### Investigating the enabling environment to close the infrastructure financing gap

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# 1 Introduction

Infrastructure is the backbone of society, providing essential services that enable social and economic activity. It plays a crucial role in achieving sustainable development objectives, as infrastructure contributes to 92% of the Sustainable Development Goals (SDG) targets<sup>1</sup> and is linked to approximately 79% of global greenhouse gas (GHG) emissions and 88% of global adaptation costs<sup>2</sup>. Yet, the current stock of infrastructure aging, and is not enough to meet the demand for the services it provides. Today, 663 million people lack access to improved sources of drinking water, 940 million people lack access to electricity, 1 billion lack access to good quality roads, 2.4 billion lack access to adequate sanitation facilities and 4 billion lack internet access <sup>34</sup> Population growth, urbanization, economic growth, and climate change mean that infrastructure service demand will only rise, further burdening deficient infrastructure systems. Amidst this growing demand, there is an infrastructure financing gap; the Addis Ababa Action Agenda estimates that current infrastructure investment levels fall \$1.5 trillion USD short of what is needed in developing countries alone<sup>5</sup>. The financing gap is often cited as a key barrier to infrastructure development. However, as noted by the Public-Private Infrastructure Advisory Facility, "the key problem is not a lack of funding, as might be expected. Instead, it is the lack of packaged, bankable projects" - projects that bring financial returns on investments – "which in turn points to a need for more and better project preparation"<sup>6</sup>. The lack of bankable projects is a key barrier limiting infrastructure investment<sup>7</sup>; this begs the question: what hinders the development of bankable projects in developing countries?

Infrastructure development is inherently complex. It involves making complicated decisions amongst numerous stakeholders with limited information and uncertain futures. Governments must prioritize infrastructure projects for development, determine procurement strategies (public, private or PPP), and develop financing strategies (budgets, grant, debt, equity etc.) amongst many other tasks. Many of these critical decisions are made at the preparation stage, where significant capital investment is required (up to 10% of total project costs), where limited information is available for decision making and where the project is farthest away from completion<sup>8</sup>. The preparation stage is arguably the most challenging, but also where the most potential for impact lies. Strong project preparation can lead to reductions in project cost, time and risk, and increase access to infrastructure financing in future stages<sup>9</sup>. Project preparation is typically the responsibility of governments who must undertake significant efforts to progress

<sup>9</sup> Global Infrastructure Hub, 2019,

<sup>&</sup>lt;sup>1</sup> Thacker et al. 2018. "Infrastructure Underpinning Sustainable Development." Copenhagen, Denmark.
<sup>2</sup> UNOPS, UNEP, and University of Oxford. 2021. "Infrastructure for Climate Action." Copenhagen, Denmark.

<sup>&</sup>lt;sup>3</sup> Rozenberg, J. & Fay, M. 2019. "Beyond the Gap: How Countries Can Afford the Infrastructure They Need While Protecting the Planet. Sustainable

Infrastructure." Washington DC. <sup>4</sup> Global Infrastructure Facility. "About GIF"

<sup>&</sup>lt;sup>5</sup>United Nations. 2015. "Addis Ababa Action Agenda of the Third International Conference on Financing for Development." New York.

 <sup>&</sup>lt;sup>6</sup> Chennells, M., Chaponda, T. & Nikore, M. 2014. "Effective Project Preparation for Africa's Infrastructure Development." Cape Town, South Africa.
 <sup>7</sup> Nassiry, D., Nakhooda, S. and Barnard, S. 2016. "Finding the Pipeline Project Preparation for Sustainable Infrastructure."

<sup>&</sup>lt;sup>8</sup> Global Infrastructure Hub. 2019. "Leading Practices in Governmental Processes Facilitating Infrastructure Project Preparation: A Practical Guide for Governments, Informed by a Country-Lens Review of Leading Practices

projects from concepts to the point of financing and implementation. Their ability to do so hinges on the strength of their enabling environments: the people, institutions, rules, resources and conditions that facilitate infrastructure project development. The infrastructure enabling environment is a term without a standard definition or conceptualization. Several organizations, including the United Nations Office for Project Services (UNOPS)<sup>10</sup>, Global Infrastructure Hub (GI Hub)<sup>11</sup>, World Bank<sup>12</sup>, Economic Intelligence Unit (EIU)<sup>13</sup> and the Institution of Civil Engineers (ICE)<sup>14</sup>, have developed conceptualizations and tools to assess the enabling environment. However, these lack standardization and cohesion between them, and none present a holistic framework of the enabling environment. Developing country governments are often burdened by weak enabling environments, which hinder project preparation. Investigating the enabling environment thus has potential to uncover novel insights to address this challenge.

The complexity of infrastructure development necessitates a systems perspective. Existing literature recognizes the need for a systems of systems of approach for infrastructure asset management in the operations phase<sup>15</sup>, but there is a lack of literature addressing this need in the preparation phase. Systems analysis is a novel, multidisciplinary approach to addressing complex problems, which links systems "structure to performance, and performance to structure — often for purposes of changing structure (relationships) so as to improve performance."<sup>16</sup>.

This research thus aims to conduct a systems analysis to map the infrastructure enabling environment, identify relationships and causal loops within this system, and identify leverage points to improve project preparation in developing countries. A comprehensive and holistic framework – the INABLE Framework for the Infrastructure Enabling Environment (INABLE) - is developed and applied to a systems stakeholder map and causal loop analysis to investigate the enabling environment and uncover challenges and solutions to project preparation. In the subsequent sections of this paper a brief description of the research methodology is provided and the INABLE framework is presented, followed by its application to the systems analysis, results, recommendations and a conclusion.

#### 2 Research Methodology

The methodology aims to answer the following research questions:

- 1. What are the core components of the enabling environment, and how do they interact?
- 2. How does the enabling environment affect infrastructure development?
- 3. What opportunities exist to strengthen the enabling environment to improve infrastructure development?

The methodology consisted first of a critical review of literature to conceptualize the enabling environment and develop the INABLE framework to answer the first question. Based on this review, a systems analysis was conducted, consisting of a stakeholder system map and causal loop diagram, to identify key interactions and leverage points in the enabling environment, answering the second question. The system stakeholder map was developed by identifying key stakeholders and elements of the enabling environment, and mapping their relationships. The causal loop analysis loosely follows the methodology developed by Harodlsson (2000)<sup>17</sup>,

<sup>&</sup>lt;sup>10</sup> UNOPS. 2018. "Capacity Assessment Tool for Infrastructure Explainer Document." Copenhagen, Denmark.

 <sup>&</sup>lt;sup>10</sup> UNOPS. 2018. Capacity Assessment for the intrastructure Laplace. Explane. Explane. Explane. Explane. Explane. 2019.
 <sup>11</sup> Global Infrastructure Hub. 2019.
 <sup>13</sup> Economic Intelligence Unit. 2022. "About the Infrastructure Development."
 <sup>14</sup> Institution of Civil Engineers. n.d. "Enabling Better Infrastructure: 12 Guiding Principles for Prioritising and Planning Infrastructure."
 <sup>15</sup> Hall, W et. al. 2017. "Strategic Analysis of the Future of National Infrastructure." *Proceedings of the Institution of Civil Engineers: Civil Engineering* 170 (1): 39–47. https://doi.org/10.1690/ision.16.00018

 <sup>47.</sup> https://doi.org/10.1680/jcien.16.0018.
 <sup>16</sup> Hjorth, P., & Bagheri, A. 2006. "Navigating towards Sustainable Development: A System Dynamics Approach." *Futures* 38 (1): 74–92. https://doi.org/10.1016/j.futures.2005.04.005.
 <sup>17</sup> Haraldsson, Hördur v. 2000. "Introduction to Systems and Causal Loop Diagrams."

and identifies key balancing loops, reinforcing loops and leverage points using the framework developed by Meadows (1999)<sup>18</sup>. A further literature review and stakeholder interviews were used to refine INABLE, and augment the systems analysis. In total, 13 semi-structured<sup>19</sup> interviews were conducted with stakeholders representing federal government agencies, infrastructure financiers, civil society and engineering practitioners. Interviews covered five topics, pertaining to challenges and potential interventions in: (1) the enabling environment, (2) project preparation, (3) infrastructure financing and (4) infrastructure quality, as well as the (5) the role the stakeholder's organisation plays in addressing each. Ethics approval was obtained from the University of Cambridge to conduct interviews. Interviews were conducted under Chatham House Rules and were conducted in accordance with University of Cambridge ethics guidance. Based on the systems analysis, potential leverage points are identified, answering the third research question.

# **3 Infrastructure Enabling Environment Definition**

Stemming from the absence of a definition of the infrastructure enabling environment, a working definition is developed based on the literature review and stakeholder interviews:

"The actors, resources and conditions that facilitate the planning, preparation, delivery and management of sustainable, resilient and quality infrastructure projects."

Actors refer to the key stakeholders in infrastructure development. Resources and conditions refer to components of the enabling environment and the extent to which they exist. Planning, preparation, delivery and management summarize the key stages of the infrastructure lifecycle in which the enabling environment has most effect. Finally, sustainable, resilient and quality refer to the desired outcomes and characteristics of infrastructure development that a strong enabling environment can foster.

# 4 INABLE Framework for the Infrastructure Enabling Environment

INABLE has been developed in response to the lack of a comprehensive framework defining the infrastructure enabling environment and its component parts. The framework is developed from a public sector perspective and aims to outline the "resources and conditions", and the key enablers that influence governments' ability to conduct project preparation activities and develop infrastructure projects. INABLE consists of 5 categories (INABL), as well as six exogenous constraints (E) summarized in Figure 1.



Figure 1: INABLE Framework categories: institutions, direction & commitment, accountability measures, budgets & resources, rules and exogenous constraints.

**Institutions** refer to the structure of government agencies responsible for overseeing and governing infrastructure development, as well as the arrangements that dictate how they work together, and their capacity to fulfill their individual mandates. **Direction & Commitment** represent the political aspect of infrastructure development; it includes a

<sup>&</sup>lt;sup>18</sup> Meadows, Donella. 1999. "Leverage Points Places to Intervene in a System."

robust policy framework, as well as plans and strategies, and a demonstrated political will to execute of stated policy directives. **Accountability Measures** facilitate openness, transparency and collaboration between stakeholders, and hold actors to account for their respective roles and responsibilities through stakeholder engagement, reporting and information disclosure. **Budgets & Resources** represent the money, people, physical and technical resources available to institutions to carry out infrastructure development activities. **Rules** govern how infrastructure development is conducted, and include legislation, regulations and standards developed by government institutions, as well as the ability to enforce these rules through rule of law. Finally, **Exogenous Constraints** are factors that influence infrastructure development, but whose influence comes from external sources which are not directly within the control of government institutions and other stakeholders. Figure 2 outlines the INABLE framework in more detail, with its 18 component parts and 6 exogenous factors.



Figure 2: INABLE Framework with 5 categories, 18 components and 6 exogenous constraints.

# **5 Stakeholder Systems Map**

The components of the enabling environment are interconnected and dynamic. They interact with each other and with key stakeholders to facilitate project development. Figure 3 displays a stakeholder systems maps for infrastructure development, outlining the elements of the enabling environment, key actors in project development, and how they interact. The key actors in the analysis include **government institutions** who prepare infrastructure projects; **politicians** who set legislation and policy for infrastructure development and investment; **engineering contractors** who conduct assessments, design and construction of infrastructure; **financiers** who supplement government budgets through the provision of project preparation and infrastructure financing, and support government institutions through technical assistance; **users** who dictate infrastructure demand, and ultimately benefit from infrastructure provision; and **civil society** who generates thought leadership, knowledge and data around best practice, support government institutions through capacity building, and hold politicians and financiers to account.

From the analysis, it becomes clear how the elements of the enabling environment interact: Government Institutions (I) conduct project preparation activities and liaise with key actors to develop infrastructure. Direction and commitment (N) determine the priorities of these institutions. Accountability measures (A) facilitate trust and transparency between institutions and relevant stakeholders. Budgets and resources (B) dictate how effectively institutions can function, the scope of their activities and their ability to carry out their mandate. Finally, rules (L) rules govern how institutions should act.



rigure o. Glakenolder systems map for project development

The stakeholder systems map highlights the central role that government institutions play in infrastructure development. Institutions are directly responsible for the development of infrastructure projects and directly influence key elements of the enabling environment, such as policies, plans & strategies, guidelines & processes, and accountability measures. Legislation, policy, human capacity, data, funding, financing, and political commitment, are all inputs and enablers of strong institutions with high capacity and coordination. Institutions are also intermediaries, as they interact with and are accountable to all stakeholders in the enabling environment. Institutions are accountable to politicians to deliver on their mandate and fulfill policy objectives; to users and civil society to determine public need and deliver infrastructure to meet this need; to engineering contractors to conduct clear and fair procurement processes in order to attain their services; and finally, to financiers to repay debts from financing arrangements.

A key theme emerging from stakeholder interviews which is highlighted in the systems map is the need for trust in key stakeholder relationships in the enabling environment. Trust is built through shared values and mutual respect between stakeholders,

accountability measures applied appropriately and confidence in the rule of law<sup>20</sup>. Institutional arrangements also foster trust and coordination amongst government institutions. Trust is essential in each of the abovementioned relationships between institutions and other actors. Table 1 describes trust affects relationships between government institutions and users & civil society, financiers, and engineering contractors, the outcome and enablers of a trusting relationship and potential negative outcomes in the absence of trust. Several elements of the enabling environment play a role in facilitating trust between institutions, namely accountability measures, legislation, rule of law, policy frameworks, and political commitment. Worth further investigation is the power dynamics within these trust relationships, namely between, institutions and financiers, institutions and users, and politicians and institutions, and the role it plays in facilitating trusting relationships.

Table 1: Trust relationships between government institutions and relevant actors in the enabling environment.

Actor	Trust Relationship	Trust Outcome	Trust Enablers	Negative Outcomes
Users and Civil Society	Must trust that institutions consider their needs in infrastructure development	Willingness to pay for infrastructure services	Stakeholder engagement, transparency, reporting	Protests, delays, lack of project impact
Financiers	Must trust that governments will pay their debts in full and on schedule	Facilitate provision of financing	Legislation, rule of law, fiscal policy, political commitment	Lack of financing, increased cost of financing
Engineering Contractors	Must trust that institutions will conduct fair and transparent procurement, and pay for services in due time and based on quality	Facilitate infrastructure preparation and delivery	Legislation, rule of law, transparency, reporting	Poor quality delivery, lack of infrastructure

The stakeholder systems map highlights the central role that government institutions play in infrastructure development, and how trust between institutions and key stakeholders facilitates this process. Investing public resources in strengthening government institutions, solidifying institutional arrangements, building human capacity, and improving resource allocation can have cascading effects on project preparation. The decisions made by government institutions, and the people who work within them, regarding infrastructure project prioritization, fiscal policy, resource allocation and governance are essential in getting infrastructure development right.

# 6 Causal Loop Analysis

Infrastructure development and project preparation is driven by a series of actions triggered by causal relationships that together create feedback loops. Figure 4 presents a causal loop diagram of the infrastructure development process with emphasis on the enabling environment and infrastructure financing. The system goal is to increase the **number of quality prepared projects.** The system boundary is limited to national or regional public infrastructure, the project preparation phase, and elements of the enabling environment outlined in INABLE, excluding exogenous constraints. The sections below dissect the causal loop diagram to highlight key causal loops and leverage points.

<sup>&</sup>lt;sup>20</sup> Goldie-Scot, Hamish. 2022. "ACTS Diagnostic Tool: Assessment of Perceived Drivers of Good Performance."



Figure 4: Causal loop analysis of the infrastructure project development process

#### 6.1 Infrastructure Reinforcing Loop: Virtuous Cycle of Development

The infrastructure development cycle causal loop is a reinforcing loop that outlines a simplified theoretical process of project development, its desired outcomes and its intended sustainability. Government funding used for project preparation financing enables project preparation activities to be conducted. Well-done project preparation activities produce more investment ready prepared projects, which theoretically increase access to infrastructure financing. Financing (amongst other things) enable the delivery of infrastructure projects, which increase the stock of infrastructure and facilitate the provision of infrastructure services. Infrastructure services generate revenues which bolster



Figure 5: Reinforcing loop of the infrastructure development cycle.

government budgets to repay debts and further enable project preparation financing. This cycle demonstrates the challenge of infrastructure development, namely the delay between the incursion of costs at the preparation and delivery phase, and the recuperation of revenues through the provision of infrastructure services. This delay presents several risks, namely in predicting future revenues, which create challenges in securing project preparation and infrastructure financing. The two primary sources of infrastructure and project preparation financing are government funds, generated from tax revenues, and external financing provided by infrastructure investors (Figure 6). Strategic decision-making and effective fiscal policy are essential strike the balance between these sources.

Investor Confidence — External Financing

Project Preparation Financing

Infrastructure Revenue (Taxes, Fees and Levies) ——— Government Funding

Figure 6: Causes tree of project preparation financing

# 6.2 Debt Balancing Loop: Effects of Overreliance on External Financing

The debt balancing loop (Figure 7) demonstrates the effects of overreliance on external financing, namely debt. Private sector, development bank and government loans are the largest financing mechanism used for infrastructure financing in developing countries<sup>21</sup>. External financing drives debt, which worsens economic indicators, such as overall debt levels and debt-to-GDP ratios, which investors use to make investment decisions. This in turn affects investor confidence and can limit future investment opportunities. The debt balancing loop highlights the key role that fiscal policy plays in managing public debt to ensure sustainability in infrastructure financing. Limits to external financing highlight the importance of strategic decision-making frameworks and project appraisal mechanisms in upstream project preparation to prioritize the



Figure 7: Balancing loop of debt financing

right projects for investment. It is worth noting that this feedback loop applies primarily to traditional public procurement methods, in which the government is responsible for financing infrastructure delivery. Limited fiscal capacity and the effects of overreliance on debt shown in debt balancing loop justify the global push towards private participation in infrastructure through public-private partnerships. This would shift the burden of infrastructure financing off government balance sheets and onto the private sector. While this has the potential to increase fiscal capacity for infrastructure revenues do not materialize. Despite its challenges, external financing has an important role to play in financing infrastructure. In order to appropriately leverage external financing, government resources must be leveraged effectively to improve investor confidence to increase access to favorable financing and increase confidence in project bankability to improve certainty in future infrastructure revenues and improve sustainability of external financing.

# 6.3 Improving Investor Confidence through Reinforcing Gains

Investor confidence is the primary driver of external infrastructure financing (Figure 6); investors need to trust that they will get a return on investment, and (in the case of development financiers) that the project will achieve its intended development outcomes. Several factors influence investor confidence, including a strong institutional capacity, proven track record of infrastructure delivery, confidence in bankability and development impact (demonstrated in part through extensive project preparation activities), government investment in infrastructure, and understanding of project risk, amongst other things. The reinforcing gains loops (Figure 8)



highlight the reinforcing loops of successful project preparation and infrastructure delivery in improving investor confidence. Firstly, successfully delivered

Figure 8: Reinforcing gains of successful preparation and delivery

projects reinforce confidence in investors for future investments. A potential information gap exists here; a database of case studies of successfully delivered infrastructure

<sup>&</sup>lt;sup>21</sup> Global Infrastructure Hub. 2022. "Green bonds mobilising more capital to finance sustainable infrastructure"

projects may improve investor confidence in investing in the host country. Secondly, successful project preparation builds knowledge and experience (i.e. human capacity) amongst civil servants, which in turn strengths institutions. This has two effects of giving more confidence to investors and also improving the quality of project preparation activities in the future. This is predicated, of course, on the retention of public sector talent over multiple years. The reinforcing gains of successful project preparation and delivery suggest that quick-win projects of lower complexity be prioritized to build experience in infrastructure development.

# 7 Recommendations and Future Work

The systems mapping and causal loop analysis highlight the complexity of infrastructure development, the various actors and enablers involved in the process, and the causal impacts of strategic decisions. Below are a set of recommendations stemming from the analysis to address this complexity and navigate system impacts:

- 1. Invest in building trust in government institutions: the system analysis highlighted the central role of government institutions in infrastructure development, and need for trust between institutions and the other actors in the enabling environment. Rules, Accountability Measures and Direction & Commitment are key to build trust.
- 2. Invest government funding upstream to attract downstream financing: focus public capital on strengthening institutional capacity for project prioritization and appraisal early in project preparation. Allocating resources here will can have downstream effects on improving fiscal management and attracting financing.
- 3. Prioritize quick win, and small-scale distributed projects to highlight successful projects, build momentum and reinforce trust: quick win and small-scale projects have significant potential for success, to build a track record and foster trust and confidence amongst stakeholders, specifically financiers. Leverage past project data and reporting mechanisms to highlight successful projects to build trust amongst investors and users. These can increase revenues through tax (less tax avoidance), as well as external financing.

Future work building on this research can seek to apply the INABLE Framework and systems analysis to a case study country using publicly available data from existing tools, as well as stakeholder interviews, to validate the theoretical analysis with practical examples. In addition, a more detailed causal loop analysis within a specific context can be conducted, including temporal delays, stocks and flows. While this would require more time and data to quantify variables such as delays, infrastructure stock, levels of service, infrastructure revenues, debt etc., it would provide more detailed insights into the system dynamics and enable the identification of more leverage points.

# 8 Conclusions

This research has taken a novel approach to addressing the global lack of infrastructure and financing for infrastructure by developing a comprehensive framework to investigate the enabling environment and applying it through a systems analysis. The systems analysis has uncovered key stakeholder relationships, processes and causal loops which drive infrastructure development. Namely, the analysis highlighted importance of government institutions, trust amongst stakeholders, fiscal management and building on project successes to address the infrastructure and infrastructure financing gaps. Ultimately, by unlocking the infrastructure enabling environment, there is significant potential to improve the development and financing of quality infrastructure projects to achieve our global sustainable development objectives.

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