



Citizen-Centered Approaches
to State and Market



Dissemination Note: Infrastructure

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I. Overview

The necessity of building, maintaining, operating, renovating and retiring infrastructure will loom large in the next 25 years. Both developed and developing countries require massive investments in their infrastructure currently and for the foreseeable future. Estimates by global firms currently range between US \$30 and \$70 trillion in spending on infrastructure in the next 25 years.¹ In Africa it is estimated that US \$93 billion will be needed annually over the next decade, more than twice what was previously thought. The construction industry, which will be the key provider of infrastructure, is distinctive from other² industries – even in high-income countries, 25 to 40% of the demand for infrastructure built by private sector originates from the government. In developing countries, where international financial institutions are providers of assistance, the bulk of the resources are often provided by the government.

II. The Centrality of Infrastructure

ISE argues that provision of infrastructure services is one of the core ten functions of the state. The response to the global financial crisis of 2008 has taken the form of stimulus packages where investment in infrastructure has again become a core driver of both recovery and future competitiveness. Most developed and developing countries have, in the course of implementing their stimulus packages, discovered that they were not sufficiently ready to invest speedily in infrastructure. However, a number of countries, such as Canada, China, Malaysia, and Singapore, for example, were able to move both comprehensively and with speed to use the stimulus packages to deliver thousands of projects aligned to serve the goal of recovery and renewal of growth. By investing in infrastructure, these administrations were able to advance long-term economic and social goals through a single process.

Studies in BRIC countries reveal that there are significant constraints in the design, building, and the delivery efficiency of infrastructure. It is documented that the Russian construction industry, for instance, is only 36% as efficient as its American counterpart, which means that their ambitious housing goals will not be met. India is estimated to be losing \$200 billion a year because of poorly maintained and constructed infrastructure. In developing countries, the construction industry typically accounts for 6 to 12 % of the GDP. However, neither the World Bank nor the IMF has been paying systematic attention to the role of the construction industry as a driver of growth. The only organization that has gathered systematic data on construction is the United Nations, whose records for most of the world go back to 1970, and for the former Soviet Union, to 1990.

III. Sourcebook Objectives and Content

The objective of the infrastructure sourcebook is to provide policy makers, leaders and managers in the government and private sector, and practitioners in development institutions, universities

¹ See: Ernst and Young 2011 Infrastructure Report, Booz Allen Hamilton Bringing Infrastructure into the 21st Century, and McKinsey's Lions on the Move

² See World Bank's Africa's Infrastructure: A Time for Transformation

and organizations of learning with a synthetic overview of the issues in the sector, a stocktaking of current challenges, and proposals for managing the challenges of the next 25 years.

The content of the sourcebook is as follows:

1. The sourcebook documents the extent to which infrastructure is and will continue to be one of the core state functions in both developed and developing countries.
2. By focusing on costs, timeliness, efficiency, effectiveness and transparency in delivery of infrastructure in high, middle and low income countries we will identify the common features that have made the public skeptical about the promise of infrastructure. Corruption in the construction industry, to take just one feature, is perceived to be among the highest, exceeding perceived corruption even in the defense industry. Cost overruns, lack of timely delivery and the need to redo a significant part of the work – judged to be as high as 40% in the UK – are other common features in the building of infrastructure.
3. By differentiating between the stock and flow of infrastructure, the sourcebook takes account of the accumulated gains of the past and the nature of investments that have or have not taken place. This distinction allows us to focus on the requirements of operations and maintenance, renovation and retiring of property. The American Society of Engineers, for instance, has given US infrastructure a grade of C- across the last 10 years. Despite the Obama Administration's intention to invest in infrastructure, they could not find a sufficient stock of investable projects that would meet the criteria of being targeted and timely. Japan, which has taken a comprehensive investigation into its infrastructure stock, has concluded that it will not be able to renew, operate and maintain the existing stock, and urgently needs to develop policies and criteria for retiring a significant amount of infrastructure in the coming 25 years. The distinction between stock and flow also enables us to use a dynamic rather than static definition of infrastructure. Analysts who operate with a static definition freeze the policy discussions on critical infrastructure at a particular moment in time. A dynamic definition, by contrast, allows us to see how technological, societal and political change brings about significant redefinition of what constitutes critical infrastructure at any moment in time or across decades.
4. Equally significant, the safety of infrastructure assumes different configurations, as millions of devices are linked together into systems. The infrastructure underpinning cybersecurity and the threats that will emanate from cyberspace are going to have a significant bearing on how citizens, the private sector and governments use, build, manage and regulate infrastructure. The sector comprises not only physical, but also informational networks.
5. To allow for comparisons across eras and countries we differentiate between the following key components of infrastructure: network (transport and communication), utilities, government, housing and commercial.
6. While significant empirical work has been carried out on specific components of delivery of the construction industry, a framework that would allow for investigation of linkages and for rethinking of better alignment between or among the components has been lacking. This

sourcebook, therefore, frames the issue of the construction industry in terms of five critical components:

- **Rules and regulations**, both those promulgated by the government as laws and regulations as well as those adopted by the industry in general and specific firms as norms, standards, and operational procedures- which, among the leaders, often exceed the government regulatory framework, but minimally must comply with the law.
- **Construction** is the process connecting the owner's definition of need to ultimate product delivery. Analysis of this step in terms of a value chain reveals significant misalignments, particularly between designers and builders. Government procurement, where cost effectiveness is often defined in terms of lowest bids, rather than durability, has a defining role in how construction firms bid, design and construct.
- **Commissioning** is the third building block. In the current, segmented industry, it appears to be a control mechanism to ensure that the delivery of construction fulfills the owners' and users' project requirements in three ways: the legal standards (safety, security, emissions etc); fulfilling design specifications; and meeting quality assurance standards. Within this, the job of commissioning essentially becomes system and quality audit before use.

New approaches to commissioning have appeared to move in the direction of life cycle quality improvement and sustainability, starting at the pre-design phase and moving through design, construction, and use, and working across the phases to identify opportunities to improve the process.

There is a significant relationship across the supply chains and between various actors. Commissioning is ongoing through the design, construction and first period (usually one year) of use.

- **Operation, maintenance, renovation and retiring** make up the fourth building block. Despite the historically well-understood importance of operations and maintenance, government budgetary practices have often neglected these components and have not sufficiently acknowledged their importance in policy, budgets or analysis. A comprehensive study by the US Department of Commerce has shown that the value of annual work performed in renovation of infrastructure – which excludes housing – exceeds the volume of expenditure and classic operation and maintenance. Retiring of infrastructure – including its destruction and re-use – is comparatively new, but in fields such as nuclear installation, is likely to be quite significant, particularly given the challenges of environmental issues.
- **Supply chain and clusters** make up the fifth building block of the construction industry; supply chains are the linkages between construction and other industries. Clusters are the linkages in a particular locale ranging from the sub-national to global in scale. As the construction industry

empirically has one of the largest back and forth connections to other industries, analysis of this building block provides for a focus on creation of efficiencies – both in overall costs and in delivery of services – and in building of coalitions of interests among a wide range of stakeholders.

IV. Conclusion

Our analytic framework has explicitly developed to provide for both a stock-taking of assets and constraints in a sub-national, national, regional or global level. By focusing on integration across the five building blocks of the construction industry, and five components of infrastructure, we allow for development of policies, programs and projects that would result in systematic efficiency and sustainability gains. Applied across countries or sub-national regions, the framework will allow for benchmarking within each of the individual building blocks as well as across the value chain.

The sourcebook provides specific recommendations in the following ways:

1. It will offer governmental policy makers and managers and private sector partners an empirical framework for identifying their assets and constraints
2. Each of the building blocks of the construction industry opens the possibility of benchmarking across levels of government and industry
3. The discussion of examples of best practice in effectiveness, efficiency and timely delivery, policy makers and practitioners will be provided with options on tackling the needs of the next quarter century
4. Examination of the current practices leading to adverse environmental and social consequences, as well as documentation of breakthrough solutions in sustainability, clarifies how to tackle the challenges of sustainability – an example being avoiding the trap of aiming at short term savings for medium and long term penalties
5. Examination of organizational cultures as constraints in sustainable design will facilitate exploration of use and delivery and articulation of better ways of learning, designing and building

We hope that the existing communities of practice will find sufficient value in this sourcebook to embark on serious discussions of innovation within and across their communities. Attention to the overarching frame can also catalyze a global discussion to seek ways to bring about cooperation and to lower the current cost projections while building a new stock of infrastructure that will serve a sustainable basis for the needs of the coming generations.