with operational phase projects benefiting significantly from revenue generation. While scope management practices drive project success, including expansions and upgrades, the qualitative insights revealed that the main issue revolves around design change and scope creep. While Kenya excelled in transitioning the SGR project into its operational

phase in 2017, seven months before its scheduled date, Wang (2022) revealed that the executive agency, mainly the president, influenced schedule management to match completion with the presidential election. The current study finds that utilising infrastructure development as an affordance for political career advancement leads the implementation team to underweight design and scope management with the missed implementation of low-carbon design specifications in the scope, mainly electrifying the SGR with Kenya's cheaper geothermal power. Emergent design and integrated change management constraint cross-sectoral collaboration and elevate infrastructure portfolio risks. Schedule management is often challenged by limited initial capital, counterparty risk, and loan disbursement delays, which signal underlying information loss and exchange constraints. Effective lifecycle cost management should prioritise profitability to ensure debt servicing and avoid contractor payment delays that often disrupt implementation and elevate cost when contractors penalise delayed payments through additional interest. Misunderstood design and scope creep undermine quality management, project refinancing, carbon emission risk, and resource management. There is a need for securing viability gap guarantees and forecasting cash adequacy in operational phases.

Communication breakdown encompassing limited information exchange with the public can signal markets and constrain debt access. ICT integration in the project management process, such as the "Integrated Financial Management and Information System (IFMIS)", enable access to information and often facilitates well-documented risk management approaches and procedures, supports managerial decision-making, and timely financial audits. The main issue was political influence on public information access and transparent reporting, consistent with the findings of Walker *et al.*, (2023) in Australia that the efficacy of technology-enabled collaborative learning depends on the data structure and information inputted into the system and communicated to project practitioners. Procurement practices associated with accessing debt should aim to mitigate budget, quality, and financial risks using forward contracts, future contracts, performance bonds, and interest rate swaps to boost Kenya's competitiveness in attracting external debt. Critical stakeholder engagement risks emerge from utility off-take guarantees, fuel supply guarantees, currency and regulatory guarantees, debt repayment, tariff setting, job creation, vandalism prevention, and land dispute management to mitigate lifecycle integration risks. The rising sovereign risk exposures and complexity of implementing large-scale infrastructure projects are exemplified by delayed government funding and the rising number of cross-sectoral participants. Lastly, effective risk treatment involves partial guarantees, risk transfer, revenue diversification, robust credit risk policies, and institutional capacity building around financial risks.

9.2.1.4. Theme 4: Macroeconomic risk

Financial market development determines the macroeconomic risk exposures of infrastructure development projects. The current study corroborates the findings of Odhiambo *et al.* (2020) and Rambo & Lucas (2016) that the key indicators include global interest and exchange rate fluctuations. The slow pace of financial

market development and an underdeveloped domestic capital market hinder the availability of diverse financing options, increasing reliance on external debt. This exposes projects to investors' currency transfer and convertibility risk perceptions. The enforcement of transparent reporting mechanisms and a stable local currency exchange regime are essential to attract external investors and reduce uncertainties. Additionally, changes in US monetary policy, particularly the Federal Reserve interest rate, can influence capital flows and borrowing costs. As reflected in the crude oil price fluctuations and inflation, commodity price volatility further exacerbates financial market instability, necessitating robust mechanisms to mitigate these risks.

Effective public debt management mitigates the macroeconomic risk exposures of infrastructure projects. Kenya has made the right step in enacting the Public Debt and Borrowing Policy (2020). This recent survey reveals that a sufficient public debt management policy should include strict external debt to imports ratio control and diversifying maturity risk by balancing short-term and long-term debt. Aligning national debt and economic growth, measured as GDP per capita, can bolster stability and sustainability. Establishing debt policy implementation tools, such as the Public Debt Management Office (PDMO) and robust disclosure procedures, enhances transparency and accountability. Collaborative debt management at national and subnational levels alongside technical project failure reduction strengthens risk mitigation. As reflected in Kenya's corruption index relative to the world, integrating strong anti-corruption enforcement rules in public debt management is critical to maintaining investor confidence and efficient use of funds. This supports Onjala's (2018) views that corruption is also a major dimension of weak governance in Kenya, negatively constraining the planning and delivery of public projects worldwide (Locatelli *et al.*, 2017).

Carbon risk management is increasingly vital to mitigating macroeconomic risk exposures in Kenyan infrastructure projects. Managers reveal that perceptions of carbon risk by lenders, the public, and citizens significantly influence investment decisions. Effective carbon risk adaptability mechanisms and accurate carbon credit pricing are essential for aligning projects with global sustainability standards. The carbon futures price is a market-based indicator of evolving carbon risk policy and implementation practices. Registering projects as clean development mechanisms and publicly disclosing sustainability objectives demonstrate a commitment to environmental stewardship, enhancing investor confidence.

Additionally, addressing the risk of investor exit along the project lifecycle due to carbon emissions, investing in carbon risk research and development initiatives, and aligning project-level practices with national sustainability goals are crucial for comprehensive risk management. Developing a robust carbon risk management policy ensures that projects can effectively adapt to and mitigate carbon risks. By prioritising financial market development, public debt management and carbon risk management, Kenya can attract sustainable investments and promote long-term economic and environmental stability.

9.2.1.5. Theme 5: Cultural dimensions and the cultural distance between Kenya and its lenders

Hofstede's (2013) national culture and Budner's (1962) ambiguity tolerance theories provided constructs that describe the sociocultural characteristics of the Kenyan infrastructure development context. Based on the affordance theory, cultural constraints are context-specific antecedents of human herding. Also termed intolerance of ambiguity, ambiguity tolerance is a construct that originated in the seminal work of Frenkel-Brunswik (1948), defined within the psychodynamic conceptual framework as a “tendency to resort to black-white solutions” causing premature closure in evaluative aspects. The current study corroborates past research that ambiguity intolerance is a well-established personality trait in predicting adaptive outcomes in the workplace, such as risk acceptance levels, critical thinking, creativity, job performance, innovation and decision-making (O'Connor *et al.*, 2022). Managers in the Kenyan infrastructure sector lean towards moderate ambiguity intolerance. Kenya can adopt reference class forecasting because it offers a structured decision-making framework and tools to guide ambiguity-intolerant managers to evaluate economic trends systematically they may prematurely terminate to enhance critical risk evaluation. Furthermore, Kenya can adopt the recommendations of Gray & Ulbrich (2017) to address ambiguity intolerance through effective collaboration, information-seeking, and communication. These approaches can dislodge herding motives by influencing individual-level ambiguity intolerance.

The sample leaned towards high power distance, suggesting the acceptance of unequal power distribution. Herding motives associated with this constraint may involve aligning managerial performance objectives with influential political figures to mitigate the personal risk that could emerge in hierarchical structures. One way to mitigate herding among managers with stronger career concerns is to utilise anonymous digital or physical decision-making tools where lower-ranking managers can propose ideas or raise concerns without fear of reprisal. If the group consists of young and old executives, the young ones should be asked to voice their opinions before the old ones. The significant relationship between age and power distance revealed presumably more uncertainty about the ability of younger managers to voice contrarian views and, hence, a greater temptation for herd behaviour. The proposed framework can help boards design mentorship programs and collaborative decision-making simulations using artificial intelligence (AI) tools to elucidate managerial behaviour and foster a culture of enhancing leadership resilience while positively influencing collaboration under incomplete or inadequate information.

On the other hand, old executives appear more willing to express contrarian views. More generally, the demographic line of reasoning implies an advantage to integrating bottom and top-down information flow mechanisms within the infrastructure project team and organisation. The proposed framework proposes variables that can be leveraged in evaluating if cross-functional training pools interdisciplinary knowledge from economics and project management to empower managers to analyse emerging patterns. Integrating

behavioural science and human-centred design principles may result in better decision-making than if the ideas originated at a high strategic planning level and were passed downstream for line manager input.

Regarding individualism vs collectivism, the sample manifests collectivism. Herding may entail seeking consensus and leveraging collective wisdom to navigate complexity and build unity. Besides, managers in the Kenyan infrastructure development context lean towards femininity when assessed on the masculinity vs femininity dimension. Herding motives may involve seeking collaboration. Consistent with ambiguity intolerance, the sampled managers exhibited high uncertainty avoidance. Their herding motives may involve preserving norms and seeking stability and predictability in risk-prone situations. The proposed framework can help managers and organisations integrate indicators of cultural constraints into the use of scenario planning and simulation as determinants of the propensity to prematurely close critical thinking tasks to help managers visualise and prepare for diverse situations, making them more comfortable with various dimensions of ambiguity as an adaptive toolbox.

Concerning long-term vs short-term orientation, there was a balance, indicating that managerial herding might be geared towards seeking immediate performance incentives while maintaining decisive long-term actions to control perceived risks. The sample displayed a balance between indulgence and restraint. Indulgence can dislodge herding by facilitating the adoption of new management approaches. At the same time, restraint sustains conformity, minimising deviation from tradition to control emergent risk exposures from new policy guidelines and practices. The extent to which innovative ideas or project suggestions can be passed vertically and horizontally for approval within project teams depends on how well human-centred design principles are integrated into managerial incentives and followed to avoid critical information loss. Hence, organisations can use the proposed KPIs to design incentive structures that reward managers for well-informed, risk-aware decisions rather than achieving baseline project goals to augment their critical thinking. Such incentive structures can encourage managers to experiment and innovate, which inherently involves accepting uncertainty to move away from black-and-white thinking.

9.2.2. Objective 2: The relationship between culture and managerial demographics

Kenya's Vision 2030 advocates people-centred governance, gender diversity, inclusive decision-making, and cultural preservation. Hence, the relationship between cultural and managerial demographics presents the cultural determinants of human-centred capacity in the Kenyan infrastructure development context. As understood through local norms and practices, cultural constraints highlight progress and challenges in managerial engagement with stakeholders, negotiations, and implementation of projects. For instance, the gender distribution shows 25.6% of female respondents. Its significant relationship with power distance, individualism vs collectivism, and masculinity vs femininity reveal that Kenya can leverage them as likely perceptual determinants of the low female participation in managerial roles to advance gender diversity.

The age variable shows that older managers exhibit individualism, associated with herd-leading motives, being confident to pursue contrarian views, competitiveness or a low likelihood of excessively seeking consensus. Notable cultural constraint differences existed between managers with local and international experience, affirming that the context in which managers acquire experience determines herding motives.

Moreover, due to the perception of risk and adequate funding, the significant relationship between culture and the managerial propensity to desert projects reveals personal risk exposures influence staff retention. Besides, job tenure is significantly related to collectivism and uncertainty avoidance, meaning managers find career safety through social cohesion. Attitudes towards ambiguity are considered valuable predictors of leadership skills, job performance, and creativity, with implications for their followers' performance (O'Connor *et al.*, 2022). For instance, Gray & Ulbrich (2017) found ambiguity acceptance and translation skills as the most critical managerial traits that can boost project success more than “technical skills”, like planning and scheduling. It seems possible that these attitudes enhance talent retention in projects, which limits work disruption due to staff turnover. This is one of the challenges existing studies have identified.

The perceived cultural constraints between managers with professional project management certifications and those without demonstrate that the sense of belonging to a professional community of practice exerts a non-redundant influence on the perception of individual managerial capacity. It was mostly associated with ambiguity tolerance, lower perception of unequal power distribution as a constraint, and balancing competitiveness and collaboration while minimising deviation from traditional practices, albeit to avoid social exclusion. Kenya can leverage professional certification to achieve inclusive decision-making and cultural preservation among managers due to the potential positive effect of their well-defined code of conduct on the managerial perception of self-efficacy and capacity to challenge conventions.

Although the sample revealed an intermediate long-term vs short-term orientation, board membership was related to a long-term orientation. This resonates with the delegation of strategic decision-making authority between the board and management, where board incentives are aligned with the organisation's long-term stability despite the short-term nature of individual projects. Senior managers exhibited individualism more than middle-level managers. While senior managers exhibit herd-leading motives due to lower perceived cultural constraints, their tendency to prioritise individual goals may negatively influence inclusive decision-making in the hierarchical structure, potentially due to perceived rewards and penalties of deviating among their followers. The high proportion of public versus private sector projects and the managerial preference for the renewable energy versus transportation sector were related to power distance and collectivism. It implies that the personal risks associated with the leadership styles of each sector redistribute managerial capacity in projects with implications for the organisation's talent strategy. The role of infrastructure in alleviating poverty in rural and urban areas requires resource allocation improvement.

The study reveals that some offerings of the environment in which an infrastructure development activity occurs enable and constrain people-centred governance, gender diversity and inclusive decision-making. Hence, the study examined culture as a mediator and moderator of the relationship between managerial perceptions of sovereign risk exposures, project risk premium and infrastructure development activity.

9.2.3. Objective 3: Culture as a mediator and moderator of the relationship between sovereign risk and the development of Kenyan renewable energy and transportation infrastructure projects

The study examined how cultural variables displaced the baseline relationship between the dependent variables, sovereign risk and project risk premium and each independent variable.

9.2.3.1. Theme 1: Debt-side governance

Sovereign risk was positively related to loan maturity, compliance with covenants and adopting a green economic development policy in the baseline model. When ambiguity tolerance was included, investment size and debt-to-equity rate became significant. While power distance significantly influenced sovereign risk, it did not displace the baseline. Individualism vs collectivism, masculinity vs femininity, uncertainty avoidance, long-term vs short-term orientation and indulgence vs restraint displace the baseline model.

Project risk premium had a significant positive regression coefficient when regressed on sovereign bond spreads, loan disbursement delay and the external debt to imports, revealing that management practices associated with these processes should be improved to reduce project risk. However, the significant negative regression coefficients when project risk premium was regressed on loan maturity, expected internal rate of return, climate risk disclosure and the GDP growth rate validate the positive effect of the affordance of these debt-governance tools on project risk premium. The moderation effect was assessed by the interaction of the cultural distance between Kenya and its lenders with sovereign bond spreads. All the interaction terms moderated the baseline relationship except uncertainty avoidance. The interaction term for sovereign bond spreads with individualism vs collectivism had a negative regression coefficient.

9.2.3.2. Theme 2: Project management

Sovereign risk had a positive regression coefficient with project lifecycle integration, scope management, schedule management and quality management in the baseline model. The significant negative regression coefficient for cost management suggests that despite strong agreement on the determinants of sovereign risk, respondents disagree that prioritising profitability and avoiding contractor payment delays may be effective risk reduction mechanisms. All the culture variables displace the baseline model. Procurement management had a positive regression coefficient when masculinity vs femininity when added. It implies that collaborative financial risk-sharing through forward contracts, futures contracts, performance bonds, and interest rate swaps can mitigate budget and overall lifecycle risks.

Project risk premium had a significant positive regression coefficient when regressed on sovereign bond spreads, external debt to imports, ICT integration in the project management process, and environmental impact assessment, corroborating the need to improve managerial practices in these areas. However, in a sample in which public sector projects have lower premiums than private sector projects, the significant negative regression coefficients when project risk premium was regressed on cost overrun, vandalism, number of cross-sectoral project collaborators, and GDP growth rate highlight that private sector projects experience significant organisation and coordination challenges than the public sector. Only the interaction terms for sovereign bond spreads with long-term vs short-term orientation and indulgence vs restraint were significant. The interaction term for sovereign bond spreads with indulgence vs restraint had a negative regression coefficient, while the one with long-term vs short-term orientation was positive.

9.2.3.3. Theme 3: Macroeconomic risk

Sovereign risk had a positive regression coefficient with financial market development, public debt management and carbon risk in the baseline model. The significant negative regression coefficient for voluntary carbon risk disclosure illustrates the positive effects of information exchange in perceiving risk. When ambiguity tolerance was included, it did not displace the baseline. All the culture variables displace the baseline model, validating that herding leads to critical information loss.

Project risk premium had a significant positive regression coefficient when regressed on sovereign bond spreads, external debt to imports carbon futures price, corruption index and syndicate size in the baseline model. It reveals that the mechanisms of accessing the global financial market, carbon risk reduction and anti-corruption enforcement measures are critical for Kenya to reduce project risk. The findings revealed that Kenya can lower project risk premia by 9% through anti-corruption measures. The country can leverage the recommendations of Locatelli *et al.* (2017) of enhancing transparency in procurement and execution, strengthening regulatory oversight, and prosecuting individuals involved in corrupt practices. Moreover, the significant negative regression coefficients for crude oil futures, the GDP growth rate and external debt to imports validate the positive effect of these risk mitigation tools on project risk premium. The interaction terms moderated the baseline relationship except for power distance. The interaction term for sovereign bond spreads with individualism vs collectivism, uncertainty avoidance, and indulgence vs restraint had a negative regression coefficient. While the interaction term for sovereign bond spreads with masculinity vs femininity and long-term vs short-term orientation had positive regression coefficients.

The main conclusion from the mediation and moderation analysis is that the perception of infrastructure debt-side governance, project management, macroeconomic risk, and cultural constraints are positively related but distinct. Cultural constraints moderate the relationship between the dependent and independent variables as antecedents of managerial herding. The integrated quantitative and qualitative findings reveal

important culture-mediated herding personas within the infrastructure development activity that should be understood to improve the performance of managers in Kenya. Theme 4 addresses this herding concept.

9.2.3.4.Theme 4: Culture constraints as antecedents of managerial herding personas

Based on the affordance theory, cultural constraints are context-specific antecedents of human herding. Hofstede's (2013) national culture and Budner's (1962) ambiguity intolerance constructs were adopted to describe how culture-mediated herding personas moderate the relationship between sovereign risk and the infrastructure development activity in Kenya. While the significant regression coefficients elicited the powerful influence of culture on managerial motives to preserve conventions (Norman, 1999), they do not describe how cultural constraints generate negative consequences. Cultural constraints inhibit human actions to conventions. It can constrain managerial learning to reproduce old infrastructure project management approaches and procedures or follow the crowd due to the perception that the rest of the crowd is better informed. This inhibits the managerial capacity to challenge conventions or innovate to improve project governance and performance.

9.2.3.4.1.Ambiguity intolerance

Ambiguity intolerance is a personality trait of perceiving situations as having multiple interpretations, novel, familiar, uncertain, insoluble, or complex. For example, Wiewiora & O'Connor (2022) found that US project managers face numerous ambiguities, including task complexity, core project management, stakeholder management, human resource capacity, insufficient task and role information, mistakes and errors, and unforeseen circumstances and occurrences. While “task-related” ambiguity evoked positive emotions, “people-related” ambiguity evoked negative emotions. According to the survey, managers in Kenyan infrastructure projects with high ambiguity tolerance disagree on their propensity to desert projects due to limited funding. However, they agree on their propensity to exit projects due to risk. It implies that the type of ambiguity or risk matters. Managers perceive funding as a challenge that can be overcome through additional funding, suggesting they may underweight cost overruns. However, they view risk as a personal career threat, potentially because incentive structures do not justify the dangers of mistakes and errors to resolve unforeseen circumstances and occurrences.

The managerial subjective norms and perceived behavioural control on tolerating ambiguity and navigating risk exposures of infrastructure projects are situations where clear or definitive outcomes may not be readily apparent (O'Connor *et al.*, 2022). It appears that individuals reduce the risk of being blamed for poor decisions by leaving projects, as they can justify their choices based on the collective action of the group. If a substantial number of managers look to the behaviour of others as a cue for appropriate action, especially under ambiguous and uncertain infrastructure policy implementation situations, ambiguity

intolerance may drive herding. Herding is a protective strategy that may lead to policy legitimisation failure. Consequently, the policy implementation instruments and tools fail to pool managerial behaviour towards desired outcomes. It may redefine infrastructure development. Thus, herding mediated by risk intolerance among managers can explain the lack of technical capacity to implement the renewable energy policy, with projects stalling in the investment stages in Kenya. Ambiguity tolerance or intolerance redefines the division of labour between those charged with infrastructure debt-side governance, project management and macroeconomic risk based on how managers decipher group behaviour and utilise cultural constraints such as ambiguity tolerance as defensive socio-cognitive learning to navigate uncertain environments.

9.2.3.4.2. Power distance

The survey demonstrates a strong acceptance of unequal power distribution. Power distance significantly affected sovereign risk perception and project risk premiums, suggesting it mediates self-perception in a hierarchical structure. Findings in China by Liu *et al.* (2015) show that bureaucrats elevate infrastructure implementation costs by overriding regulations to prioritise timely completion over cost and quality, redefining contractor objectives. As an antecedent of herding, power distance may constrain management-level actions to the objectives of authoritative figures, prioritising safety, social acceptance, and perceived reliability over independent decision-making. If a substantial number of managers look to the behaviour of authoritative figures as a cue for appropriate action, herding mediated by power distance perceptions may emerge as a protective strategy.

Consequently, when authoritative figures introduce new project objectives, managerial herding in their direction may redefine infrastructure development outcomes. Herding mediated by power distance may be a cultural constraint on institutional effectiveness as formal instruments and tools that the infrastructure development environment affords managers. This form of herding can redefine the division of labour between those charged with infrastructure debt-side governance, project management and macroeconomic risk based on how managers perceive authoritative figures as knowledgeable and utilise power distance as defensive socio-cognitive learning to align their actions with self-perception in a hierarchical structure.

9.2.3.4.3. Individualism vs collectivism

While the survey revealed collectivism, the negative cultural distance between Kenya's collectivism and its lenders means that Kenya had a lower collectivism score based on the sampled projects. Collectivism is a human resource capacity that influences task mastery and core project management processes such as stakeholder management and implicit role information. Collectivism can be seen as an antecedent of

herding mediated by the fear of isolation. Aligning with the group helps managers avoid social isolation and maintain their standing, as deviating from the norm can lead to social disapproval or exclusion.

Fragmented governance within the infrastructure development activity may redefine managerial actions. The failure to prioritise stakeholders perceived as out-groups redefines the rules and division of labour between those charged with infrastructure debt-side governance, project management and macroeconomic risk. The prioritised in-group goals can create cultural constraints as defensive socio-cognitive learning to avoid troublesome collaboration situations within the activity. Managers constrained by collectivism may adhere rigidly to predetermined project goals, overlooking the information depth that captures broad stakeholder interests and the evolution in the project context.

9.2.3.4.4. Masculinity vs femininity

According to the survey, managers in Kenyan infrastructure projects exhibited femininity. However, the positive cultural distance between Kenya and its lenders means Kenya has a higher masculinity score, where people may value competitiveness and personal goals. Thus, masculinity may be leveraged to dislodge herding motivated by a strong design for social approval. A balance between seeking consensus and standing out or proposing unconventional ideas can reduce the risk of following crowds to avoid being blamed for poor decisions, as managers can justify their creative and innovative choices as early informants while preserving the group's collective action.

Prolonged decision-making redefines collective decision-making rules and the division of labour between those charged with infrastructure debt-side governance, project management and macroeconomic risk. It can redefine collective decision-making to the extent that managers utilise group behaviour as defensive socio-cognitive learning to ensure that the decision demonstrates that they value relationships and quality of life. Preferring innovation and adaptation over established practices exemplifies strong masculinity that could dislodge herding motives. Moreover, contrasting views from in-depth interview participants reveal that information cascades occur when traditional practices overshadow innovation to avoid uncertainty.

9.2.3.4.5. Uncertainty avoidance

Uncertainty avoidance is interchangeably used with ambiguity tolerances. The negative cultural distance between Kenya and its lenders means Kenya has a low uncertainty avoidance score based on the sampled projects. While “task-related” ambiguity evoked positive emotions, “people-related” ambiguity evoked negative emotions among US project managers, managers in Kenyan infrastructure projects with high ambiguity tolerance exhibited high uncertainty avoidance, suggesting they may also face perceptual

challenges dealing with stakeholder engagement issues – people-related ambiguity. Consequently, the sampled managers perceived funding as a challenge that can be overcome through additional funding requests, suggesting they may underweight cost overruns.

9.2.3.4.6. Long-term vs short-term orientation

The survey revealed a balance between long-term and short-term orientation among managers in Kenyan infrastructure projects. Still, the negative cultural distance between Kenya and its lenders means Kenya has a lower long-term orientation score based on the sampled projects. Managers perceive prioritising short-term and long-term objectives can minimise herding motives associated with short-cut information. Herding leverages information shortcuts to simplify decision-making by allowing individuals to rely on the presumed expertise or better information of others, thus saving cognitive resources and time.

Herding mediated by long-term vs short-term orientation is a heuristic to navigate complex and uncertain infrastructure development environments. Prioritising short-term goals over independent decision-making among managers can explain the persistent corruption. Short-term orientation redefines the division of labour between those charged with short-term and long-term infrastructure debt-side governance, project management and macroeconomic risk mitigation objectives. Managers may utilise cultural constraints such as short-term orientation as defensive socio-cognitive learning to hide resource allocation actions.

9.2.3.4.7. Indulgence vs restraint

The sample displayed a balance between indulgence and restraint, suggesting intermediate awareness and regulation of exploratory and exploitative learning while planning, monitoring, and evaluating risks. This attribute could dislodge herding by facilitating the adoption of new management approaches while minimising deviation from traditional practices by controlling emergent risk. The negative cultural distance between Kenya and its lenders means Kenya has a lower restraint score. As a herding antecedent, restraint refers to the societal norms and values that emphasise self-control, moderation, and the suppression of individual desires for the greater good of the community and social harmony. It is heavily influenced by Confucian philosophy, which values order, discipline, and the subordination of personal interests to familial and societal obligations. Confucian teachings promote humility, respect for authority, and self-restraint.

Restraint fosters social cohesion and stability but has significant negative consequences. By enabling herding behavior and constraining individual ambition, it can stifle innovation, limit personal and professional growth, and lead to inefficient reproduction of old project management approaches and procedures. It may limit the capacity of managers to legitimise new rules, institutional structures and

divisions of labour. Balancing the positive aspects of restraint with opportunities for individual expression and innovation can address herding challenges and foster a more dynamic and resilient human-centred infrastructure development capacity.

The herding personas reveal that learning by observing and mimicking the actions of others, particularly those perceived as successful or knowledgeable, is a defensive socio-cognitive way of learning without direct experience mediated by the desire to reduce personal trial-and-error risks. Consequently, the study identified thirty-one culture-mediated socio-cognitive learning dimensions and sixteen KPIs of human capital development in the infrastructure development activity and sovereign risk as embedded outcomes. The findings show that mere policy reforms may not address this culture-mediated defensive learning. The proposed interventions aim to dislodge culture-mediated herding motives for sustainable human capital development, ultimately improving the governance and performance of infrastructure projects by building a sustainable human-centred infrastructure design and implementation framework.

9.2.4. Objective 4: A human-centred infrastructure design and implementation framework

This PhD thesis has integrated cultural-historical activity theory with national culture psychology and affordances theory as mid-range theoretical filters to elicit herding as defensive socio-cognitive learning motives mediating the dialectical relationship between infrastructure development and sovereign risk. The study proposes a human-centred infrastructure design and implementation framework with five factors for mapping defensive socio-cognitive learning dimensions of managers in the infrastructure development activity on sovereign risk and project risk. The proposed framework entails the functional socio-cognitive constructs for designing the human-centred learning framework, assessing the behavioural pooling effects of the infrastructure project context and national culture, identifying defensive socio-cognitive learning dimensions from these micro-level behavioural effects and interventions for the negative effect of these micro-level practice-based variables on the macro-level sovereign risk variable.

9.3. Research contributions

9.3.1. Theoretical contributions

There are two theoretical contributions. First, integrating four theories illustrates how to overcome each theory's shortcomings. The micro-foundational theoretical framework was the Cultural-Historical Activity Theory of expansive learning at the workplace (Engeström 2001). Its core elements grounded the study in managerial practice. The affordances hypothesis (Gibson 1979) provided an ecological theoretical lens that revealed tensions between what the Kenyan infrastructure development environment affords managers as possible actions and what managers perceive as possible actions. Culture emerged as a socio-cognitive

constraint because its social and cognitive properties of preserving conventions block expansive learning. Based on Hofstede *et al.* (2010b), national culture, and Budner's (1962) ambiguity tolerance constructs, the study validates cultural constraints as antecedents of herding. The framework was developed based on the seminal work of Norman (1988), a cognitive scientist and usability engineer who pioneered human-centred design by focusing on end-user needs, abilities, and limitations. The focus on culture at the individual decision-making level under risk underscores its robustness in reconciling micro, meso and macro-level development outcomes. Cultural constraints are antecedents of herding that explain how discriminatory behavioural alignment in an infrastructure development activity emerges in specific context, revealing the phenomenon's underlying dynamics through the principles of internalisation and externalisation.

Secondly, the theoretical proposition that within-country cultural constraints have explanatory power for the dialectical relationship between sovereign risk and the infrastructure development activity emphasises focusing on human capital for transformative infrastructure development. This proposition offers insights into managers' adaptation complexities while operating in collective stakeholder engagement roles with key performance indicators that cut across global, regional, and local infrastructure project management practices. The propositions are grounded in empirical observations, contributing to a robust understanding of adaptation processes and their subsequent implications on risk premiums when information losses occur.

9.3.2. Methodological contributions

The study offers two significant contributions. Firstly, it introduces a scale to gauge cultural constraints in the infrastructure development activity, meticulously developed per Barry *et al.*'s (2011) guidelines. This within-country approach mitigates cross-country bias in national culture (Hofstede, 2013) Likert scales, ensuring individual differences prevail. Iterative loops guided the questionnaire design, which was subsequently validated through a pilot study in Kenya.

Secondly, the research pioneers the moderating influence of ambiguity intolerance, cultural constraints, and discriminatory institutional alignments based on herding, specifically in infrastructure risk preferences. This study delved into ambiguity intolerance and cultural constraints as antecedents of managerial herding influencing risk in the economic infrastructure development sectors. The significance of the study led to the support from management boards overseeing six Kenyan infrastructure projects, resulting in data collection from 597 practitioners. It marks the first attempt to uncover the cultural constraint dynamics in this developing nation, offering insights into information loss through infrastructure management practices.

9.3.3. Practical contributions

The findings are consistent with observed differences in the collaborative decision-making processes of managers implementing infrastructure projects in China, Poland, Singapore, the Middle East, Pakistan and the U.S. The study documents the following four facts: (i) debt-side governance, project management and macroeconomic risk perceptions of managers influence the perception of sovereign risk exposures and labour mobility between public and private sector infrastructure projects; (ii) project risk premium differentials between the highest and lowest risk premiums are widening significantly driven by market and the managerial perception of sovereign risk and corruption (iii) Decision-making is more participative among public sector managers because public policy must be consulted in the process than private sector. (iv) cultural constraints moderate within-country and cross-country mobility of capital, technology and labour to public and private sector infrastructure projects driven by the career concerns of managers. According to the research findings, the fourth observation should imply the first three to the extent that reputational risks among managers in the infrastructure development labour market are critical in Kenya. Valuable experiential information may not be readily elicited from all managers if some managers place more weight on cultural constraints since they will always do the same thing, regardless of their signal. This behaviour limits the contrarian information that may be inherent in their experiences from joining the public pool of knowledge to improve the governance and performance of managers in project teams. The study reveals the pivotal role of context in the relationship between sovereign risk and infrastructure development activity, with cultural constraints as antecedents of managerial herding motives and actions that perpetuate experiential information losses. This interaction evolves dialectically through cultural exchange and the affordances of the infrastructure development environment with the following practical implications:

- Inclusive human-centred risk assessment and mitigation: This can be achieved using the proposed framework to design artificially intelligent (AI) tools that capture behavioural data when involving practitioners in designing risk frameworks to elicit their perceived constraints and affordances of the infrastructure development environment. Moreover, implement cultural awareness programmes for decision-makers to foster a deeper understanding of cultural factors affecting risk perception.
- Stakeholder collaboration for trust and knowledge sharing: promote collaboration and information exchange among stakeholders, including government entities, financiers, developers, and local communities. The proposed framework can be used to analyse participants involved in reference class forecasting as a structured decision-making framework that systematically guides managers to participate in evaluating variables they may prematurely terminate without help. Hence, the proposed framework offers a platform that provides tools that can be used to augment managerial tendencies to share risk management best practices and lessons across projects and sectors.

- Integration of collective action in regulatory frameworks: integrate collective action interventions into existing infrastructure finance and project management structures while considering social costs and benefits. It can be achieved using the proposed framework to evaluate if cross-functional training effectively pools interdisciplinary knowledge from economics and project management. Diversity of thought can enhance the design of regulations and policies by addressing factors likely to persevere herding. Encourage risk-sharing models like public-private partnerships and insurance solutions to mitigate sovereign risk's impact on infrastructure endeavours.
- The study's findings offer actionable steps for policymakers, practitioners, and stakeholders to address sovereign risk through a sociocultural aware lens, promoting effective risk management in the infrastructure sector through incentives. Organisations can use the proposed KPIs to design incentive structures that reward managers for well-informed, risk-aware decisions rather than achieving baseline project goals to augment their critical thinking. Such incentive structures can encourage managers to experiment and innovate, which inherently involves accepting uncertainty to move away from black-and-white thinking, which makes them susceptible to herd behaviour.

9.3.4. Policy contributions

Kenya has made the right step to prioritise people-centred governance, gender, inclusive decision-making and cultural preservation in its Vision 2030 and Constitution of Kenya 2010 by enacting the Local Content Act 2023. As a member of the global commitment to SDGs and the Paris Agreement about carbon emission, Kenya has made important strides in quality infrastructure development among developing African nations (United Nations, 2015). However, escalating sovereign debt risks underscore the insufficiency of current actions. Key policy recommendations that were generated from the study include:

- Develop soft infrastructure: establishing formal and informal governance institutions to facilitate collective decision-making provides a flexible framework for reducing sovereign risk through infrastructure development activity in countries with significant human capital deficits.
- Enhance human capital development: the study underscores the pivotal role of human capital in economic growth and infrastructure decision-making, but existing institutional frameworks hinder collective progress, necessitating a more data-driven behavioural measurement approach.
- Foster collective decision-making: collective decision-making structures align micro-meso-macro foundational concepts of human activity to foster commitment, accelerate action, encourage partnership, and align stakeholder interests toward sustainable infrastructure transformation.
- Multi-level learning framework: the proposed framework comprises actions and KPIs that can be used to monitor, evaluate and report micro- meso-macro-level learning. These tiers can facilitate practitioner adaptation, cross-sectoral collaboration, and integrated policy data aggregation.

- Positive narrative: the framework can be portrayed as a global strategy to rebuild with collective socio-cognitive learning methods used to evaluate infrastructure risk as a core element, supported by human-centred investment, technology, and policies that can minimise sovereign risk premiums.
- Inclusive country-specific approaches: the evaluation model should embrace varying rationales for pricing infrastructure risk based on practitioner experiences to achieve desirable sovereign risk reduction benefits from infrastructure development communities.
- Global collaboration: although initiated in Kenya, the proposed human-centred infrastructure design and implementation framework should extend beyond, involving key developing nations to capture a wider range of practitioner experiences and global lending market dynamics.

These policy recommendations emphasise the significance of soft infrastructure, human capital, collective decision-making, inclusivity, and global collaboration. They offer a comprehensive approach to addressing sovereign risk and sustainable infrastructure development in developing countries.

9.4. Limitations of the study

This section expounds on the limitations stated in Section 4.11 of Chapter Four. While offering several advantages, this explanatory sequential mixed-method research approach also presents some noteworthy limitations to its generalisability, and research results must be applied carefully, considering the research context. For instance, the model was tested with the data from managers in large Kenyan renewable energy, road and rail transportation projects. It may not fit the attributes of project-based organisations in other industries, such as agriculture, healthcare and software development projects. Further studies can test this model based on evidence from other industries. The study tested its conceptual model based on survey data from Kenya. The self-administered survey allowed the participants to respond to the questions in a single questionnaire at a particular time. Future studies should test this model with data from project organisations combining cross-sectional and longitudinal analysis to extend the concept of perception from an ecological perspective of infrastructure development. Despite these limitations, this mixed-method approach was valuable in providing a comprehensive understanding of the research question, incorporating multiple perspectives, and employing data triangulation to enhance the study's validity and reliability.

9.4.1. Methodological limitations

The scope was confined to the multicultural context, whose boundary was defined as cross-border infrastructure debt-side governance, project management, and macroeconomic risk management within Kenya, potentially limiting the generalisability of results at the Sub-Saharan African level. While insights guide researchers in integrating cultural-historical activity and behavioural decision-making theories, further exploration of other infrastructure contexts is warranted. The mixed-method research aimed for a

deeper understanding of the managerial affordances in the Kenyan infrastructure development context, potentially limiting the generalisability of findings. Careful consideration of the scope and multicultural infrastructure project context-specific insights was undertaken to address this limitation. Comparisons among various developing nations could yield insights.

Engaging infrastructure practitioners who left Kenya would have enriched insights. However, this was not feasible due to the limited time and resources to conduct quantitative and qualitative research phases within the required PhD study time of 4 years. The explanatory sequential mixed-method was resource-intensive due to the additional time to collect secondary data, resources, data analysis tools and expertise in qualitative thematic analysis. Power imbalances among public and private sector managers skewed power dynamics, potentially affecting information disclosure, with 96% of participants being from the public sector. Explanatory sequential research design limitations included a time gap between the two research phases, which could have led to changes in the research context or participants, impacting data comparability and relevance. Moreover, the sequential design may not address all of the CHAT framework's qualitative research questions or concepts and focus group discussions would have been helpful to simulate real-world interactions among managers.

While triangulation of the cross-sectional survey approach with longitudinal data analysis and interaction with participants through in-depth interviews mitigated some biases, the survey's interpersonal nature could still introduce reporting bias. The complexity of integrating data from different sources and methods, such as the integration of CHAT and Hofstede's framework, mitigated potential inconsistencies or conflicting findings. Researchers' subjectivity in interpreting integrated data may introduce bias due to their cultural values and norms as active participants engaging in knowledge construction. The researcher acknowledged this possibility and implemented measures such as reflexivity and rigorous analysis to mitigate bias. Integrating quantitative and qualitative data challenged sampling, measurement, and data comparability to form a multicultural context sample representing renewable energy, road, and rail transportation projects. Ethnography could offer deeper insights, but timing constraints and scope favoured surveys. Using established cultural variables mitigated discrepancies and ensured transparent reporting. Longitudinal, ethnographic approaches might have better captured the impact of cultural evolution on herding in infrastructure contexts.

9.4.2. Theoretical limitations

Integrating practice-based constructs from four theories: Engeström's (2001) cultural-historical activity theory of expansive learning at the workplace, Hofstede's (2013) national cultural psychology theory, Gibson's (1979) affordances theory, and Scharfstein & Stein (1990) concept of herding among managers in organisational decision-making are notable strengths in elucidating how human-centred herding motives

emerge and constrain managerial development within the infrastructure development activity. However, the sequential integration of these theories raises potential limitations and complexity in reporting the mixed-method research findings due to integrating quantitative and qualitative findings. The cultural-historical activity framework provided a clear rationale for the design, data integration process, and result interpretation, facilitating effective communication of integrated findings. The integrated theoretical perspective emphasises the evolving nature of human activity due to contradictions within the infrastructure development context. It demands a multi-stage analysis involving various activity systems, thus adding complexity. The researcher chose a specific point for analysis due to the complexity of this interdisciplinary research. Based on scholars who suggest augmenting cultural-historical activity theory with other mid-range filters (Mentz & De Beer, 2021), the researcher argues that this integrated approach allowed theoretical integration limitations to be overcome by using a qualitative approach, enabling a nuanced theoretical understanding to emerge without over-specification. The study acknowledges the potential of other cultural frameworks, noting that Hofstede's approach might have constrained the identification of emergent traits by limiting the study to the six cultural dimensions. It encourages future project management and economic researchers to explore alternate cultural definitions to compare results.

9.4.3. Recommendations for future research

The study proposes several recommendations for future research. Firstly, future studies should apply other social theories, such as the structuration, actor-network and social action theory, to replicate and extend the current study. Alternative social theories, such as the feminist theory, can be used to triangulate the insights into the relationship between managerial herding associated with gender disparities within the infrastructure development context as likely sources of sovereign risk information loss by examining practitioners' lived realities, including their social roles, power dynamics, economic status, and cultural coping mechanisms.

Secondly, a longitudinal study involving other infrastructure development samples might be useful to explore how repeated managerial behavioural pitfalls shift their impact on sovereign risk over time. Furthermore, considering evolving cross-border infrastructure risk premium determinants, it is important to investigate the influence of global infrastructure governance and management interventions based on social theories to explain the relationship between local practitioners and their international partners. The study underscores the importance of further research into understanding the cultural context in management strategies in the private sector. Structural Equation Modeling (SEM) is an alternative statistical approach that allows future researchers to examine complex relationships among sovereign risk and infrastructure development practices, including direct and indirect effects. It combines elements of factor analysis and multiple regression. Future research should address the secondary data analysis limitations by exploring

additional sources and conducting primary surveys to foster a comprehensive understanding of the relationship between cultural dimensions, sovereign risk, and infrastructure lifecycle management.

Moreover, exploring other project management domains influenced by cultural contexts may be useful to compare findings and expand the study's scope by integrating structured public consultations such as focus groups with local community members. Lastly, it is important to investigate the impact of respondent socioeconomic and education levels on unintended managerial herding and risk perception, specifically comparing educated agents from different nations to confirm assumptions and gain further insights. Addressing these recommendations would foster a robust infrastructure project management and sovereign risk premiums conceptual framework.

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Appendices

Appendix A: Researcher introduction letter

Ole Sangale Rd, Madaraka Estate
P. O Box 59857 - 00200, Nairobi, Kenya.
Cell: +254 703 034 414/6/7, Twitter: @SBSKenya
Facebook/LinkedIn: Strathmore Business School
Email: info@sbs.ac.ke or visit www.sbs.strathmore.edu



21st February 2022

Ref: SBS/ PBM/013058/19

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: LETTER OF INTRODUCTION – OYUGA SALOME (ADM.NO: 013058)

Greetings from Strathmore University Business School (SBS).

This letter serves to confirm that the above named is a student pursuing a PhD programme in Business and Management at Strathmore University Business School, Madaraka Campus.

She is working on his research thesis titled "*A Behavioral Capital Effectiveness Model For Mitigating Foreign Debt Investment Risk Exposures On Transport And Renewable Energy Projects in Kenya*" as partial fulfilment of the requirements for the programme. In view of this, she will contact you to request your assistance in data collection.

All data and information collected will be treated with utmost confidentiality and only used for academic purposes.

Any assistance accorded to him will be highly appreciated. Do not hesitate to contact me on sbsdac@strathmore.edu should you need further clarification.

Yours Sincerely,

A handwritten signature in blue ink, appearing to read "Freshia Mugo-Waweru".

Dr. Freshia Mugo-Waweru

Academic Director, Doctoral programmes

Strathmore University Business School is a Proud member of:



Appendix B: Strathmore ethical approval



16th February 2022

Ms. Oyuga, Salome
salome.oyuga@strathmore.edu

Dear Ms. Oyuga,

RE: A Behavioral Capital Effectiveness Model for Mitigating Foreign Debt Investment Risk Exposures on Transport and Renewable Energy Projects In Kenya

This is to inform you that SU-IERC has reviewed and **approved** your above **SU PhD** research proposal. Your application reference number is **SU-IERC1263/22**. The approval period is **16th February 2022 to 15th February 2023**.

This approval is subject to compliance with the following requirements:

- i. Only approved documents including (informed consents, study instruments, MTA) will be used
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
- iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 48 hours of notification
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 48 hours
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke/> and obtain other clearances needed.

Yours sincerely,

for: Prof Fred Were,
Chairperson; SU-IERC



Appendix C: NACOSI ethical approval

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 424631	Date of Issue: 25/February/2022
RESEARCH LICENSE	
	
This is to Certify that Miss. Salome Oyuga of Strathmore University, has been licensed to conduct research in Mombasa, Nairobi, Nakuru on the topic: An examination of large infrastructure foreign debt inflow size, time, and interest rates to propose a behaviorally informed capital effectiveness model for mitigating foreign debt investment risk exposures on transport and renewable energy projects in Kenya for the period ending : 25/February/2023.	
License No: NACOSTI/P/22/15895	
424631	
Applicant Identification Number	Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
	Verification QR Code
	
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Appendix D: Survey of risk perception in large-scale infrastructure development projects

Participant informed consent form

Student Name and Registration No: Salome Oyuga; 013058

This consent form is designed to give the participants all the information regarding their involvement in the research. Kindly review the contents carefully and feel free to seek any additional clarifications needed.

Research purpose: Understanding the effect of risk on foreign debt inflow to large infrastructure projects in Kenya.

Participant profile: Individuals who have completed 2 years as project practitioners and have experienced some level of interaction with financial decisions and risk management in large transportation and energy projects.

Interview time: A one-hour one-to-one interview at a convenient location. Additionally, after the interview, the notes taken will be provided to participants to verify the accuracy and share any additional information.

Participation risks and how they will be mitigated: Except for any unforeseen risks that may arise, the researcher will minimise risk by collecting data using a pseudonym of your choice once you consent to participate in the study.

Benefits of participation: Your valued information may help expand our understanding of the effects of financial risk and their mitigation methods in fostering foreign debt inflows to large economic infrastructure projects in Kenya. It may help organisations and practitioners enhance their financial risk management strategies along the project lifecycle.

Participant confidentiality: The selected pseudonym will be used on all forms and documents to collect and code the information you provide.

The decision to stop participation in the research: You can withdraw from participating in this research for any reason that you deem relevant to you at any time.

If you have any questions before or during the research, kindly contact the researcher via phone at +254 725 554 486 or email: Salome.oyuga@strathmore.edu.

Having read, understood, and explained the risks and benefits of participating in the study, I agree to participate in this research.

Participant's name:

Participant's signature:

Date:

Survey questionnaire for managerial perceptions of sovereign risk, debt-side governance, project management and national culture in Kenyan large-scale infrastructure development projects

Notes about the questionnaire:

As with many questionnaire surveys, some questions appear irrelevant or impertinent. However, it is necessary for this study that all questions are answered, as the questionnaire is designed to achieve research objectives, and it is hoped not to offend participants in any way. If there are any questions that you are unwilling or unable to answer, I wish you to continue to answer the remainder of the questionnaire. **Remember that your identity and the company you work for will remain strictly confidential.** Thank you in advance for taking the time to complete this survey.

Study aim

The research aims to propose a human-centered infrastructure design and implementation framework by that can be used to mitigate risks and sustain capital effectiveness in Kenyan Vision 2030 infrastructure development projects.

The questionnaire contains three parts

Part 1: General participant information and ambiguity tolerance measurement scale

Part 2: Risks affecting infrastructural foreign debt inflows and risk premiums in Kenya

Part 3: Risk mitigation and national culture dimensions likely to increase foreign debt inflow and reduce risk premium

Instructions

In each **demographic variable** below, please tick **only one box**

Part 1: Participant demographics and attributes of tolerance for ambiguity

1. Gender ☐ Male ☐ Female
2. Age ☐ 30-35 ☐ 35-50 ☐ 40-45 ☐ 46-50 ☐ 51-55
☐ 56-60 ☐ 61 or more
3. Years of experience ☐ 2-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25
☐ 26 or more
4. Position on the project ☐ Senior management ☐ Middle management

Board membership and the infrastructure sector are represented

As a practitioner, you collaborate with other project development, construction, and operationalisation stakeholders to assess, evaluate, and measure risks to recommend actions that may influence capital inflow to projects. Please indicate if you hold any board position advising on large infrastructure risks and risk mitigation methods' ability to influence foreign debt contracting and funding outcomes.

Board membership status ☐ Yes ☐ No

If the answer to the above is 'Yes', please indicate whether the membership belongs to the project you represent or another:

Company of board membership ☐ Where I work ☐ On another project

Project status ☐ Public ☐ Private

5. Please select the name of the infrastructure project/authority you work in:

- Standard Gauge Railway []
- Lamu Port-Southern Sudan-Ethiopia Transport (LAPSSET) []
- Nairobi Expressway []
- Thika Superhighway []
- Lake Turkana Wind Power Project []
- Olkaria Geothermal Power Station []
- KenGen wind power project []

5. Kindly indicate the duration you have been involved with this project:

- 1–2 years []
- 2–3 years []
- 3–4 years []
- 5 years and above []

Please state the countries in which you have managed large infrastructure projects:

.....

.....

.....

PART 1: Measures of intolerance for ambiguity								
The following is a list of statements that are associated with ambiguity tolerance . Please indicate (i.e. tick (√)) the scale value that most closely reflects your agreement level with the statements.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	I do not tolerate ambiguous situations well (G1)	☐	☐	☐	☐	☐	☐	☐
2	I would rather avoid solving a problem that must be viewed from several different perspectives (I1)	☐	☐	☐	☐	☐	☐	☐
3	I try to avoid ambiguous situations (G2)	☐	☐	☐	☐	☐	☐	☐
4	I prefer familiar situations to new ones (N1)	☐	☐	☐	☐	☐	☐	☐
5	Problems that cannot be considered from just one point of view are a little threatening (I2)	☐	☐	☐	☐	☐	☐	☐
6	I avoid situations that are too complicated for me to understand easily (C1)	☐	☐	☐	☐	☐	☐	☐

7	I am tolerant of ambiguous situations (G3)	☐	☐	☐	☐	☐	☐	☐
8	I enjoy tackling problems that are complex enough to be ambiguous (C2)	☐	☐	☐	☐	☐	☐	☐
9	I try to avoid problems that do not seem to have only one "best" solution (I3)	☐	☐	☐	☐	☐	☐	☐
10	I generally prefer novelty over familiarity (N2)	☐	☐	☐	☐	☐	☐	☐
11	I dislike ambiguous situations (G4)	☐	☐	☐	☐	☐	☐	☐
12	I find it hard to make a choice when the outcome is uncertain (U1)	☐	☐	☐	☐	☐	☐	☐
13	I prefer a situation in which there is some ambiguity (G5)	☐	☐	☐	☐	☐	☐	☐

Would you like to participate in a follow-up phone call with the researcher on ambiguity tolerance and preferred projects?

.....

Can you recommend any other large infrastructure project manager(s) who would be interested in participating in this survey?

Yes

No

If yes, please add their email address(es) below:

.....

Please note that questions identified with a (c) are the questions that were negatively stated and therefore reversed scored.

Please note that the codes to the right of some questions indicate that the scale includes three items considered insoluble, illogical, fundamental, and internally inconsistent stimuli (I). Two items address unfamiliar, new, and novel stimuli (U). Two items address complex stimuli (C), one item refers to uncertain stimuli (U), and five items correspond to ambiguous stimuli in general (G).

Have you ever left a project due to high financial risks?

.....

Have you ever left a project due to capital running out?

.....

Are you a certified project management professional?

.....

SECTION TWO: FINANCIAL RISK AND FOREIGN DEBT CAPITAL FLOW

PROJECT FINANCIAL DATA

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Year										
Project size (total amount investment in US\$)										
Foreign debt (US\$)										
Interest rate charged (%)										
Debt maturity in years										
Investment opportunities (refinancing need)										
Source of debt (country)										
Operational costs (profitability as %)										
Material purchase price changes (%)										
Carbon emission reduced (volume)										

PART 2A: Sovereign risk factors								
The following table presents various statements on indicators of sovereign risk likely to significantly influence interest rates on foreign debt borrowed to fund large infrastructure projects in Kenya.								
Please indicate (i.e. tick (✓)) the scale value that most closely reflects your agreement level with the statements.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Inflation rate	☐	☐	☐	☐	☐	☐	☐
2	Changes in the US\$ interest rate	☐	☐	☐	☐	☐	☐	☐
3	The Kenya shilling exchange rate to the US dollar	☐	☐	☐	☐	☐	☐	☐
4	Kenya's long-term national debt growth	☐	☐	☐	☐	☐	☐	☐
5	Kenya's short-term national debt growth	☐	☐	☐	☐	☐	☐	☐
6	Construction material import price changes	☐	☐	☐	☐	☐	☐	☐
7	Kenya's gross domestic product (GDP) growth	☐	☐	☐	☐	☐	☐	☐
8	Implementation of the Kenyan Green Bonds Programme (GBPK)	☐	☐	☐	☐	☐	☐	☐
9	Implementation of the Green Economy Strategy and Implementation	☐	☐	☐	☐	☐	☐	☐

	Plan (GESIP) of 2016–2030							
10	Implementation of the national debt management policy	☐	☐	☐	☐	☐	☐	☐
11	Politics does not affect foreign debt capital flows to large infrastructure projects in any way	☐	☐	☐	☐	☐	☐	☐
12	Large infrastructure projects have suffered the consequences of political risk, affecting their completion and maintenance	☐	☐	☐	☐	☐	☐	☐
13	Large infrastructure projects in Kenya are charged a high interest rate due to corruption risk, leading to increased project costs	☐	☐	☐	☐	☐	☐	☐
14	Our country is financially stable; hence, it does not suffer any form of higher interest rates on foreign debt capital to projects due to country risks	☐	☐	☐	☐	☐	☐	☐
15	Our country's foreign debt capital flows have been appropriate and have been managed appropriately	☐	☐	☐	☐	☐	☐	☐

The following table presents various indicators of sovereign risk likely to influence foreign debt capital flows, irrespective of interest rate charges to borrow capital to fund large infrastructure projects. Please indicate (i.e. tick (✓)) the scale value that most closely reflects your agreement level with the statements.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Kenya's inflation rate	☐	☐	☐	☐	☐	☐	☐
2	Changes in the US\$ interest rate	☐	☐	☐	☐	☐	☐	☐

3	The Kenya shilling exchange rate to the US dollar	☐	☐	☐	☐	☐	☐	☐
4	Kenya's long-term national debt growth	☐	☐	☐	☐	☐	☐	☐
5	Kenya's short-term national debt growth	☐	☐	☐	☐	☐	☐	☐
6	Import price changes for construction inputs	☐	☐	☐	☐	☐	☐	☐
7	Kenya's gross domestic product (GDP) growth	☐	☐	☐	☐	☐	☐	☐
8	Implementation of the Kenyan Green Bonds Programme (GBPK)	☐	☐	☐	☐	☐	☐	☐
9	Implementation of the Green Economy Strategy and Implementation Plan (GESIP) of 2016–2030	☐	☐	☐	☐	☐	☐	☐
10	Implementation of the national debt management policy	☐	☐	☐	☐	☐	☐	☐
11	Politics does not affect foreign debt capital flows to large infrastructure projects in any way	☐	☐	☐	☐	☐	☐	☐
12	Large infrastructure projects have suffered the consequences of political risk, affecting their completion and maintenance	☐	☐	☐	☐	☐	☐	☐
13	Large infrastructure projects in Kenya are charged a high interest rate due to corruption risk, leading to increased project costs	☐	☐	☐	☐	☐	☐	☐
14	Our country is financially stable; hence, it does not suffer any form of higher interest rates on foreign debt capital to projects due to country risks	☐	☐	☐	☐	☐	☐	☐
15	Our country's foreign debt capital flows have been appropriate and have been managed appropriately	☐	☐	☐	☐	☐	☐	☐

What emergent challenges are you currently experiencing in the financial risk management process in your infrastructure project?
Please list below:

.....

.....

.....

.....

.....

PART 2B: Project-specific debt-side governance factors								
The following table presents various statements on a project's debt structure likely to influence the interest rate on foreign debt borrowed to fund large infrastructure projects. Please indicate (i.e. tick (√)) the scale value that most closely reflects your agreement level with the statements.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Project size influences the interest rate charged on foreign debt capital	☐	☐	☐	☐	☐	☐	☐
2	The debt-to-equity ratio of capital influences the interest rate on foreign debt capital	☐	☐	☐	☐	☐	☐	☐
3	The loan maturity period influences the interest rate charged on foreign debt capital	☐	☐	☐	☐	☐	☐	☐
4	Investment opportunities to expand or upgrade a project influence the interest rate charged on foreign debt capital	☐	☐	☐	☐	☐	☐	☐
5	Project profitability influences the interest rate charged on foreign debt capital	☐	☐	☐	☐	☐	☐	☐

The following table presents various statements on project debt structures likely to influence foreign debt capital flows to large infrastructure projects irrespective of the interest rate charged for borrowing capital. Please indicate (i.e. tick (√)) the scale value that most closely reflects your agreement level with the statements.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Project size influences foreign debt capital flow	☐	☐	☐	☐	☐	☐	☐
2	The debt-to-equity ratio influences foreign debt capital flow	☐	☐	☐	☐	☐	☐	☐
3	The loan maturity period influences foreign debt capital flow	☐	☐	☐	☐	☐	☐	☐
4	Investment opportunities to expand or upgrade a project influence foreign debt capital	☐	☐	☐	☐	☐	☐	☐
5	Project profitability influences foreign debt capital flow	☐	☐	☐	☐	☐	☐	☐
6	Our project has been refinanced at a low interest due to a good credit history	☐	☐	☐	☐	☐	☐	☐

PART 2B: Project management factors								
The following table presents various statements on project management practices likely to influence the interest rate on foreign debt capital borrowed to fund large infrastructure projects. Please indicate (i.e. tick (✓)) the scale value that most closely reflects your agreement level with the statements.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Transparent reporting of financial risks influences the interest rate charged on foreign debt capital	☐	☐	☐	☐	☐	☐	☐
2	Poor risk management practices have greatly contributed to a large number of stalled projects	☐	☐	☐	☐	☐	☐	☐
The following table presents various statements on project management practices likely to influence foreign debt capital borrowed to finance large infrastructure projects, irrespective of the interest rate charged. Please indicate (i.e. tick (✓)) the scale value that most closely reflects your agreement level with the statements.								
3	Foreign debt inflow has decreased in Kenya due to rising financial risks	☐	☐	☐	☐	☐	☐	☐
4	Project implementation has been delayed greatly due to reduced debt inflow	☐	☐	☐	☐	☐	☐	☐
5	The financial risks management policy is well documented	☐	☐	☐	☐	☐	☐	☐
6	Contractual financial risk management terms with our foreign debt capital providers are followed appropriately	☐	☐	☐	☐	☐	☐	☐
7	Most of the stalled projects are a result of withdrawn funding due to poor financial risk management practices	☐	☐	☐	☐	☐	☐	☐
8	Our project faces tremendous delays due to the difficulty of implementing all laid down financial risk management strategies	☐	☐	☐	☐	☐	☐	☐
9	Our project faces tremendous delays because controls available in the government's schedule concerning financial risks do not adequately address key cross-sectoral project risks management challenges	☐	☐	☐	☐	☐	☐	☐
10	The government policy on foreign debt capital risk management is appropriate	☐	☐	☐	☐	☐	☐	☐

11	Our project has faced litigation due to default on in risk management	☐	☐	☐	☐	☐	☐	☐
12	Our project has faced litigation due to default on lender covenants	☐	☐	☐	☐	☐	☐	☐

The following table presents various statements on large infrastructure project phases likely to rely on foreign debt and stakeholders for their success. Please indicate (i.e. tick (√)) the scale value that most closely reflects your agreement level with the statements.

		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Projects rely on foreign debt and stakeholders in the development phase	☐	☐	☐	☐	☐	☐	☐
2	Projects rely on foreign debt and stakeholders in their construction phase	☐	☐	☐	☐	☐	☐	☐
3	Projects rely on foreign debt and stakeholders in their operational phase	☐	☐	☐	☐	☐	☐	☐
4	Projects rely on foreign debt and stakeholders to fund maintenance costs	☐	☐	☐	☐	☐	☐	☐
5	Projects rely on foreign debt and stakeholders in their termination phase	☐	☐	☐	☐	☐	☐	☐
6	Natural disasters due to climate change affect project implementation success deterring foreign debt inflow and global stakeholders from Kenyan projects	☐	☐	☐	☐	☐	☐	☐

PART 2C: Carbon emission rfactors

The following table presents various statements on a project's carbon emission management factors likely to influence investors' interest rate charges on borrowed foreign debt to finance large emission-intensive infrastructure projects. Please indicate (i.e. tick (√)) the scale value that most closely reflects your agreement level with the statements.

		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Carbon influences the interest rate charged on foreign debt	☐	☐	☐	☐	☐	☐	☐
2	The public perception of carbon influences the interest rate charged on foreign debt	☐	☐	☐	☐	☐	☐	☐
3	The presence of carbon emission adaptability mechanisms influences the interest rate charges on foreign debt	☐	☐	☐	☐	☐	☐	☐

4	Changes in the carbon credit price influence the interest rate charges on foreign debt capital	☐	☐	☐	☐	☐	☐	☐
5	Registering a project as a clean development mechanism project influences the interest rate on foreign debt	☐	☐	☐	☐	☐	☐	☐
6	Natural disasters due to climate change affect project implementation success, thus increasing the interest rate charged on foreign debt capital	☐	☐	☐	☐	☐	☐	☐
The following table presents various statements on a project's carbon emission management behaviour likely to influence investor willingness to provide foreign debt capital to large emission-intensive infrastructure projects. Please indicate (i.e. tick (✓)) the scale value that most closely reflects your agreement level with the statements.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Our project's carbon emission influenced the foreign debt capital flow	☐	☐	☐	☐	☐	☐	☐
2	The public perception of carbon influences foreign debt contracting	☐	☐	☐	☐	☐	☐	☐
3	The presence of carbon emission adaptability mechanisms influences foreign debt inflow	☐	☐	☐	☐	☐	☐	☐
4	Changes in the carbon credit price influence the foreign debt inflow	☐	☐	☐	☐	☐	☐	☐
5	Registering a project as a clean development mechanism project enhances its ability to attract foreign debt inflows	☐	☐	☐	☐	☐	☐	☐
6	Foreign debt provider stopped project funding due to carbon risks	☐	☐	☐	☐	☐	☐	☐
7	We have faced community action or paid penalties against our project due to pollution	☐	☐	☐	☐	☐	☐	☐
8	We have faced penalties due to pollution exposure of our staff	☐	☐	☐	☐	☐	☐	☐
9	Our project has faced disputes with customers due to pollution	☐	☐	☐	☐	☐	☐	☐
10	We ask for carbon emission disclosures across our value chain of process and in all the goods and services procured	☐	☐	☐	☐	☐	☐	☐

11	We invest in research and development to reduce our project's carbon emissions	☐	☐	☐	☐	☐	☐	☐
12	We regularly update our carbon emission policies in line with the national green energy and sustainability policies	☐	☐	☐	☐	☐	☐	☐
13	Our project has contributed to reducing the country's carbon emissions	☐	☐	☐	☐	☐	☐	☐
14	Our project has contributed to the avoidable increase in the country's carbon emissions	☐	☐	☐	☐	☐	☐	☐

SECTION THREE: RISK MITIGATION AND NATIONAL CULTURE DIMENSIONS

PART 3: Risk mitigation								
PART 3A: Sovereign risk mitigation tools								
The following table presents various contractual agreements and guarantees provided by the government to reduce financial risks to attract foreign debt capital into large infrastructure projects. Please indicate (i.e. tick (✓)) the scale value that most closely reflects your agreement level with the statements regarding the financial risk mitigation tools' effectiveness.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
Contractual obligations of government entities								
1	Guarantee of off-take in power projects	☐	☐	☐	☐	☐	☐	☐
2	Guarantee of fuel supply in power projects	☐	☐	☐	☐	☐	☐	☐
Policy and political risks								
1	Guarantee of currency convertibility and transferability	☐	☐	☐	☐	☐	☐	☐
2	Guarantee in case of changes of law or regulatory regime	☐	☐	☐	☐	☐	☐	☐
Financial market disruptions and fluctuations								
1	Guarantee of interest rate	☐	☐	☐	☐	☐	☐	☐
2	Guarantee of exchange rate	☐	☐	☐	☐	☐	☐	☐
3	Debt guarantee	☐	☐	☐	☐	☐	☐	☐
Market risks								
1	Guarantee of tariff rates (sales rates)	☐	☐	☐	☐	☐	☐	☐
2	Revenue guarantee	☐	☐	☐	☐	☐	☐	☐

PART 3A: Institutions and governance structures								
The following risk governance tools and management policies help reduce financial risks to attract foreign debt capital into infrastructure projects. Please indicate (i.e. tick (√)) the scale value that most closely reflects your level of agreement with the statements.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	Large infrastructure projects in the country have proved to be a heavy burden to the financial markets	☐	☐	☐	☐	☐	☐	☐
2	There have been low foreign inflows into infrastructure projects in Kenya due to market risks	☐	☐	☐	☐	☐	☐	☐
3	Market risks have led to stalled projects as the amounts required to fund them may not be successfully borrowed	☐	☐	☐	☐	☐	☐	☐
4	The government of Kenya has been able to mitigate market risks effectively	☐	☐	☐	☐	☐	☐	☐
5	The private sector projects have suffered financially due to Kenya's rising foreign debt	☐	☐	☐	☐	☐	☐	☐
6	The 2020 national debt management policy will improve borrowing and lending terms to projects in Kenya	☐	☐	☐	☐	☐	☐	☐
PART 3B: Project-level risk mitigation tools								
Project companies use the following financial instruments to reduce project inputs procurement and contracting financial risks in large infrastructural projects. Inputs are capital, material, and labour. Please indicate (i.e. tick (√)) the scale value that most closely reflects your agreement level with the statements on the instruments' effectiveness in risk mitigation.								
1	Interest rate swaps	☐	☐	☐	☐	☐	☐	☐
2	Commodity price options	☐	☐	☐	☐	☐	☐	☐
3	Fixed-price contracts	☐	☐	☐	☐	☐	☐	☐
4	Forward contracts	☐	☐	☐	☐	☐	☐	☐
5	Futures contracts	☐	☐	☐	☐	☐	☐	☐
6	Insurance guarantees	☐	☐	☐	☐	☐	☐	☐

7	Partial risk guarantees from multilateral or bilateral bodies	☐	☐	☐	☐	☐	☐	☐
8	Viability gap guarantees	☐	☐	☐	☐	☐	☐	☐
9	Performance bonds	☐	☐	☐	☐	☐	☐	☐
10	There have been low foreign debt capital flows into infrastructure projects in Kenya due to an underdeveloped capital market	☐	☐	☐	☐	☐	☐	☐

The following operational methods are used to reduce financial risks in a portfolio of large infrastructural projects. Please indicate (i.e. tick (✓)) the scale value that most closely reflects your agreement level with the statements.								
1	Risk transfer to a third party	☐	☐	☐	☐	☐	☐	☐
2	Risk acceptance	☐	☐	☐	☐	☐	☐	☐
3	Revenue diversification	☐	☐	☐	☐	☐	☐	☐
4	Project cash flow matching	☐	☐	☐	☐	☐	☐	☐
5	Debt repayment terms renegotiation	☐	☐	☐	☐	☐	☐	☐
6	Having a credit risk management policy	☐	☐	☐	☐	☐	☐	☐
7	Financial risk assessment and decision-support tools	☐	☐	☐	☐	☐	☐	☐
8	Carbon risk management policy	☐	☐	☐	☐	☐	☐	☐
9	Financial risk management training	☐	☐	☐	☐	☐	☐	☐

PART 3C: National culture dimensions of risk management The following cultural dimensions can affect foreign debt borrowers, governments, and project-level financial risk management practices. Please indicate (i.e. tick (✓)) the scale value that most closely reflects your agreement level with the statements regarding the financial risk mitigation tools' effectiveness.								
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
Power distance index (PDI): The extent to which the less powerful infrastructure project organisations, members, and institutions accept and expect that financial decision-making power is distributed unequally								
1	Kenya's foreign debt borrowers should be taught that their risk	☐	☐	☐	☐	☐	☐	☐

	management opinion is as important as the foreign debt providers							
2	Kenya's foreign debt borrowers should be taught not to take any risks for granted in the entire project lifecycle, including inter-project development government institutions	☐	☐	☐	☐	☐	☐	☐
3	Practitioners in project organisations at the country and project level must be able to create individual financial risk control functions	☐	☐	☐	☐	☐	☐	☐
4	Foreign debt providers make all financial risk management decisions that project organisers and stakeholders must accept and respect	☐	☐	☐	☐	☐	☐	☐
5	The most effective way to raise project foreign debt inflow and reduce debt costs in Kenya is to replace those with the power to make financial decisions	☐	☐	☐	☐	☐	☐	☐
Individualism (IDV): The degree to which individuals in a large infrastructure project are integrated into groups. On the individualist side, stakeholder ties in financial risk management are loose, and everyone is expected to look after their individual project's financial risks. On the collectivist side, stakeholder ties from the project start date onwards are integrated into strong, cohesive in-groups, often extended into network-based (capital provider and borrower) risk reduction instruments which continue protecting project cash flows in exchange for unquestioning loyalty.								
1	Project organisations have a strong policy loyalty only to the sub-sector groups they belong to and not cross-sector groups	☐	☐	☐	☐	☐	☐	☐
2	The project sub-sector group's risk management conventions/rules influence my risk management behaviour	☐	☐	☐	☐	☐	☐	☐
3	Successful project finance practitioners are recognised based on their lender loyalty and age	☐	☐	☐	☐	☐	☐	☐
4	It is immoral for a government not to offer guarantees to the project sponsoring organisation	☐	☐	☐	☐	☐	☐	☐
Masculinity (MAS) versus its opposite, femininity, refers to the distribution of roles between the genders, which is another fundamental issue for any large infrastructure social unit to which a range of risk management solutions are found.								
1	I have sympathy for failed projects, and I envy others for their financial success	☐	☐	☐	☐	☐	☐	☐

2	At work, I am motivated by a relaxed, friendly atmosphere	☐	☐	☐	☐	☐	☐	☐
3	Financial decisions in large projects must be based on consensus	☐	☐	☐	☐	☐	☐	☐
4	Large socioeconomic infrastructure projects offer products that foster a good quality of life and are important for both men and women	☐	☐	☐	☐	☐	☐	☐
5	What we want most from our project financial partners is support in difficult situations	☐	☐	☐	☐	☐	☐	☐
Uncertainty avoidance index (UAI) deals with a social unit's tolerance for uncertainty and ambiguity. It indicates the extent to which a risk management culture programmes large infrastructure project management teams to feel uncomfortable or comfortable in unstructured situations. Unstructured situations are novel, unknown, surprising, and different from usual. Uncertainty avoiding cultures try to minimise the possibility of such conditions by strict laws and rules, while uncertainty accepting cultures are more tolerant of opinions that are different from what they are used to, trying to have as few rules as possible for risk management.								
1	Project finance and delivery practitioners must be taught to be organised and avoid ambiguity	☐	☐	☐	☐	☐	☐	☐
2	High competence and expert risk leadership are appreciated in large infrastructure project financing and delivery	☐	☐	☐	☐	☐	☐	☐
3	Foreign debt providers and local practitioners should always carry an identity in project financial success	☐	☐	☐	☐	☐	☐	☐
4	It is improper to express large infrastructure project financial failures in public	☐	☐	☐	☐	☐	☐	☐
5	There are some risk management rules and customs that all project stakeholders must respect	☐	☐	☐	☐	☐	☐	☐
Long-term orientation (LTO) deals with long- versus short-term orientation. A long-term orientation entails using financial resources wisely and perseverance in delivering complex projects. At the same time, a short-term orientation is associated with respecting tradition and fulfilling social obligations to the extent of protecting one's "face" as a project construction manager, such as not considering the long-term debt repayment sustainability of a large infrastructure project once it transitions to the operational lifecycle.								
1	Practitioners know very clearly what good financial risk management is and what is bad	☐	☐	☐	☐	☐	☐	☐
2	Practitioners think every risk in a project is relative and permanently changing	☐	☐	☐	☐	☐	☐	☐

3	Practitioners must be taught to ask WHY, WHAT, and HOW of the project governance board's financial decisions	☐	☐	☐	☐	☐	☐	☐
4	Project governance boards always influence practitioners' risk management behaviour	☐	☐	☐	☐	☐	☐	☐
5	Practitioners can deliver projects successfully, even with contradictory risk information due to evolving economic, social, and environmental factors	☐	☐	☐	☐	☐	☐	☐
Indulgence versus restraint (IVR) deals with freedom to spend. Indulgent societies allow relatively free gratification of basic and natural human desires leading to enjoying life and having fun. Restrained societies suppress gratification of needs and regulate it using strict social norms. In contrast to indulgent societies, restrained societies do not emphasise immediate gratification and control the gratification of their desires.								
1	Are you generally focused in life on the short term?	☐	☐	☐	☐	☐	☐	☐
2	Are you generally focused in life on the long term?	☐	☐	☐	☐	☐	☐	☐
2	How do you display this focus in how you live your life and make decisions? I need immediate results	☐	☐	☐	☐	☐	☐	☐
3	Why do you believe you have developed this type of focus for your life?	☐	☐	☐	☐	☐	☐	☐

Thank you again for taking part in this survey. If you would like a summary of the results, please add your name and contact address below:

Name:

Contact details:

Appendix E: In-depth interview codebook

Concept	Definition	Empirical application	Empirical observation
Activity	A purposeful interaction between the subject and the world or a system of actions undertaken by subjects (actors) to transform an object into a desired outcome	Improving collective decision-making in infrastructure development projects to mitigate sovereign risk	
Actions	Conscious, goal-directed steps may be taken to reach the motive/fulfil the object	Debt-side governance, project management, and macroeconomic and sociocultural risk management	Conscious debt-side governance, project management, and macroeconomic and social interactions among infrastructure practitioners
Operations	Automatic/routine processes oriented toward the conditions in which the subject is striving towards the goal	Spontaneous adjustments by participants when interacting with decision-making tools and rules	Spontaneous adjustments by participants when interacting with debt-side governance, project management, and macroeconomic risk information aggregation mechanisms (may not be evident since some may be mental)
Subject	The individual whose agency is chosen as the focal point of analysis	Senior infrastructure practitioners	Theory
Object	Material or ideal prospective outcome that motivates and directs an activity	Motivations for participating in collective decision-making and engaging other debt governance, project management, and macroeconomic risk information aggregation activities expressed by participants	Reasons given for collective decision-making interventions (both actuated and desired) Reasons given by other stakeholders for motivating their different actions concerning the infrastructure debt governance, project management, and macroeconomic risk information aggregation
Goal	The desired short-term outcome of a conscious action	Reasons for the actions	The desired outcomes for the identified actions
Conditions	Situations that are embedded in the context that affect the subject's activity and which the subject is not in control of	Factors that affect how an action within the infrastructure risk reduction activity is executed through infrastructure debt governance, project management, and macroeconomic risk information aggregation	Infrastructure system development barriers Environmental barriers Governance and information aggregation challenges Any other barriers that motivate how collective decision-making structures were used
Outcome	The intended or unintended result (a translated motive)	The desired/perceived sovereign risk outcome of the cross-border infrastructure risk reduction activity	The goal of reducing risks through governance information aggregation during cross-border infrastructure development lifecycle as desired by participants
Tools	Physical, conceptual, or technological artefacts mediating the subject-object interaction	Interventions to foster collective decision-making in cross-border infrastructure contexts	Big 4 Agenda and other policy/institutional artefact affordances
Mediation	Affordances: properties of the debt governance, project management, and macroeconomic risk aggregation	The collective decision-making structure facilitation and constraints in achieving user goals	User interaction with the decision-making mechanisms

	artefacts that provide possibilities for action; the action possibilities are culture-dependent. Agency: user response to the affordance or mediation initiation	How collective decision-making structures provoke/resolve conflict between goals User developmental transformation	Integration of technology into debt governance, project management, and macroeconomic risk aggregation activities with the social-cultural environment
Community	The social group that the subject belongs to while engaged in an infrastructure project management activity The community of practice to which the activity/subjects belong	Other stakeholders interested and participating in the infrastructure debt governance, project management, and macroeconomic risk aggregation activity	People/institutions identified and inferred by participants as crucial in reducing risk in infrastructure projects through effective debt governance, project management and macroeconomic risk information aggregation activities
Rules/values	The implicit and explicit norms, conventions, and social relations within a community potentially limit the activity being undertaken	Explicitly stated in the infrastructure policy standards and implied in cultural norms/practices/beliefs about cross-border infrastructure debt governance and risks	Cross-border infrastructure debt-side governance, project management, and macroeconomic risk aggregation Barriers to reducing infrastructure risks as expressed by participants Norms and beliefs that guide infrastructure practitioners' management behaviour in the infrastructure context
Division of labour	How the activity is distributed among the community members is the role everyone plays in the activity, the power each wields, and the tasks each is responsible for	Responsibilities among the stakeholders Power relationships and structures Resources ownership and sharing	Power relations/authoritative structures in relationships between practitioners and other community members and practitioners and infrastructure risk management providers Expectations of who does what in the infrastructure development period
Contradictions	Structural tensions in the activity system	Challenges, shortcomings, and bottlenecks experienced by participants in the collective decision-making structure by users and other stakeholders by introducing the Big 4 Agenda as the most recent Vision 2030 policy intervention The Big 4 Agenda is one of the most recent policy guidelines that sought to integrate practitioners into the national infrastructure governance activity. Challenges in other organisational decision-making structures	Policy user frustration, challenges and limitations expressed or manifested in the use of collective decision-making structures, i.e. the Big 4 Agenda New ways of using/interacting with collective infrastructure governance and risk interventions like the Big 4 Agenda (changes and adaptations) Challenges in the implementation and use of the intervention
Internalisation Externalisation	Reconstruction of external objects and transforming internal activities into external ones	Manifested patterns of cultural response to infrastructure implementation risks and the availability of decision-making structures for cross-border infrastructure debt governance, project management, and macroeconomic risk mitigation	New behavioural patterns: responses and patterns of using policy guidelines in managerial interactions as one of the collective decision-making structures within infrastructure project contexts

Appendix F: Test scale results for perceptions of debt-side governance

1.	Interest rate					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Inflation	+	0.59	0.49	0.19	0.76
	Public debt management policy	+	0.57	0.46	0.19	0.76
	The inability of politics to affect projects	+	0.61	0.52	0.18	0.76
	The ability of politics to affect projects	+	0.65	0.56	0.18	0.76
	Corruption	+	0.64	0.55	0.18	0.76
	Economic stability	+	0.55	0.45	0.19	0.77
	Sound debt management	+	0.43	0.32	0.20	0.78
	USD interest rate changes	+	0.36	0.24	0.20	0.78
	Exchange rate	+	0.32	0.19	0.21	0.79
	Long-term debt	+	0.51	0.40	0.19	0.77
	Short-term debt	-	0.31	0.18	0.21	0.79
	Commodity price changes	+	0.45	0.33	0.20	0.78
	Economic growth	+	0.51	0.40	0.19	0.77
	Green Bonds Programme Kenya	-	0.50	0.39	0.19	0.77
	Green Economy Strategy Implementation Plan	-	0.47	0.35	0.20	0.77
	Test scale - mean (standardised items)				0.19	0.78
2.	Investment	S	it-cor	ir-cor	ii-cor	alpha
	Average inter-item correlation				0.49	
	Ticket size affects the interest rate					
	Ticket size affects debt inflow					
	Scale reliability coefficient:					0.66
3.	Debt-to-equity ratio					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Debt-to-equity-ratio-based interest rate	+	0.81	0.54	0.27	0.42
	Debt-to-equity-ratio-based debt flow	+	0.79	0.50	0.32	0.49
	Debt-to-equity-ratio-based risk views	+	0.69	0.33	0.55	0.71
	Test scale - mean (standardised items)				0.38	0.64
4.	Maturity	S	it-cor	ir-cor	ii-cor	alpha
	Average inter-item correlation				0.63	
	Maturity influences interest rate					
	Maturity influences debt inflow					
	Scale reliability coefficient:					0.78
5.	Bankruptcy					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Stalled project due to risk	+	0.69	0.27	0.15	0.26
	Stalled project due to covenant non-compliance	+	0.66	0.21	0.23	0.37
	Stalled project due to budget overrun	+	0.68	0.25	0.18	0.30
	Test scale - mean (standardised items)				0.19	0.41
6.	Covenant compliance					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Covenant compliance	-	0.62	0.37	0.07	0.30
	Covenant litigation	+	0.59	0.34	0.07	0.32
	Payment renegotiation	-	0.31	0.01	0.13	0.48
	Carbon disclosure across the value chain	+	0.36	0.06	0.12	0.46
	Carbon emission reduction	-	0.42	0.13	0.11	0.42
	Staff pollution exposure penalty	+	0.59	0.34	0.07	0.32
	Politics-mediated schedule delay	+	0.45	0.16	0.10	0.41
	Test scale - mean (standardised items)				0.10	0.43

7.	Environmental, social, and governance					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Climate change limiting debt inflow	+	0.58	0.36	0.17	0.55
	Climate change influencing interest rates	+	0.54	0.31	0.18	0.56
	Rising avoidable carbon emission	+	0.43	0.18	0.21	0.61
	Green Bonds Programme Kenya	+	0.52	0.29	0.18	0.57
	Green Economy Strategy Implementation Plan	+	0.58	0.37	0.17	0.54
	Community action due to pollution	+	0.63	0.42	0.16	0.52
	Customer pollution exposure penalty	+	0.52	0.29	0.18	0.57
	Test scale - mean (standardised items)				0.18	0.60

Appendix G: Test scale results for perceptions of project management

1.	Integration					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Cross-border development debt and talent demand	+	0.70	0.47	0.21	0.51
	Cross-border construction debt and talent demand	+	0.60	0.33	0.26	0.59
	Cross-border operational debt and talent demand	+	0.58	0.31	0.27	0.60
	Cross-border maintenance debt and talent demand	+	0.64	0.38	0.24	0.56
	Cross-border termination debt and talent demand	+	0.63	0.38	0.24	0.56
	Test scale - mean (standardised items)				0.25	0.62
2.	Scope					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Expansion or upgrade-oriented interest rate	+	0.75	0.40	0.19	0.32
	Expansion or upgrade-oriented debt inflow	+	0.80	0.48	0.09	0.17
	Management default litigation	-	0.60	0.16	0.52	0.69
	Test scale - mean (standardised items)				0.27	0.52
3.	Schedule					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Schedule delay due to limited capital	+	0.59	0.19	0.80	0.89
	Schedule delay due to management	+	0.87	0.67	0.15	0.25
	Schedule delay due to counterpart failures	+	0.84	0.61	0.21	0.35
	Test scale - mean (standardised items)				0.39	0.65
4.	Cost	S	it-cor	ir-cor	ii-cor	alpha
	Average inter-item correlation				0.68	
	Profitability influences interest rate					
	Profitability influences debt inflow					
	Scale reliability coefficient:					0.81
5.	Quality	S	it-cor	ir-cor	ii-cor	alpha
	Average inter-item correlation				0.26	
	Number of items in the scale: 2					
	Scale reliability coefficient:				0.42	0.42
6.	Resources	S	it-cor	ir-cor	ii-cor	alpha
	Average inter-item correlation				0.48	
	Viability gap guarantees					
	Limited cash generation					
	Scale reliability coefficient:					0.64
7.	Communication					
	Items	S	it-cor	ir-cor	ii-cor	alpha

	Information-based market access	+	0.62	0.11	0.13	0.22
	Well-documented risk management	+	0.63	0.14	0.10	0.17
	Decision-making support tools	+	0.64	0.15	0.08	0.14
	Test scale - mean (standardised items)				0.10	0.25
8.	Procurement					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Commodity price options	+	0.80	0.70	0.41	0.78
	Fixed-price contracts	+	0.73	0.59	0.44	0.80
	Forward contracts	+	0.77	0.64	0.43	0.79
	Future contracts	+	0.67	0.51	0.47	0.82
	Performance bonds	+	0.67	0.51	0.47	0.82
	Interest rate swaps	+	0.76	0.63	0.43	0.79
	Test scale - mean (standardised items)				0.44	0.83
9.	Stakeholder management					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Utility off-take guarantee	+	0.61	0.46	0.48	0.85
	Fuel supply guarantee	+	0.63	0.49	0.47	0.84
	Currency convertibility and transferability guarantee	+	0.77	0.66	0.43	0.82
	Law and regulatory changes guarantee	+	0.78	0.68	0.42	0.81
	Debt repayment guarantee	+	0.74	0.63	0.43	0.82
	Tariff rate guarantee	+	0.78	0.68	0.42	0.81
	Revenue guarantee	+	0.75	0.64	0.43	0.82
	Test scale - mean (standardised items)				0.44	0.85
10.	Risk management					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Insurance guarantee	+	0.66	0.52	0.42	0.81
	Multilateral or bilateral partial risk guarantee	+	0.74	0.62	0.40	0.80
	Risk transfer to a third party	+	0.69	0.56	0.41	0.81
	Risk acceptance	+	0.68	0.55	0.41	0.81
	Revenue diversification	+	0.76	0.66	0.39	0.79
	Credit risk management policy	+	0.71	0.59	0.40	0.80
	Financial risk management training	+	0.66	0.52	0.42	0.81
	Test scale - mean (standardised items)				0.41	0.83

Appendix H: Test scale results for perceptions of macroeconomic risks

1.	Financial market development					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Global interest rate fluctuations	+	0.47	0.30	0.23	0.71
	Global exchange rate fluctuations	+	0.44	0.25	0.24	0.71
	Limited financial market development	+	0.48	0.30	0.23	0.70
	Under-developed capital market	+	0.48	0.30	0.23	0.70
	Transparent reporting	+	0.58	0.43	0.21	0.68
	Local currency exchange rate	+	0.69	0.55	0.19	0.66
	USD interest rate changes	+	0.65	0.51	0.20	0.67
	Commodity price changes	+	0.57	0.41	0.21	0.68
	Inflation	+	0.60	0.44	0.21	0.68
	Test scale - mean (standardised items)				0.22	0.71
2.	Public debt management					
	Items	S	it-cor	ir-cor	ii-cor	alpha

	A sufficient public debt management policy	+	0.55	0.41	0.18	0.70
	Effective macroeconomic risk mitigation	+	0.58	0.45	0.17	0.70
	National indebtedness limiting debt access	+	0.28	0.12	0.21	0.74
	Sound public debt management practices	+	0.47	0.32	0.19	0.71
	Long-term debt	-	0.55	0.42	0.18	0.70
	Short-term debt	-	0.50	0.36	0.18	0.71
	Economic growth	-	0.27	0.10	0.21	0.74
	National debt management tools	-	0.50	0.36	0.18	0.71
	Non-politics-led project failure	+	0.48	0.34	0.18	0.71
	Economic stability and sustainability	+	0.68	0.57	0.16	0.68
	Collaborative debt management	+	0.68	0.57	0.16	0.68
	Corruption	-	0.45	0.30	0.19	0.72
	Test scale - mean (standardised items)				0.18	0.73
3.	Carbon risk management					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Carbon risk perception by the lender	+	0.70	0.62	0.22	0.77
	Carbon risk perception by the public	+	0.44	0.31	0.25	0.80
	Carbon adaptability mechanisms affect debt costs	+	0.64	0.55	0.23	0.78
	Carbon credit prices affect debt costs	+	0.64	0.55	0.23	0.78
	Clean development mechanism registration affects debt costs	+	0.62	0.52	0.23	0.78
	Carbon risk perception by citizens	+	0.54	0.42	0.24	0.79
	Carbon adaptability mechanisms affect debt inflow	+	0.71	0.63	0.22	0.77
	Carbon credit prices affect debt inflow	+	0.76	0.69	0.21	0.76
	Clean development mechanism registration shapes debt inflow	+	0.60	0.49	0.23	0.78
	Carbon risk-based lender exits	+	0.33	0.19	0.26	0.81
	Investment in carbon risk research and development	+	0.32	0.18	0.26	0.81
	Aligning carbon policies with national sustainability policies	+	0.43	0.30	0.25	0.80
	Carbon risk management policy	+	0.33	0.20	0.26	0.81
	Test scale - mean (standardised items)				0.24	0.80

Appendix I: Test scale results for perceptions of national culture

1.	Ambiguity tolerance					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Ambiguity intolerance	+	0.73	0.67	0.31	0.84
	Ambiguity dislike	+	0.68	0.60	0.31	0.85
	Ambiguity preference	-	0.34	0.22	0.35	0.87
	Ambiguity avoidance	+	0.74	0.67	0.31	0.84
	Ambiguity tolerance	-	0.49	0.38	0.34	0.86
	Novelty preference over familiarity	+	0.28	0.16	0.36	0.87
	Familiarity preference over novelty	+	0.72	0.64	0.31	0.84
	Uncertainty-oriented indecision	+	0.71	0.64	0.31	0.84
	The insolubility of multiperspective problems	+	0.71	0.64	0.31	0.84
	The insolubility of multiperspective problems	+	0.69	0.61	0.31	0.84
	The insolubility of multiperspective problems	+	0.63	0.55	0.32	0.85
	Complexity avoidance	+	0.75	0.69	0.30	0.84
	Complexity preference	-	0.48	0.37	0.34	0.86
	Test scale - mean (standardised items)				0.32	0.86
	1. A: General ambiguity tolerance					
	Items	S	it-cor	ir-cor	ii-cor	alpha

	Ambiguity intolerance	+	0.76	0.59	0.31	0.64
	Ambiguity dislike	+	0.76	0.58	0.31	0.64
	Ambiguity preference	-	0.57	0.32	0.42	0.74
	Ambiguity avoidance	+	0.74	0.55	0.32	0.65
	Ambiguity tolerance	-	0.63	0.40	0.38	0.71
	Test scale - mean (standardised items)				0.35	0.73
	1. B: Novelty	S	it-cor	ir-cor	ii-cor	alpha
	Average interitem correlation				0.04	
	Novelty preference over-familiarity					
	Familiarity preference over novelty					
	Scale reliability coefficient:					0.08
	1. C: Insolubility					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	The insolubility of multiperspective problems	+	0.85	0.64	0.38	0.55
	The insolubility of multiperspective problems	+	0.76	0.46	0.61	0.75
	The insolubility of multiperspective problems	+	0.82	0.58	0.45	0.62
	Test scale - mean (standardised items)				0.48	0.73
	1. D: Complexity	S	it-cor	ir-cor	ii-cor	alpha
	Average inter-item correlation				0.21	
	Complexity avoidance					
	Complexity preference					
	Scale reliability coefficient:					0.35
2.	Power distance	S	it-cor	ir-cor	ii-cor	alpha
	Average inter-item correlation				0.51	
	Unequally distributed decision-making power					
	Teaching practitioners how to manage risks					
	Scale reliability coefficient:					0.68
3.	Individualism vs collectivism					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Limited cross-sectoral collaboration	+	0.57	0.37	0.37	0.74
	Strictly follow sub-sector rules	+	0.70	0.53	0.32	0.70
	Rules compliance and age determine outstanding practitioners	+	0.80	0.67	0.28	0.66
	Immoral for the government not to guarantee payment	+	0.57	0.36	0.37	0.74
	Accept and follow lender rules	+	0.64	0.45	0.34	0.72
	Replace existing decision-makers	+	0.70	0.54	0.31	0.70
	Test scale - mean (standardised items)				0.33	0.75
4.	Masculinity vs femininity					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Empathy for failure and envy for success	+	0.46	0.16	0.14	0.45
	Motivated by a relaxed and friendly environment	+	0.52	0.23	0.12	0.41
	Consensus decision-making	+	0.52	0.22	0.12	0.41
	Benefits realisation for men and women	+	0.47	0.17	0.14	0.44
	Importance of lenders' support during a financial crisis	+	0.55	0.26	0.11	0.39
	Benefits sharing between lenders and borrowers	+	0.59	0.32	0.10	0.36
	Test scale				0.12	0.46
5.	Uncertainty avoidance					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Importance of being organised and avoiding ambiguity	+	0.63	0.31	0.30	0.56
	The reward for high competence and expert leadership	+	0.64	0.33	0.29	0.55
	Respect for project management rules and customs	+	0.71	0.42	0.23	0.47
	Create individual risk control initiatives	+	0.70	0.41	0.24	0.48
	Test scale - mean (standardised items)				0.26	0.69

6.	Long-term orientation vs short-term orientation					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Capacity to manage risks	+	0.67	0.39	0.10	0.32
	Ability to identify evolving risk	+	0.61	0.30	0.13	0.38
	Ability to question board decisions	+	0.46	0.13	0.20	0.50
	Board influence on management behaviour	+	0.61	0.30	0.13	0.38
	Macroeconomic risk contribution to project failure	+	0.49	0.16	0.19	0.48
	Test scale - mean (standardised items)				0.15	0.47
7.	Indulgence vs restraint					
	Items	S	it-cor	ir-cor	ii-cor	alpha
	Preference for long-term versus short-term gratification	+	0.80	0.58	0.89	0.94
	Time perception's importance in decision-making	+	0.92	0.80	0.58	0.73
	General time-oriented optimism in life	+	0.93	0.84	0.54	0.70
	Test scale - mean (standardised items)				0.67	0.86

Appendix J: Sub-sample results for the regression of sovereign risk on debt-side governance and cultural perceptions in renewable energy projects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
VARIABLES	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest
Investment size	0.090*** (0.031)	0.090*** (0.031)	0.095*** (0.031)	0.090*** (0.031)	0.091*** (0.031)	0.090*** (0.031)	0.089*** (0.031)	0.082*** (0.031)	0.074** (0.031)	0.088*** (0.031)
Debt-to-equity ratio	-0.060** (0.029)	-0.060** (0.030)	-0.064** (0.029)	-0.060** (0.029)	-0.064** (0.029)	-0.059** (0.029)	-0.060** (0.029)	-0.058** (0.029)	-0.053* (0.029)	-0.060** (0.029)
Maturity	0.026 (0.027)	0.026 (0.027)	0.026 (0.027)	0.026 (0.027)	0.026 (0.027)	0.026 (0.027)	0.027 (0.027)	0.022 (0.027)	0.024 (0.027)	0.024 (0.027)
Covenant compliance	0.064** (0.026)	0.064** (0.026)	0.061** (0.026)	0.064** (0.026)	0.067*** (0.026)	0.059** (0.027)	0.059** (0.026)	0.055** (0.026)	0.061** (0.025)	0.060** (0.026)
National indebtedness	0.004 (0.024)	0.004 (0.024)	0.005 (0.024)	0.004 (0.024)	-0.001 (0.024)	0 (0.024)	-0.004 (0.024)	-0.008 (0.025)	0.002 (0.023)	0.008 (0.024)
Environmental, social, and governance	-0.014 (0.035)	-0.014 (0.035)	-0.012 (0.035)	-0.014 (0.035)	-0.016 (0.034)	-0.009 (0.035)	-0.017 (0.034)	-0.002 (0.035)	-0.012 (0.034)	-0.012 (0.035)
Green economic development policy	0.262*** (0.032)	0.262*** (0.032)	0.262*** (0.032)	0.263*** (0.033)	0.256*** (0.032)	0.252*** (0.035)	0.243*** (0.033)	0.257*** (0.032)	0.243*** (0.033)	0.263*** (0.032)
Ambiguity tolerance		0.000 (0.024)								
General ambiguity tolerance			-0.025 (0.026)							
The insolubility of multiperspective problems				-0.002 (0.015)						
Power distance					0.061 (0.038)					
Individualism vs collectivism						0.021 (0.028)				
Masculinity vs femininity							0.058** (0.028)			
Uncertainty avoidance								0.062 (0.039)		

Long-term vs short-term orientation									0.078**	
									(0.033)	
Indulgence vs restraint										0.015
										(0.018)
Constant	3.478***	3.479***	3.569***	3.480***	3.165***	3.443***	3.316***	3.233***	3.242***	3.400***
	(0.253)	(0.264)	(0.271)	(0.254)	(0.319)	(0.257)	(0.264)	(0.295)	(0.270)	(0.269)
Observations	306	306	306	306	306	306	306	306	306	306
R-squared	0.244	0.244	0.246	0.244	0.25	0.245	0.255	0.25	0.258	0.246
Adjusted R-squared	0.226	0.224	0.226	0.224	0.23	0.225	0.234	0.23	0.238	0.225
Standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Appendix K: Sub-sample results for the regression of sovereign risk on debt-side governance and cultural perceptions in transportation projects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
VARIABLES	SR	SR	SR	SR	Interest	Interest	Interest	Interest	Interest	Interest
Investment size	-0.044	-0.044	-0.044	-0.041	-0.042	-0.056	-0.043	-0.044	-0.047	-0.045
	(0.040)	(0.041)	(0.041)	(0.040)	(0.041)	(0.040)	(0.040)	(0.041)	(0.040)	(0.040)
Debt-to-equity ratio	0.045	0.048	0.048	0.059	0.046	0.075	0.065	0.046	0.061	0.044
	(0.049)	(0.052)	(0.051)	(0.051)	(0.049)	(0.050)	(0.049)	(0.050)	(0.049)	(0.049)
Maturity	0.182***	0.183***	0.183***	0.185***	0.183***	0.184***	0.156***	0.182***	0.170***	0.176***
	(0.032)	(0.033)	(0.032)	(0.032)	(0.033)	(0.032)	(0.033)	(0.034)	(0.032)	(0.033)
Covenant compliance	0.054**	0.052**	0.053**	0.044*	0.053**	0.024	0.058**	0.054**	0.031	0.061**
	(0.024)	(0.026)	(0.025)	(0.026)	(0.025)	(0.026)	(0.024)	(0.025)	(0.025)	(0.025)
National indebtedness	0.038	0.037	0.038	0.031	0.039	0.03	0.023	0.038	0.045	0.04
	(0.030)	(0.031)	(0.030)	(0.031)	(0.031)	(0.030)	(0.030)	(0.032)	(0.030)	(0.030)
Environmental, social, and governance	0.055*	0.056*	0.056*	0.062**	0.057*	0.087***	0.033	0.055*	0.083***	0.053*
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.032)	(0.031)	(0.031)	(0.031)	(0.031)
Green economic development policy	0.091***	0.088***	0.089***	0.078**	0.091***	0.046	0.114***	0.091***	0.04	0.097***
	(0.029)	(0.032)	(0.030)	(0.031)	(0.029)	(0.032)	(0.029)	(0.029)	(0.032)	(0.029)
Ambiguity tolerance		0.006								
		(0.035)								
General ambiguity tolerance			0.007							
			(0.033)							
The insolubility of multiperspective problems				0.023						
				(0.020)						
Power distance					-0.007					
					(0.033)					
Individualism vs collectivism						0.075***				
						(0.024)				
Masculinity vs femininity							0.093***			
							(0.032)			
Uncertainty avoidance								0.002		
								(0.039)		
Long-term vs short-term orientation									0.086***	
									(0.026)	
Indulgence vs restraint										0.021

										(0.017)
Constant	3.274***	3.253***	3.244***	3.205***	3.292***	3.067***	2.777***	3.268***	3.038***	3.163***
	(0.321)	(0.342)	(0.349)	(0.326)	(0.332)	(0.323)	(0.359)	(0.351)	(0.323)	(0.332)
Observations	291	291	291	291	291	291	291	291	291	291
R-squared	0.281	0.281	0.281	0.285	0.281	0.305	0.302	0.281	0.308	0.285
Adjusted R-squared	0.263	0.261	0.261	0.264	0.261	0.285	0.283	0.261	0.288	0.265
Standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Appendix L: Sub-sample results for the regression of sovereign risk on project management and cultural perceptions in renewable energy projects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
VARIABLES	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest
Integration management	0.059**	0.055**	0.059**	0.053**	0.059**	0.053**	0.03	0.059**	0.061**	0.058**
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.027)	(0.026)	(0.025)	(0.026)
Scope management	0.136***	0.139***	0.136***	0.141***	0.127***	0.152***	0.133***	0.134***	0.130***	0.133***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.039)	(0.041)	(0.039)	(0.040)
Schedule management	0.039**	0.041**	0.038**	0.040**	0.039**	0.025	0.036**	0.038**	0.030*	0.037**
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)
Cost management	-0.013	-0.014	-0.013	-0.014	-0.009	-0.03	-0.018	-0.012	-0.017	-0.01
	(0.029)	(0.029)	(0.029)	(0.028)	(0.029)	(0.030)	(0.028)	(0.029)	(0.028)	(0.029)
Quality management	0.01	0.004	0.011	0.003	0.011	0.008	0.012	0.01	-0.01	0.011
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)	(0.028)	(0.028)	(0.028)
Resource management	-0.04	-0.038	-0.04	-0.041	-0.042	-0.056	-0.053	-0.04	-0.034	-0.04
	(0.038)	(0.038)	(0.039)	(0.038)	(0.038)	(0.039)	(0.038)	(0.039)	(0.038)	(0.038)
Communication management	0.037	0.032	0.038	0.035	0.041	0.02	0.033	0.036	0.007	0.033
	(0.044)	(0.044)	(0.045)	(0.044)	(0.044)	(0.045)	(0.044)	(0.045)	(0.045)	(0.045)
Procurement management	0.105**	0.108**	0.104**	0.106**	0.107**	0.101**	0.102**	0.104**	0.103**	0.106**
	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.050)	(0.049)	(0.049)
Stakeholder integration	0.062	0.073	0.061	0.074	0.053	0.057	0.064	0.062	0.058	0.059
	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)	(0.053)	(0.053)	(0.054)	(0.053)	(0.054)
Stakeholder integration policies	0.04	0.043	0.04	0.045	0.037	0.038	0.02	0.041	0.056	0.038
	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.046)	(0.047)
Risk management	-0.014	-0.021	-0.014	-0.024	-0.023	0.003	0.002	-0.015	-0.032	-0.007
	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.081)	(0.082)	(0.080)	(0.082)
Ambiguity tolerance		0.031								
		(0.026)								
General ambiguity tolerance			-0.004							
			(0.029)							
The insolubility of multiperspective problems				0.024						
				(0.017)						
Power distance					0.051					
					(0.042)					
Individualism vs collectivism						0.068**				
						(0.033)				
Masculinity vs femininity							0.093***			
							(0.030)			

Uncertainty avoidance								0.006		
								(0.043)		
Long-term vs short-term orientation									0.126***	
									(0.039)	
Indulgence vs restraint										0.013
										(0.019)
Constant	3.155***	3.024***	3.174***	3.076***	2.951***	3.070***	2.940***	3.140***	2.840***	3.106***
	-0.367	-0.383	-0.397	-0.37	-0.402	-0.367	-0.368	-0.383	-0.374	-0.375
Observations	306	306	306	306	306	306	306	306	306	306
R-squared	0.159	0.163	0.159	0.165	0.164	0.171	0.185	0.159	0.189	0.160
Adjusted R-squared	0.128	0.129	0.125	0.131	0.129	0.137	0.152	0.125	0.155	0.126
Standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Appendix M: Sub-sample results for the regression of sovereign risk on project management and cultural perceptions in transportation projects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
VARIABLES	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest
Integration management	0.111***	0.108***	0.106***	0.109***	0.106***	0.112***	0.104***	0.112***	0.110***	0.116***
	(0.034)	(0.035)	(0.034)	(0.034)	(0.034)	(0.034)	(0.033)	(0.034)	(0.034)	(0.034)
Scope management	0.249***	0.256***	0.262***	0.260***	0.242***	0.247***	0.223***	0.251***	0.249***	0.231***
	(0.041)	(0.044)	(0.043)	(0.043)	(0.042)	(0.042)	(0.041)	(0.041)	(0.041)	(0.041)
Schedule management	0.052***	0.051***	0.052***	0.049**	0.052***	0.053***	0.045**	0.053***	0.052***	0.057***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Cost management	-0.045**	-0.048**	-0.051**	-0.048**	-0.048**	-0.045**	-0.036	-0.044*	-0.044*	-0.044*
	(0.023)	(0.024)	(0.023)	(0.023)	(0.023)	(0.023)	(0.022)	(0.023)	(0.023)	(0.022)
Quality management	0.081***	0.078***	0.075***	0.075***	0.087***	0.084***	0.083***	0.079***	0.078***	0.092***
	(0.022)	(0.023)	(0.022)	(0.023)	(0.022)	(0.024)	(0.021)	(0.022)	(0.026)	(0.022)
Resource management	0.063	0.064	0.062	0.066	0.063	0.062	0.051	0.064	0.063	0.051
	(0.043)	(0.044)	(0.043)	(0.044)	(0.043)	(0.044)	(0.043)	(0.044)	(0.044)	(0.043)
Communication management	-0.07	-0.073*	-0.074*	-0.076*	-0.066	-0.066	-0.063	-0.071*	-0.07	-0.065
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.044)	(0.042)	(0.043)	(0.043)	(0.042)
Procurement management	-0.037	-0.04	-0.037	-0.044	-0.033	-0.035	-0.007	-0.038	-0.04	-0.033
	(0.047)	(0.048)	(0.047)	(0.048)	(0.047)	(0.048)	(0.048)	(0.047)	(0.049)	(0.047)
Stakeholder integration	-0.025	-0.025	-0.024	-0.026	-0.036	-0.025	-0.019	-0.025	-0.028	-0.018
	(0.047)	(0.047)	(0.047)	(0.047)	(0.048)	(0.047)	(0.046)	(0.047)	(0.049)	(0.047)
Stakeholder integration policies	-0.039	-0.04	-0.039	-0.039	-0.031	-0.04	-0.048	-0.04	-0.038	-0.046
	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.043)	(0.044)	(0.044)	(0.043)
Risk management	0.109	0.116	0.121	0.124	0.096	0.108	0.088	0.116	0.111	0.109
	(0.081)	(0.082)	(0.081)	(0.083)	(0.082)	(0.081)	(0.080)	(0.082)	(0.081)	(0.080)
Ambiguity tolerance		0.016								
		(0.037)								
General ambiguity tolerance			0.037							
			(0.033)							
The insolubility of multiperspective problems				0.018						
				(0.021)						

Power distance					0.033 (0.034)					
Individualism vs collectivism						-0.008 (0.029)				
Masculinity vs femininity							0.085*** (0.030)			
Uncertainty avoidance								-0.018 (0.039)		
Long-term vs short-term orientation									0.008 (0.033)	
Indulgence vs restraint										0.039** (0.017)
Constant	3.042***	2.974***	2.850***	2.954***	2.948***	3.057***	2.697***	3.098***	3.035***	2.869***
	-0.318	-0.355	-0.36	-0.335	-0.333	-0.323	-0.336	-0.343	-0.32	-0.324
Observations	291	291	291	291	291	291	291	291	291	291
R-squared	0.316	0.317	0.320	0.318	0.319	0.317	0.336	0.317	0.317	0.329
Adjusted R-squared	0.290	0.287	0.29	0.289	0.289	0.287	0.307	0.287	0.287	0.301
Standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Appendix N: Sub-sample results for the regression of sovereign risk on macroeconomic and cultural perceptions in renewable energy projects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
VARIABLES	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest
Financial market development	0.260*** (0.039)	0.261*** (0.040)	0.260*** (0.039)	0.261*** (0.040)	0.267*** (0.039)	0.254*** (0.041)	0.238*** (0.041)	0.282*** (0.039)	0.249*** (0.039)	0.257*** (0.039)
Market price fluctuations	0.038 (0.029)	0.037 (0.030)	0.037 (0.030)	0.038 (0.030)	0.033 (0.029)	0.035 (0.030)	0.027 (0.030)	0.035 (0.029)	0.032 (0.029)	0.038 (0.029)
Public debt management	0.131*** (0.039)	0.132*** (0.040)	0.131*** (0.040)	0.132*** (0.040)	0.134*** (0.039)	0.127*** (0.040)	0.134*** (0.039)	0.110*** (0.040)	0.095** (0.040)	0.133*** (0.040)
Carbon risk perception by stakeholders	0.078*** (0.029)	0.078*** (0.029)	0.078*** (0.029)	0.078*** (0.029)	0.067** (0.029)	0.078*** (0.029)	0.071** (0.029)	0.059** (0.029)	0.067** (0.028)	0.079*** (0.029)
Voluntary carbon risk disclosures	-0.022 (0.023)	-0.022 (0.023)	-0.022 (0.023)	-0.022 (0.023)	-0.022 (0.023)	-0.023 (0.023)	-0.029 (0.023)	-0.01 (0.023)	-0.03 (0.023)	-0.023 (0.023)
Ambiguity tolerance		-0.005 (0.024)								
General ambiguity tolerance			-0.004 (0.026)							
The insolubility of multiperspective problems				-0.003 (0.015)						
Power distance					0.086** (0.038)					
Individualism vs collectivism						0.012 (0.028)				
Masculinity vs femininity							0.053* (0.029)			

Uncertainty avoidance								0.107***		
								(0.037)		
Long-term vs short-term orientation									0.113***	
									(0.032)	
Indulgence vs restraint										0.019
										(0.017)
Constant	2.897***	2.906***	2.913***	2.895***	2.375***	2.899***	2.832***	2.268***	2.630***	2.807***
	(0.325)	(0.328)	(0.342)	(0.326)	(0.394)	(0.325)	(0.326)	(0.389)	(0.328)	(0.335)
Observations	306	306	306	306	306	306	306	306	306	306
R-squared	0.234	0.234	0.234	0.234	0.247	0.235	0.243	0.255	0.264	0.237
Adjusted R-squared	0.221	0.219	0.219	0.219	0.232	0.219	0.227	0.24	0.249	0.222
Standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Appendix O: Sub-sample results for the regression of sovereign risk on macroeconomic and cultural perceptions in transportation projects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline	AT	GAT	IAT	PDI	IDV	MAS	UAI	LTO	IVR
VARIABLES	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest	Interest
Financial market development	0.349***	0.353***	0.359***	0.353***	0.337***	0.348***	0.307***	0.349***	0.343***	0.347***
	(0.037)	(0.037)	(0.037)	(0.037)	(0.038)	(0.037)	(0.037)	(0.037)	(0.036)	(0.037)
Market price fluctuations	-0.013	-0.009	-0.008	-0.01	-0.015	-0.013	-0.021	-0.013	-0.032	-0.014
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)	(0.028)	(0.028)	(0.028)
Public debt management	0.263***	0.255***	0.252***	0.252***	0.274***	0.256***	0.292***	0.263***	0.192***	0.265***
	(0.037)	(0.038)	(0.038)	(0.039)	(0.038)	(0.045)	(0.037)	(0.037)	(0.042)	(0.037)
Carbon risk perception by stakeholders	0.031	0.032	0.029	0.032	0.023	0.032	0.024	0.031	0.03	0.031
	(0.030)	(0.030)	(0.030)	(0.030)	(0.031)	(0.030)	(0.029)	(0.031)	(0.029)	(0.030)
Voluntary carbon risk disclosures	-0.027	-0.033	-0.027	-0.032	-0.024	-0.03	-0.025	-0.027	-0.059**	-0.021
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.024)	(0.021)	(0.023)	(0.023)	(0.023)
Ambiguity tolerance		0.027								
		(0.029)								
General ambiguity tolerance			0.039							
			(0.030)							
The insolubility of multiperspective problems				0.015						
				(0.019)						
Power distance					0.04					
					(0.033)					
Individualism vs collectivism						0.007				
						(0.029)				
Masculinity vs femininity							0.117***			
							(0.029)			
Uncertainty avoidance								0.002		
								(0.038)		
Long-term vs short-term orientation									0.102***	
									(0.030)	
Indulgence vs restraint										0.015
										(0.016)

Constant	2.286***	2.199***	2.098***	2.264***	2.094***	2.300***	1.754***	2.277***	2.385***	2.192***
	(0.333)	(0.346)	(0.364)	(0.335)	(0.368)	(0.338)	(0.351)	(0.380)	(0.328)	(0.348)
Observations	291	291	291	291	291	291	291	291	291	291
R-squared	0.308	0.31	0.312	0.31	0.312	0.309	0.345	0.308	0.336	0.311
Adjusted R-squared	0.296	0.296	0.298	0.295	0.297	0.294	0.331	0.294	0.322	0.296
Standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										

Appendix P: List of large-scale infrastructure development projects

ID	Project name	Lenders/syndicate member	Loan start	Loan end	Maturity	Technology	Amount (US\$)	Source
1	Olkaria I Geothermal Plant	European Investment Bank	2012			Geothermal	145,125,938	2012 OECD Credit Report System (CRS) Database
2	Olkaria II Geothermal Plant	Japanese International Cooperation Agency	2010			Geothermal	275,020,183	2010 OECD Credit Report System (CRS) Database
3	OrPower 4 Geothermal	U.S. International Development Finance Corporation	2011			Geothermal	354,695,540	https://www.dfc.gov/sites/default/files/2019-08/pending-orpower4_geothermal.pdf
4	Olkaria IV	World Bank	2014			Geothermal	126,500,000	Kenya Electricity Generating Company
5	Olkaria V Geothermal Power Development Project	European Investment Bank Japanese International Cooperation Agency	2016			Geothermal	420,072,687	2016 OECD Credit Report System (CRS) Database
6	Olkaria IV Geothermal Field Drilling	Export-Import Bank of China	2010			Geothermal	115,280,033	Gallagher, Kevin P. (2021), "China's Global Energy Finance," Global Development Policy Center, Boston University
7	Geothermal Wellhead Power Plant – Eburru					Geothermal	300,000,000	
8	Akiira One Geothermal Power Station	Standard Bank of South Africa	2014			Geothermal	300,000,000	
		Overseas Private Investment Corporation						
9	Menengai Geothermal Development Project	African Development Fund	2012			Geothermal	115,743,444	2012 OECD Credit Report System (CRS) Database
10	Steam Field Development Bogoria-Silali Block	Govt of Fed. Republic of Germany - GTZ	10-Jul-14	01-Aug-29	15.07		80,000,000	The National Treasury, External Public Debt Register
11	Ngong Hills Wind Power Station							
12	Lake Turkana Wind Power Plant	African Development Bank	26-Apr-13	26-Apr-28	15.01		853,120,000	African Development Bank
		Standard Bank of South Africa						
		Nedbank Capital						
		Norfund						
		European Investment Bank						
		Netherlands Development Finance Company						
		Proparco						
		East African Development Bank						
		Trade and Development Bank						
		German Investment Corporation						
		Triodos Bank						
		EKF Bank						
		Overseas Private Investment Corporation						
13	Longonot Geothermal Power Project							
14	Kipeto Wind Power Project	U.S. International Development Finance Corporation	2014			Wind energy	251,918,916	https://www.dfc.gov/sites/default/files/2019-08/kipeto-info-summary1.pdf

15	Development of Solar Power Project in Garissa	Export-Import Bank of China	2017			Solar energy	139,176,194	Gallagher, Kevin P. (2021), "China's Global Energy Finance," Global Development Policy Center, Boston University
16	Ethiopia Power Interconnector Project	Agence Francaise De Development	16-Dec-13	31-Jul-34	20.64		91,000,000	The National Treasury, External Public Debt Register
	Ethiopia-Kenya Electricity Highway Project	African Development Bank	16-Dec-12	01-Oct-61	48.82		75,000,000	The National Treasury, External Public Debt Register
17	Last Mile Connectivity Programme	Agence Francaise De Development	17-Mar-17	27-Mar-37	20.04	Bilateral	90,000,000	The National Treasury, External Public Debt Register
18	Last Mile Connectivity Project II	African Development Bank	17-Oct-16	01-Aug-38	21.80	Multilateral	134,640,000	The National Treasury, External Public Debt Register
19	Kenya Power Distribution Last Mile Connectivity	European Investment Bank	27-Mar-17	15-Feb-38	20.90	Multilateral	60,000,000	The National Treasury, External Public Debt Register
20	Kenya Electricity Modernization Project - KEMP	International Development Association	29-Jun-16	15-Nov-52	36.41	Multilateral	172,600,000	The National Treasury, External Public Debt Register
21	Kenya Power Distribution System Modernisation and Strengthening Project Phase II	Export-Import Bank of China	02-Feb-17	21-Mar-35	18.14	Bilateral	496,979,883	The National Treasury, External Public Debt Register
22	Kenya Power Transmission Improvement	Export-Import Bank of China	16-May-17	21-Jul-33	16.19	Bilateral	319,827,810	The National Treasury, External Public Debt Register
23	Mombasa-Nairobi Power Transmission Line	Agence Francaise De Development	03-Apr-09	31-Jan-32	22.84	Bilateral	60,000,000	The National Treasury, External Public Debt Register
24	Mombasa-Nairobi Transmission Line Project	African Development Bank	04-Jun-09	01-May-65	55.95	Bilateral	50,000,000	The National Treasury, External Public Debt Register
25	Kenya (Chemositsit-Kisii & Kamburu-Meru) Power Distribution System Modernisation & Strengthening Project	Export-Import Bank of China	23-Jan-06	21-Mar-26	20.17	Distribution		
26	Drilling Geothermal Stream	Export-Import Bank of China	2015			Geothermal	399,544,075	Gallagher, Kevin P. (2021), "China's Global Energy Finance," Global Development Policy Center, Boston University
27	Drilling Materials for Eighty (80) Geothermal Wells at Olkaria Geothermal Field Project	Export-Import Bank of China	21-May-12	21-Jul-32	20.18		382,500,000	The National Treasury, External Public Debt Register
28	Rural Electrification in Five Regions Project	Saudi Development Fund	06-Sep-13	30-Nov-43	30.25	Bilateral	45,000,000	The National Treasury, External Public Debt Register
		Abu Dhabi Fund for Arab Econ Cooperation	23-Sep-13	30-Nov-32	19.20	Bilateral	36,730,000	The National Treasury, External Public Debt Register
		Instituto De Credito: Kingdom Of Spain.	05-Aug-98	23-Sep-28	30.16	Bilateral	5,067,930	The National Treasury, External Public Debt Register
		Agence Francaise De Development	17-May-00	30-Oct-21	21.47	Bilateral	9,146,941	The National Treasury, External Public Debt Register

		Instituto De Credito: Kingdom Of Spain.	15-Feb-01	01-Jun-31	30.31	Bilateral	5,430,431	The National Treasury, External Public Debt Register
		Instituto De Credito: Kingdom Of Spain	15-Jun-07	30-Jul-22	15.13	Bilateral	12,000,000	The National Treasury, External Public Debt Register
		Arab Bank for Economic Development in Africa	23-Sep-11	01-Jun-45	33.71	Multilateral	10,000,000	The National Treasury, External Public Debt Register
		Organization of the Petroleum Exporting Countries	25-Sep-11	15-Apr-31	19.57	Multilateral	15,000,000	The National Treasury, External Public Debt Register
29	Arusha–Namanga–Athi River Road Development Project	African Development Bank	08-Feb-07	01-May-57	50.26	Multilateral	49,241,000	The National Treasury, External Public Debt Register
30	Multinational Arusha–Holili/Taveta–Voi Road Project	African Development Bank	15-Jul-13	01-Apr-62	48.75	Multilateral	75,000,000	The National Treasury, External Public Debt Register
31	Bagamoyo–Horohoro–Lunga Lunga–Malindi Road Project Phase I	African Development Bank	10-Jun-20	15-Nov-44	24.45	Multilateral	108,000,000	The National Treasury, External Public Debt Register
32	Bagamoyo–Horohoro–Lunga Lunga–Malindi Road Project Phase II	African Development Bank	10-Jun-20	15-Nov-49	29.45	Multilateral	46,360,000	The National Treasury, External Public Debt Register
33	East Africa Trade and Transport Facilitation Project	International Development Association	05-May-20	15-Nov-45	25.55	Multilateral	83,300,000	The National Treasury, External Public Debt Register
34	Kenol–Kagana–Marua Highway Improvement Project - AfDB	African Development Bank	09-Jan-20	15-Aug-44	24.62	Multilateral	209,170,000	The National Treasury, External Public Debt Register
35	Kenya Mombasa–Nairobi Standard Gauge Railway Project	Export-Import Bank of China	11-May-14	21-Jul-34	20.21	Bilateral	1,600,000,000	The National Treasury, External Public Debt Register
36	Kenya Mombasa–Nairobi Standard Gauge Railway Project (comm)	Export-Import Bank of China	11-May-14	21-Jul-29	15.21	Bilateral	2,003,584,029	The National Treasury, External Public Debt Register
37	Kenya Nairobi–Naivasha Standard Gauge Railway Project	Export-Import Bank of China	03-Dec-15	21-Jul-36	20.65	Bilateral	1,397,927,373	The National Treasury, External Public Debt Register
38	Sirari Corridor Accessibility and Road Safety Improvement Project: Isebania–Kisii–Ahero	African Development Bank	01-Jan-16	15-Dec-35	19.97	Multilateral	228,000,000	The National Treasury, External Public Debt Register
39	Nairobi Expressway	Export-Import Bank of China	07-Jun-20	07-Jun-50	30.02	Bilateral	575,970,000	https://ppi.worldbank.org/en/snapshots/project/Nairobi-expressway-10668
40	Mombasa–Nairobi–Addis Ababa Road Project	African Development Bank						
41	Mombasa–Nairobi–Addis Ababa Road Corridor Project Ph 3 (Turbi-Moyale)	African Development Bank	12-Mar-12	1-Oct-61	49.59	Multilateral	120,000,000	The National Treasury, External Public Debt Register
42	Mombasa–Mariakani Highway Project Lot 1 – Mombasa–Kwa Jomvu	African Development Bank	22-May-15	1-Oct-64	49.40	Multilateral	80,000,000	The National Treasury, External Public Debt Register

43	Kenya Nairobi-Thika Highway Improvement Project	African Development Bank	21-Nov-07	1-May-67	59.48	Multilateral	119,160,940	The National Treasury, External Public Debt Register
44	Nairobi Southern Bypass	Export-Import Bank of China	1-Dec-11	21-Jan-32	20.15	Bilateral	183,600,000	The National Treasury, External Public Debt Register
45	Nairobi Eastern and Northern Bypass Project	Export-Import Bank of China	15-Dec-08	21-Jan-29	20.12	Bilateral	108,000,000	The National Treasury, External Public Debt Register
46	Roads 2000 - District Rural Roads Rehabilitation Project	African Development Bank	15-Feb-02	1-Nov-51	49.74	Multilateral	20,000,000	The National Treasury, External Public Debt Register
47	Roads 2000 - Phase II Project	Agence Francaise De Development	5-Jul-10	31-Jul-36	26.09	Bilateral	40,000,000	The National Treasury, External Public Debt Register
48	Roads 2000 - Phase II Project	Agence Francaise De Development	1-Jan-16	30-Sep-39	23.76	Bilateral	15,000,000	The National Treasury, External Public Debt Register
49	Upgrading of Kibwezi-Mutomo-Kitui Road Project	Export-Import Bank of China	28-Nov-16	21-Jul-32	15.65	Bilateral	194,740,598	The National Treasury, External Public Debt Register
50	Nairobi Outer Ring Road Improvement Project	African Development Fund	27-Jan-14	1-Oct-63	49.71	Multilateral	102,540,666	The National Treasury, External Public Debt Register

Appendix Q: Measurement variables and secondary data sources

VARIABLE	MEASUREMENT	UNIT	SOURCE
Dependent variable source: Investing.com project loan interest rate minus US\$ 10-year bonds yield = project risk premium (PRP)	Spread	Basis points	Morsy & Moustafa (2020)
Independent variable source: Investing.com Kenya 10-year minus US\$ 10-year bond yield = sovereign bond spread (SBS)	Spread	Basis points	Morsy & Moustafa (2020)
Culture variables source: Geert Hofstede's website: Kenya index minus each lending syndicate member index = average residual distance			
PDI distance	Spread	Basis points	Hofstede (2010)
IDV distance	Spread	Basis points	Hofstede (2010)
MAS distance	Spread	Basis points	Hofstede (2010)
UAI distance	Spread	Basis points	Hofstede (2010)
LTO distance	Spread	Basis points	Hofstede (2010)
IVR distance	Spread	Basis points	Hofstede (2010)
Debt-side governance variables source: Kenya's National Treasury; Annual public debt management report (2022) database			
Debt-to-total investment			
Maturity in years	Debt/total investment	Percentage	Debt statistics (2022)
Grace period	Years	Numbers	Debt statistics (2022)
Expected internal rate of return	Annual	Percentage	Project appraisal report
Public funding	Dummy	1 public 0 otherwise	Debt statistics (2022)
Loan disbursement delay	Years	Numbers	Audited reports
Loan utilisation rate	Annual	Percentage	Debt statistics (2022)
Climate risk disclosure	Dummy	1 disclose 0 otherwise	Audited reports
Project management-level variables source: African Development Bank (AfDB), infrastructure project databases, and audited reports			
Disclosure of the number of jobs created	Dummy	1 disclosed 0 otherwise	National Statistics
ICT integration	Dummy	1 integrated 0 otherwise	National Statistics
Schedule delay	Years	Numbers	Project appraisal report
Cost overrun	Years	Percentage	Audited reports
Design change	Dummy	1 changed 0 otherwise	Audited reports
Community-based projects	Projects completed	Numbers	Project databases
Institutional capacity-building project	Projects completed	Numbers	Project databases
Technical or financial audit delays	Dummy	1 delayed 0 otherwise	Audited reports
Loan utilisation delay	Dummy	1 delayed 0 otherwise	Audited reports
Litigation matter	Dummy	1 litigation 0 otherwise	Audited reports
Loan approval delays	Dummy	1 delayed 0 otherwise	National Statistics
Contractor payment delays	Dummy	1 delayed 0 otherwise	National Statistics
CDM registration	Dummy	1 delayed 0 otherwise	Project databases
Government funding delays	Years	Numbers	Project appraisal document
Land acquisition disputes	Dummy	1 dispute 0 otherwise	Project databases
Employee disputes	Dummy	1 dispute 0 otherwise	Project databases
Vandalism	Dummy	1 incident 0 otherwise	Project databases
Environmental impact assessment events	Dummy	1 incident 0 otherwise	Project databases
Number of cross-sectoral collaborators	Agents	Numbers	Project databases
Macroeconomic-level variables source: World Bank, International Monetary Fund, Transparency International, and National Statistics			
Carbon price (US\$)	Monthly price	US\$	Investing.com
Crude oil price (US\$)	Monthly price	US\$	Investing.com
Corruption index	Kenya/world index	Percentage	Transparency International
Syndicate size	Lenders	Numbers	National Statistics
External debt over imports changes	US\$ debt/imports	Percentage	National Statistics
GDP per capita growth changes	Annual changes	US\$	National Statistics

Appendix R: Similarity index

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