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January 2014

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***Multi-Tier Monitoring of
Infrastructure:
Top Down and Bottom Up***

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World Bank

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1. Introduction

There is a robust literature on how a nation's infrastructure can promote economic growth, further the goal of poverty reduction, facilitate movement of people and goods, provide energy where it is needed, and improve a nation's health.¹ The literature also attests that although due to their varying starting points of their systems of public financial management that different countries go about the infrastructure process differently, there is also a common feature among countries in that the delivery of infrastructure services is inherently intergovernmental or "multi-tier". These twin messages neatly frame the topic of this Symposium to one of the many areas of Dana's expertise: the poly-centric (decentralized) nature of infrastructure assets that provide a range of services designed to meet basic, but at the same time, varied and complex, social and economic needs in a manner that addresses a multiplicity stakeholder interests.²

Richard Bird frames decentralizing infrastructure theme by posing several questions: which type of organization will design, build, finance, and, eventually own an infrastructure project? Will that organization be a general or special purpose government, a regional public entity, a state enterprise or other agency reporting to government(s), or a privately regulated instrumentality, or a donor? And, once those questions are addressed, who will then be accountable for monitoring the capital asset and who will the monitoring agent be accountable to? Once the monitoring accountability links are established, how is that monitoring be documented or measured? Is infrastructure monitoring about tracking facilities maintenance (inputs)? Measuring a flow of services (outputs)? Or an assessment of a project's social and economic benefits and costs (outcomes)?³ Or all of these? And, are decentralized agents capable to carry out the monitoring task? If not all, then which monitoring task(s) are they capable of undertaking and what is the practice?

The focus of this paper is on the last set of these questions -- that of the capacity and the practice of decentralized infrastructure monitoring. The experience and practice of low, middle and high income countries alike is considered. The paper is organized as follows: the next section, Section 2, defines how infrastructure is defined for purposes here, and then proceeds to discuss where the monitoring of infrastructure fits into the broader activity of decentralized infrastructure management. Section 3 then lays out some of the "pre-conditions" for effective decentralized monitoring of infrastructure, leading to the conclusion that for many developing countries these pre-conditions are not satisfied and, thus, why in order to make useful statements about decentralized monitoring of infrastructure one turns to specific case studies for lessons learned from current practice. Accordingly, Section 4 focuses on a mix of illustrative country practices on governmental monitoring of infrastructure that serve to reinforce the conventional view that though there are core lessons common to all intergovernmental societies, there is no single

¹ Yilmaz, Vaillancourt and Dafflon (2012), Ch.4 review the general case. Martinez-Vazquez and Frank (this volume); Aschauer (1989), World Bank (1994) examine the case of infrastructure.

² Bird (1994); NRC (1995).

³ Bird (1994)

“best” approach since each country faces different starting and end points to which they aspire.⁴ Section 5 reviews selected non-governmental and civil society role in what the paper labels as decentralized “bottom up” monitoring. Concluding comments are provided in Section 6.

2. Multi-Tier Infrastructure Management

Definition and Scope

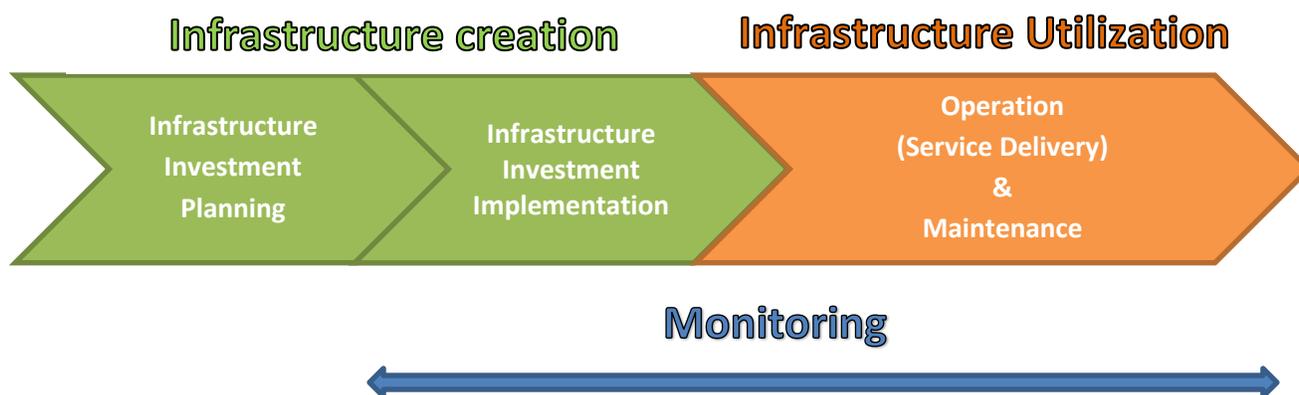
The term “infrastructure” has been used in different ways by different authors in different contexts. In this paper infrastructure is defined as long- useful life publicly provided physical assets –capital spending --used in in economic production and by households.⁵ But even with that definition, what counts as “core” infrastructure varies across countries and sectors. Thus, for rural areas, local roads, irrigation networks, community water boreholes are core. For urban systems facilities such as inter-connector roads and highways, tram systems, power and telecom, supply-to-point-of- distribution water systems, wastewater (sewerage and storm water), and street lighting dominate. Complementing the focus of the physical infrastructure as discussed here is the social overhead capital of schools, health clinics, general government office buildings, post offices, sports and entertainment facilities, fire and police stations, and prisons.

The infrastructure management process can be depicted as having two stages: *creation* of the physical infrastructure (planning and implementation of infrastructure investment) and *utilization* of a physical asset: operation and maintenance of infrastructure. The monitoring activity partially overlaps the first stage (investment and implementation) and the entirety of the utilization stage (Figure 1).⁶ The monitoring function overlays three activities: planning, implementation, and operation and maintenance (O&M). In multi-tier government systems, different types of governments may be responsible for different functions. Some aspects of infrastructure management may also be taken on by non-governmental institutions; accordingly, both governmental and non-governmental monitoring will be discussed below.

⁴ Thomas (2006), p.3

⁵ Thus excluded from the discussion here is both the fully privately provided and the public-private partnership, also important topics, but that are adequately discussed elsewhere; e.g., World Bank (1994) and Dannin and Cokorinos (2012).

⁶ The questions of functional assignment and finance are discussed by Bird, de Mello and Sutherland elsewhere in this volume.

Figure 1. The Infrastructure Management Sequence

Four Models

For a start in setting the intergovernmental (decentralized) monitoring context, four arrangements can be identified (Table 1).

1. *National planning and implementation, subnational maintenance.* Infrastructure can be created by the national government and then transferred to subnational governments for operation and maintenance. Water infrastructure in Albania is an example of this type of arrangement.
2. *National planning, subnational implementation.* Infrastructure can be planned by the national government and implemented by subnational governments. In Vietnam, for example, the central government sets investment priorities for most infrastructure projects while provincial and local (provincial) governments act as the central government's agents to implement the central decisions. As an agent the role of the province is to prepare investment proposals for central government approval.
3. *National goal setting, subnational planning and implementation.* Infrastructure can be created by the subnational governments according to the goals and plans of national governments. In People's Republic of China the central government sets investment priorities across and within sectors, including the setting of targets and timetables for infrastructure coverage in different classes of cities. Subnational governments implement the centrally established policies and standards, but may have authority to plan where and how the local infrastructure is implemented and maintained.
4. *Devolution.* Subnational governments can make their own choice of infrastructure investment priorities and manage throughout infrastructure creation and utilization. However, the central government may have a role in planning and finance. The classic case that of the United States with its 50 unitary "state" governments and its nearly 90,000 local governments. Nearly three out of five of those local governments are special

(rather than general) purpose governments, and of those, a fourth are organized as special districts for the sole purpose of the delivery infrastructure services as defined above.⁷

Table 1. Stylized Governmental Arrangements in Subnational Infrastructure

Option	Infrastructure creation		Infrastructure utilization	Example
	Planning	Implementation	Operation & Maintenance	
1.	N	N	S	Albania
2.	N	S	S	Sierra Leone Vietnam
3.	N, S	S	S	China
4.	S	S	S	Indonesia Philippines United States

Note: N: National government, S: Subnational government

The Monitoring Phase

As depicted in Figure 1, the monitoring task begins once the planning and investment steps are completed. There are two aspects of the monitoring phase.

- *Monitoring implementation of infrastructure investment* aims to ensure infrastructure projects are implemented on time, within budget and with the intended output goals met. Implementation monitoring thus focuses on cost, timeline and quality of infrastructure construction and, at its most basic level, requires comparisons of project progress against project plan. Accordingly, an effective monitoring process should be able to detect project construction cost overruns and delays in a manner that allows for timely corrective actions.⁸
- *Monitoring operation and maintenance* of infrastructure is to ensure that created assets achieve desired outputs and outcomes over their useful life, and that the assets are properly maintained over their life cycle. Monitoring infrastructure operation and maintenance focuses on output and outcomes of operation and cost of operation and maintenance, and at its most basic level, requires comparison of operation outputs and

⁷ US Bureau of the Census (2012)

⁸ Nonetheless, in even the most technically and administratively advanced of countries some timelines will not be met and cost overruns will occur. A cross-country study by the Construction Sector Transparency Initiative shows that more advanced countries like the U.K. have much lower cost and time overruns than developing countries like Ethiopia and Malawi. (CoST 2011). However, the evidence is not confined specifically to subnational projects.

outcomes against the infrastructure design. Accordingly, an effective monitoring process should be able to detect any underperformances and their causes so that relevant solutions can be made timely to restore adequate performance.

Infrastructure can be monitored by those who plan, finance, manage, own and/or use the infrastructure, a division of roles that will vary by country and by sector. In principle, the manner in how these tasks are arranged in a multi-tier system of government begins with the sorting out of expenditure and revenue assignment arrangements as discussed by Bird, DeMello and Sutherland in this volume. Though there are generally accepted “assignment rules” for a well-designed (over time) multi-tier system, such sorting out will vary due to the political and fiscal architecture that is unique to each country case.⁹ Thus, in some cases, the parties that plan and finance infrastructure may also take on the monitoring role as in Vietnam whereby the central government not only plans infrastructure projects, but then also assumes the monitoring role that in other countries may be carried out by a regional (e.g., in Vietnam, provincial) or local government. There are also countries such as Sierra Leone where the central government plans infrastructure, but then does not monitor local implementation of the plan. And, in Albania only localities that receive central subsidies for water infrastructure operation and maintenance report to the central government about their financial needs, though with this arrangement it is often the result that center does not receive full information it seeks.

In a devolved system like the United States (U.S), where central government directly accounts for only about 15% of total infrastructure investment, the central role is largely limited to that of monitoring environmental outcomes, a role that often leads to the central government’s promulgation of national environmental standards and regulatory practices for projects that in the center’s judgment (which can be challenged in court) create negative externalities across state borders.¹⁰

And, in many countries the monitoring process can be heavily influenced by civil society organizations through mechanisms such as citizen “report cards” or other forms of citizen feedback activities (e.g., public hearings, establishment of government established advisory groups). In Germany citizens can go directly to a readily accessible website of add their voice to the infrastructure monitoring process.¹¹ This citizen/civil society role is further discussed below.

3. Pre-Conditions for Effective Decentralized Monitoring

The “Gaps to Solutions” theme of this book well fits the practice of decentralized monitoring of infrastructure. But, in the context of decentralized governance, the gaps are not just that of the monitoring process *per se*; rather, the problem is that in many countries the infrastructure practice never even gets to a stage that permits a subnational monitoring role. To paraphrase Kornai, a *pre-condition* for effective decentralized monitoring of infrastructure is that there is a

⁹ Wallace (2003).

¹⁰ U.S. CBO 2008: 4-5. See Kaiser and Vinuela (this volume) for cross-country data on governmental infrastructure spending.

¹¹ For the German practice see http://www.bmvbs.de/DE/Service/Baustellenmelder/baustellenmelder_node.html

well-designed, functioning of political and fiscal decentralized authority of infrastructure to begin with. And, for that “well - functioning” system to be a reality, central and subnational governments alike must have developed the capacity to be intergovernmental.¹² However, due to the reality that at present much of the world, particularly the developing world, is still at the early stages of becoming intergovernmental, there is little evidence of effective decentralized monitoring other than the episodic.

If one looks at a conventional textbook expenditure assignment matrix that links broad categories (e.g., water supply vs. distribution) on a vertical axis with generalized economic and engineering criteria for “which type of government does what”, the assignment of the monitoring responsibility seems to be straightforward. For example in the case of water supply and distribution, national (or maybe even supra- national) entities have the intergovernmental responsibility for water supply and subnational (e.g., local) governments take on the local pipeline/ water distribution role. That is the broad first cut at the question of “which government” should then take on the monitoring function.

But, as Table 2 reveals (and even here there is heroic simplification of the complexity of the nature of all the decisions that require monitoring by some entity or entities), when one gets in the “small stuff” there is no often bright-line between supply and distribution.¹³ Thus, in the case of water management the conventional assignment exercise would assign the monitoring of the source-to-distribution point of a water flow to a central or regional authority, with the local government then taking on the monitoring of pipeline distribution to households and businesses. But, upon a closer look when takes into account externalities (e.g., is the local tap water safe to drink so as to avoid bad regional health outcomes?). It may turn out that the central (local) authority has a high monitoring interest in the occurrence of, say, local management of (central) pipeline leakage, reservoir/storage capacity, and water pressure. Similarly, the central (local) authority has a high interest monitoring water quality in order to be able to assess willingness to pay and, thus, the structure of general vs. user financing (Table 2).¹⁴ None of this is to say that these monitoring issues cannot be sorted out among governments, but rather to stress the point that to get it “right” will require both central and subnational governments (and not just general purpose governments) to be intergovernmentally capable as a pre-condition to how monitoring will work in multi - tier systems.¹⁵

¹² Kornai (1992).

¹³ Gershberg (2006) provides a country illustration of this complexity for allocation K-12 education tasks among different types of governmental authorities.

¹⁴ The topic of financing infrastructure is addressed in this volume by de Mello.

¹⁵ And add to this the reality of the asymmetric capacity to govern, let alone be intergovernmental, in many developing countries. See Dafflon (2006), 271-305 and Congleton (2006), 131-154.

Table 2. An Illustration of a Conceptual Framework Checklist: Decentralization of the Infrastructure Monitoring Function

Framework and System Inventory for Monitoring		←Who Monitors? →	Monitoring Measures	
<i>Generic Goals</i>	<i>Decentralization: Determinant of Scale and Jurisdictional Coverage</i>	<i>Institutional Considerations</i>	<i>Output</i>	<i>Outcomes</i>
<ul style="list-style-type: none"> • Economic Productivity • Economic Health • Environmental Quality • Poverty reduction (distribution of flow of services) • Employment stimulus 	<ul style="list-style-type: none"> • System size • System cost • Degree of cost recovery • Technology • Area of Extent • Distribution of general population • Distribution of poverty Population 	<ul style="list-style-type: none"> • Formal vs. Informal Institutions • Conventional vs. Traditional Governance • Collectivity: Governmental or CSO/CDD? • Political “level” of government having a benefits stake in the goals • Political: general or special purpose? 	<ul style="list-style-type: none"> • Availability per unit of time (per unit of time such per hours; on demand? peak?) • Technical productivity(output /unit input) • User Satisfaction (and, thus, willingness to pay) • Safety • Environmental Externalities 	<ul style="list-style-type: none"> • Willingness to pay • User “report card” (formal and/or informal) satisfaction • Public health and safety • Environmental considerations • Equity (distribution of costs, benefits, consequences)
Framework and System Inventory for Monitoring		←Who Monitors? →	Monitoring Measures	
<i>Water Supply & Distribution Goals</i>	<i>Decentralization : Determinants of Scale and Jurisdictional Coverage</i>	<i>Institutional Considerations</i>	<i>Output</i>	<i>Outcomes</i>
<ul style="list-style-type: none"> • Provide adequate, reliable source of water • Ensure general public health • User safety • Access to Employment and Schooling (& gender economics) • Access to poor 	<ul style="list-style-type: none"> • Meters and capacity protocols of main supply system (e.g., pipeline) • Meters and capacity protocols of local distribution systems • Treatment plants • Storage capacity • Reservoirs (natural and constructed) • Pipe leakage 	<ul style="list-style-type: none"> • By system Ownership (by whole or parts; public vs. private?) • By agent that financed the project plan and implementation • Service area users • General or special purpose government • Intergovernmental cooperative • Major users (e.g., industrial) 	<ul style="list-style-type: none"> • Gallons delivered • Pipeline Pressure (main supply and local distribution) • Storage rate (e.g., % of capacity to store) • Leakage/loss rates • Consumption per unit user • Financing: user charges vs. general finance • Lifeline user payment arrangements • Water pressure 	<ul style="list-style-type: none"> • Public health/disease incidents • Maintenance tracking/disruption of service rates • Poverty reduction service and catchment areas • Poverty reduction access to water (to the home?) • Willingness to pay • Economic growth and employment stimulus

Note: This presentation is not designed for a bullet-to-bullet cross table reading. Thus, for example, the Column1 generic of employment stimulus may relate to one or more of the bulleted entries in columns 2-4. Source; Adapted from U.S. National Research Council (1995)

An illustration for the lack of decentralized monitoring of infrastructure is found in the decentralization of the water sector in Eastern Europe and Central Asia. While some aspects of infrastructure management have been decentralized, monitoring responsibilities have not been decentralized accordingly. Based on the World Bank’s recent study of the institutional arrangements in water infrastructure in Eastern Europe and Central Asia, out of 19 countries surveyed, 17 countries have some aspects of decentralized infrastructure management (Table 3).¹⁶ However, there is a disconnect between the type of government (typically subnational) authority that creates and utilizes the water infrastructure services (Table 3, Columns 2 and 3)

¹⁶ World Bank, Urban and Sector, Country Sector Notes, 2012. Unpublished as of this writing.

and the authority, typically national, that monitors (Table 3, Column 4). Moreover, only four countries, Albania, Belarus, the Czech Republic, and Turkey report that monitoring of infrastructure is part of the overall strategic planning process. This lack of decentralized monitoring of infrastructure well fits the argument that if there are no pre-conditions for decentralization, one cannot expect to find a decentralized role for multi-tier infrastructure monitoring.

Table 3. Institutional Arrangement in Water Sector Management , Eastern Europe and Central Asia, 2012

Country	Infrastructure Creation Authority	Infrastructure Utilization (O & M) Authority	Infrastructure Utilization Monitoring Authority	Use of Monitoring in Strategic Planning
Albania	Regional	Regional	National	Yes
Armenia	National	National/Regional	None	NA
Azerbaijan	National	National	None	NA
Belarus	Municipal	Municipal	None	Yes
Bulgaria	Regional	Regional	National	No
Croatia	Municipal	Municipal	National	No
Czech Republic	Municipal	Regional	National	Yes
Georgia	Regional	Regional	None	NA
Hungary	Municipal	Municipal	National	No
Kazakhstan	Municipal	Municipal	None	NA
Lithuania	Municipal	Municipal	National	No
Moldova	Municipal	Municipal	National	No
Poland	Municipal	Municipal	National	No
Romania	Municipal	Regional	National	No
Serbia	Regional	Regional	National	No
Slovak Republic	Regional	Regional	National	No
Turkey	Municipal	Municipal	National	Yes
Ukraine	Municipal	Municipal	None	No
Uzbekistan	Municipal	Municipal	National	No

Source: World Bank, *Urban Water Notes, 2012 (unpublished)*.

Note: NA: Information not available

Organizational Capacity

The matter of becoming intergovernmentally capable enough to have a discussion about infrastructure monitoring in multi-tier systems is not only about whether individuals in subnational governments are adequately trained for the task; rather, it is the failure having the *organizational and institutional capacity* in place for the system as a whole. The World Bank's Independent Evaluation Group's (IEG) report on the evaluation of the Banks' support or

capacity building found that “individuals are often trained for specific tasks before the organizational framework has been reformed to allow them to use the training effectively”.¹⁷ In short, if a country is not broadly organized to be intergovernmental—that is, if its system of political and fiscal decentralization is flawed from the start in that the fundamental questions of “which government does what” has not been sorted out, well, then, so much for a decentralized monitoring.¹⁸ As Martinez-Vazquez and Frank note in their summary paper to this volume, such organization capacity is a “first aspect of the decentralization and infrastructure and hand”. Yes, there can be a deconcentrated dispersion of responsibilities to monitor within a central bureaucracy, and central-to-local agency delegation is also an option; but, from a conceptual as well as empirical perspective, this is not multi-tier or *decentralized* governance.¹⁹

But, that said, for this discussion of infrastructure monitoring it is useful set aside the conceptual argument regarding the degree of organizational capacity required for a country to be “decentralized” and accept the proposition that if there is a degree of deconcentration and/or delegation *with authority*—that is, regional/local branches of central offices are created with an ability to make decisions independent of the center—there is, therefore, some degree of a *de facto* decentralization system.²⁰

Institutional Capacity

Regardless of the degree of organizational capacity, the capacity to be decentralized—and, therefore, carrying out a decentralized task as key as monitoring of infrastructure-- is incomplete unless there is an *institutional* capacity to be multi-tier. By institutional capacity, one is referring to whether “the rules of the game” (e.g., relating to the assignment of the monitoring function) are linked with sustained performance of both entities responsible for service delivery (such as ministries and their agents, local governments) and individuals responsible for delivering results.²¹ Now a question is: what is the incentive structure of the local staff to effectively monitor local infrastructure to meet the interests and needs of their communities? If in the end the final reporting procedures and rules that the local-in-the field staff are those that address/promote/satisfy the goals of the central ministry or department, then for effective decentralized infrastructure monitoring to work there must be the happy case that the goals and incentives of central ministry or department staff happen to coincide with the desired outcomes of the end users of infrastructure services. However, the history of centralized governance leads one to conclude that there will likely not be such a happy coincidence. A good illustration is that of the pre- 1990s socialist systems in Eastern Europe and Central Asia whereby the policy of the central authority, the supra-national Soviet Union that planned infrastructure for its nation-states,

¹⁷ Thomas (2006), p.1; World Bank(2005).

¹⁸ Ebel and Yilmaz (2007) and Smoke, Kaiser and Eaton (2010)

¹⁹ Not all analysts are willing to so readily to formally rule out deconcentration or delegation as viable forms of decentralization. E.g. see Amin and Ebel (2007)

²⁰ Smoke and Taliercio address the nature of “deconcentration” vs. “decentralization” for Cambodia. Smoke and Taliercio (2007),70

²¹ Thomas (2006), p 2.

was to build—but- then-ignore local infrastructure, with the result that the pay and promotion incentive of the “decentralized” (e.g., county) local field staff was go along with the same incentives as their central managers responded to.²²

But, one not need reach back to Soviet socialism to note this problem of a breakdown in the institutional capacity for effective decentralization of infrastructure monitoring. The Independent Evaluation Group (IEG) of the World Bank reports that “only about one third of the projects reviewed in Africa were clear about the relationships among organizational, institutional, and individual capacity.”²³ In its work the IEG found that though a “lot of effort was devoted to fixing weaknesses in organizational capacity, the main problem was poor incentives for staff” and, furthermore, that “individuals were too often trained for specific tasks without reforming the [institutional] framework to let them use the training effectively”.²⁴ Thus, if one makes what for many places is the heroic assumption that the organizational capacity for decentralization—and therefore decentralized monitoring—is in place, one still runs into the problem of failure of the institutional to be effective.

The water sector in Albania provides a good example of how the lack of an institutional capacity to monitor locally.²⁵ Albania initiated a process to decentralize the water sector in 2000 when the *Organic Law* defined water sector service as a function of local government units.²⁶ The principal mode of decentralization was the transfer of ownership of water utilities from the central government to local government units (LGUs). This was accomplished either by detaching rural independent systems from existing utilities and transferring them to the communes, or through direct investments in stand-alone systems in communes, financed by the central budget or by foreign donor organizations. Then the new systems were passed onto LGUs. By 2007, the decentralization was considered largely complete with 83 percent of the total number of utilities having been transferred, involving 76 percent of municipalities and 88 percent of communes, and serving 53 percent of the population.²⁷ But, even though these organizational arrangements were effected, performance of water sector did not improve after the decentralization. Continuity of water service remains low, at only 11 hours per day, compared with Western European Benchmark of 24 hours per day. Utility staff per 1000 connections is about ten while the benchmark is only 2. Monitoring of water infrastructure has not improved. It was weak with the central government before decentralization and continues to be weak under the ownership of LGUs due to the lack of intergovernmental capability and institutional capacity to monitor. Two failures of institutional capacity are particularly evident. First, a five-year business plan is considered as a benchmarking tool that would facilitate LGUs to monitor

²² Alm and Buckley (1994); Bird Ebel, Wallich (1995).

²³ World Bank (2005)

²⁴ Thomas (2006)

²⁵ This section draws on World Bank (2011b)

²⁶ Article 10 of the Organic Law of Albania.

²⁷ However, the transfer of two of the largest water companies, Tirana and Durres, serving 37 percent of the population, has not been completed yet. Mayors of Tirana and Durres have refused to accept the utilities’ transfer without guarantees of ongoing financial support from the central government. World Bank (2011b).

performance of water companies. However, per the *de facto* “rules of the game” there is no legal obligation for water companies to prepare and submit such a plan to the central government or to the LGUs. Second, LGUs can monitor the performance of water companies against a performance agreement between an LGU and a water company; but, again, the *de facto* “rules” are such that none of the transferred water companies has concluded such an agreement with their LGUs because most LGUs do not have sufficient revenue to fund the operating and maintenance of water infrastructure.²⁸ In sum, though the Albanians got the organizational framework ‘right’, there was no follow up to make the intergovernmental institutional arrangement capable of carrying out its monitoring task.

Individual capacity.

Even if both the organizational and institutional capacity is in place, there remains the matter of the capacity of individuals—the staff—to be able to be decentralized. In Nigeria the Lagos State government has attached high importance to monitoring and evaluation of infrastructure projects. Monitoring is primarily undertaken by the Monitoring and Evaluation Directorate in the state Ministry of Economic Planning and Budget (MEPB), and supported by the Project Implementation Monitoring Unit (PIMU) in the Governor’s Office and an Independent Consultants Monitoring Team.

Implementing ministries, departments and agencies submit quarterly reports to the MEPB and PIMU and explanation is required for cost variances. MEPB and PIMU review project costs and benefits and make quarterly monitoring and evaluation reports. These reviews are, however, not as detailed as expected because of inadequate technical skills. Projects are to be stopped if irregularities are discovered by the MEPB or PIMU, but this rarely happens.

Despite Lagos government’s stated effort in improving monitoring, it is still weak as characterized by a low quality of monitoring reports. To compensate there has been a Personal Assistant to the Governor in infrastructure project monitoring and evaluation. Moreover, the Governor’s Office has collaborated with the World Bank mission in Nigeria to build the capacity of monitoring and evaluation of state Ministry of Economic Planning and Budget, and the Project Implementation Monitoring Unit (PIMU) in the Governor’s Office. However, low individual capacity still constrains quality of monitoring.

4. Case Studies.

As the forgoing discussion reveals, it makes little sense to talk of “decentralized monitoring of infrastructure” in a country if the pre-condition solutions involving organizational, institutional and individual capacity is not in place. Nevertheless, there are lessons to be learned from both

²⁸ World Bank (2011b).

“top-down” and “bottom-up” case examples—practices that the IEG notes that when it comes to the practice of project monitoring and evaluation, “can be more art than science”.²⁹ And, taking that cue, there are several case studies that give guidance of how one can move from gaps to solutions. It is also true that in closing these gaps, there is opportunity for developed and developing to learn from each other. Though there are good examples of a well-designed intergovernmental systems of subnational monitoring of infrastructure projects, there is also ample evidence of monitoring failures—or, at least of the failure of policymakers to use the monitoring information presented to them-- in “advanced” decentralized countries (ASCE, 2006).

Adopting the same stylized format as above (Table 1) for presentation of multi-tier infrastructure and utilization arrangements, one can link the phases of creation and utilization to that of monitoring (Table 4). Thus, for example, in central officials coordinate on infrastructure implementation and O &M, but then make monitoring a wholly central function (Table 4). In the Republic of Korea (South Korea) the role of which government finances is determinate whereby the central government monitors only the projects that receive large amount of central subsidy. In China, the central government is part of the planning process but, then does not generally monitor locally implemented and operated infrastructure. The US provides the classic devolution case—four “Ss” in a row.

Table 4. Stylized Governmental Arrangements of Monitoring Implementation of Infrastructure Investment

Infrastructure creation		Infrastructure utilization	Monitoring of implementation	Example
Planning	Implementation	Operation & Maintenance		
N	S	S	N	Chile
N, S	S	S	N, S	South Korea
N, S	S	S	S	China
S	S	S	S	U.S.

Note: N: National government, S: Subnational government

Chile has a strong top-down monitoring of infrastructure projects.³⁰ Project implementation is systematically reported and carefully reviewed as part of the budgeting process and project costs are controlled with performance an effective use of performance budgeting. This is accomplished by combining a mature appraisal system for project design with a strong National

²⁹ Thomas (2006), p3.

³⁰ Arancibia (2013).

Investment System (SNI) that facilitates the monitoring of project implementation. The Ministry of Planning and Ministry of Finance jointly monitor project implementation through reports submitted by the financial unit in regional governments to the ministries and through the SNI. Implementing agencies in the subnational governments then report to the financial unit in regional governments about project implementation. All information relating to investment initiatives and projects from formulation to appraisal and implementation is recorded in the SNI and posted in the Integrated Projects Bank (BIP). This information includes a listing of contracts and the expenses with each expense item being paid out and the contracting company receiving (i) the payment; (ii) *ex ante* cost estimates; (iii) the requested resources by item, and (iv) the assigned resources.

For sectoral monitoring and evaluation, a deconcentrated regional agency supervises and monitors the project implementation and the reports to relevant line ministry. For example, a regional Health Authority monitors the implementation of infrastructure for health and reports to the Ministry of Health. For education, it is the Superintendent for Education that supervises project implementation and reports to the Ministry of Education.

Regarding cost monitoring during project implementation, investment initiatives must be reassessed whenever the tendering process yields costs in excess of ten percent of the estimate. In this case, the institution formulating the project or the institution financially responsible must provide the analysis with all of the technical and economic information required to justify the cost increase. The project will then be re-appraised using the new information. Once the re-appraisal is done and resources earmarked, the goal is for no further change in project costs.³¹

In the Republic of Korea, the central government monitors local infrastructure projects that receive more than 30 bn. Won (about 30 million USD) from the central government subsidy. Local governments as implementing agencies annually report to the Total Project Cost Management System in the Ministry of Finance. The Ministry of Finance then compares the project implementation status with the project planning for a given project and decides on the merits of further funding of the project. For projects that receive less than ₩ 30 bn. the role of monitoring is assigned to local governments. The *Local Finance Law* provides the legal framework for the local government monitoring of these projects.³²

In the People's Republic of China, growing reliance on extra-budgetary funds has reduced government's control over spending units and, thus, local accountability to the center.³³ Thus by default, China provides a case which there has been decentralization of infrastructure

³¹ Chile, in which the entire infrastructure process is highly centralized, can be judged as having an advanced public investment management system. A recent study of a sample of 387 regional investment projects (eight percent of total regional projects) before 2007

showed that only twenty eight percent of regional projects had time overruns and actual costs at completion were five percent lower than estimated at appraisal. Arancibia (2013).

³² Kim (2013).

³³ Wong 2012.

(including monitoring), but a decentralization that can be characterized having insufficient funding and little oversight.³⁴ China does have National Key Construction Projects Monitoring Office with special agents assigned to each province to monitor selected projects for policy and legal compliance, disbursement of funds, project progress, tendering, and construction quality. However, their role is limited because oversight is confined to only budget funded projects which are only a small portion of infrastructure projects in China.

Local investment corporations (LICs)³⁵ have been established to provide funds for local infrastructure and have come to play a key role in financing infrastructure in many localities.³⁶ However, there is no systematic oversight, monitoring and evaluation of infrastructure investment by LICs. According to Wong, “[a]t the national level no agency has been assigned the responsibility for oversight of their activities – not the Ministry of Finance (MoF), nor the National Development and Reform Commission (NDRC), the Ministry of Construction (MoC) or the China Banking Regulatory Commission (CBRC). In the absence of national guidelines, management and supervision of LICs by local governments varies greatly across localities.”³⁷

In the **U.S.**, a highly decentralized country, subnational governments typically manage local infrastructure investment from planning to implementation. Most of the states in the U.S. have an effective process for monitoring infrastructure construction. A recent assessment on infrastructure performance in all fifty states finds that ten states have high performance on monitoring infrastructure construction, thirty eight at middle level and only two states at low ranking.³⁸ The practice of infrastructure monitoring in the U.S. states reported during 1999 – 2008 suggests that effective monitoring can be achieved when there is a comprehensive, frequent and systematic collection of performance data and effective use of the data collected in budgeting and intervening in project implementation.³⁹

Some U.S. states improved their infrastructure monitoring between 2005 and 2008 by making more frequent reports and shortening time for corrective action. For example, project monitoring was much better in Wyoming state in 2008 compared to 2005 because its Department of Transportation effectively reduced the average time to correct problems from months to weeks since workers must now immediately notify project managers of problems or concerns. In Ohio state meetings are regularly held between project managers and contractors on the progress of capital projects who review reports on cost overruns, delays and safety compliance. The result

³⁴ Subnational government share of total budgetary investment has increased over the past three decades (up to 88.8% in 2007). Wong 2013a: 9.

³⁵ “By design, LICs are complex hybrid financial organizations that mix public (fiscal) and private (financial) funding to engage in both public and private (profit-making) activities. As such, they bear similarities to public-private partnership arrangements in other countries. In China, though, the government is the only participant and decision-maker.” (Wong 2013a:17).

³⁶ “The China Banking Regulatory Commission (CBRC) estimated that LICs accounted for about two-thirds of local government debt in 2009. More recent estimates, based on findings by the National Audit Office and the central bank, is that the total debt of LICs is likely to have reached CNY 10 -14 trillion by year-end 2010 – as much as 45 per cent of current GDP” (Wong 2013a: 17-18).

³⁷ Wong 2013a: 18.

³⁸ Pew (2008).

³⁹ *Ibid.*

is that the state architect is able to respond more quickly to solve problems, such as providing solutions relating to inefficiencies, quality issues, and cost overruns. The Ohio solution response time ranges from one to two weeks for (typically civil-engineer) identified efficiency and quality matters and to up to two months to address costs issues identified by financial analysts. Alabama state improved its monitoring by focusing on collection of data on performance that allows quarterly adjustment for its performance budget reports. In New Mexico state officials instituted a bottom-up performance review process that includes weekly reports from project managers that allows the state to respond within a week for most cost overruns, delays, inefficiencies, and quality concerns, and, often within one day, for safety issues.⁴⁰

A recent survey of member states Organisation of Economic Cooperation and Development (OECD) finds that all national and regional governments answering the survey reportedly monitor implementation of infrastructure investment in one form or another.⁴¹ The majority of countries report (15 of 19 respondents to the survey) that some forms of performance monitoring of public investment projects are conducted at central government level (Figure 2).⁴² This includes the use of performance indicators as well as the formulation of objectives defined in form of target values. An example is the Urban Solid Waste Management project **Galicia (Spain)**, which is one of European Union's (EU) pilot regions using outputs and outcomes indicators as a central mechanism for management infrastructure investment funded by EU.⁴³ It is an example of a project subject to strong external constraints that have influenced its design and development.⁴⁴ Monitoring requirements established for the two major EU Structural Funds, the European Regional Development Fund and Cohesion Fund, often include reporting requirements, requirements related to the spending timeframe, the prioritization of policy areas, co-financing requirements, additionally requirements, the use of *ex ante* economic evaluation tools as well as the use of environmental impact analysis.⁴⁵ EU practice is summarized in Box 1.

⁴⁰ *Ibid.*

⁴¹ OECD (2012) and Charbit and Gamper (this volume).

⁴² The survey question is "Do central levels or supra-national authorities monitor the use of public investment funding in your sector that goes to sub-national governments over the course of implementation?" One country may report more than one monitoring level.

⁴³ Hulbert (2012).

⁴⁴ The project consists of the construction of a set of facilities operated by the private-public company, Sogama) in the municipality of Cereda, Galicia for the separation of recyclable materials and the incineration of mixed waste with energy recovery. With a project financing period of 1997-2010, the total investment costs were € 274 m (in €2011), 36% which was EU financed through the Cohesion Fund with the remainder funded by Sogama. Sogama's financing comes from its shareholders (which includes the government of Galicia) and through private loans (Sartori and Catalano, 2013 and CSIL 2012).

⁴⁵ European Commission 2012b.

Box. 1 Multi-Tier Monitoring in European Union Structural Funds

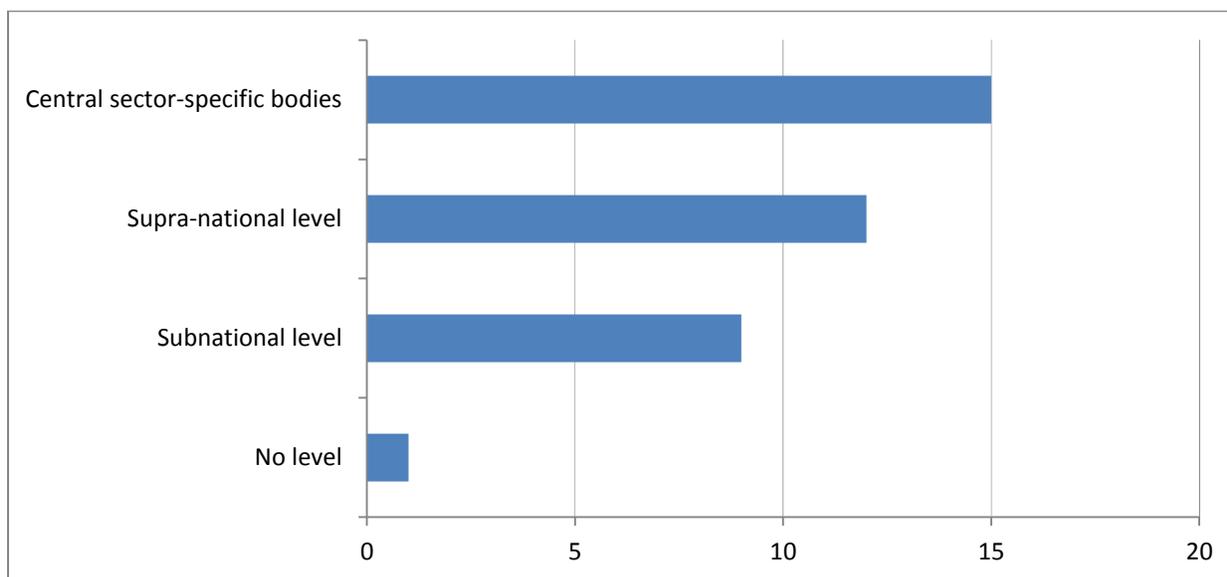
The European Union Structural Funds are intended to reduce fiscal disparities among the member states. These funds make up one of the largest items of the budget of the European Union (€ 278 bn. in 2013, which is about 28% of the committed Community Budget, and of that about a third is earmarked for infrastructure, largely for air, water, rail and road transport). To monitor these funds, the European Council and Parliament define the priorities, tasks and organization of the funds, and make regulations through the ordinary legislative procedures. Monitoring of the EU structural funds is implemented in the context of multilevel governance and is based on output and result indicators.⁴⁶ *Monitoring of outputs* means to observe whether intended services or products are delivered and whether implementation is on track with respect to a set of common output indicators. *Result indicators* are variables that provide information on some specific aspects of results that lend themselves to be measured.⁴⁷ As a national policy, each EU Member State establishes a committee to monitor implementation of each funded program in coordination with the European Commission (the Executive body of the Council).⁴⁸ At the subnational level monitoring procedures are program-specific and dependent on organizational and institutional settings of each member country. **Galicia** (Spain) provides an example of a region that is applying outputs and outcomes indicators as a central mechanism for managing public investment funded by EU funds. Compared to national or local funds for public investment, the use of EU funds involves more extensive conditionality and monitoring, as well as a performance assessment report. Requirements attached to EU funds include reporting requirements related to the spending timeframe, the prioritization of policy areas, co-financing requirements, and the use of *ex ante* economic evaluation tools as well as the use of environmental impact analysis. This focus on conditionalities and the related monitoring procedures were judged as excessive by some Spanish authorities although there is agreement that EU conditionality, monitoring and performance evaluation has contributed to a stronger focus on results, particularly with respect to the main objectives of the closure of illegal landfills and the provision of a more environmentally sustainable waste management system in compliance with EU and Spanish national directives. The introduction of performance budgeting indicators in Galicia is further interpreted by many as a pre-emptive policy from the regional government that anticipates further EU requirements.

Sources: European Commission (2012a, 2012b), Hulbert (2012), OECD (2012), CSIL (2012), and Sartori and Catalano (2013).

⁴⁶ European Commission (2012a).

⁴⁷ European Commission (2012b).

⁴⁸ European Commission (2012b).

Figure 2. Level at which monitoring is performed in OECD countries

Source: OECD, 2012. “Investing Together: Meeting the Co-ordination and Capacity Challenges across Levels of Government”. A document submitted to Delegates of the Territorial Development Policy Committee for discussion and approval at the 28th session, OECD national questionnaire: multi-level governance of public investment in sectoral context, 2012. *No Level* refers to lack of response to the survey.

Monitoring of regional infrastructure in non-OECD countries is less well established, which implies that the potential for indicators to inform policy and improve outcomes overtime is often not being realized in many developing countries. Indeed, the evidence shows that maintenance in the transport sector in developing countries often suffered from underfunding and, in thus in part by default, neglect.⁴⁹ The evidence further shows that many countries in East Asia lack standardized performance monitoring. China, Vietnam, the Philippines, Indonesia and Cambodia are cited as countries that have not as yet established central institutions for routine monitoring and reporting of infrastructure systems.⁵⁰

Measurement

As countries develop the capacity to be intergovernmental and thereby make progress to toward multi-tier infrastructure monitoring, a task to be managed will be that reaching of an intergovernmental agreement on appropriate national and subnational guidelines, standards, indicators on progress, intended outputs and outcomes.

Monitoring can be done according to *mandatory standards*, either absolute levels or as measure of improvement from a base line. In principle, mandatory standards can be used as a condition of capital grants; however, in practice such conditionality may not be applied. For example, the

⁴⁹ World Bank 2003.

⁵⁰ Peterson and Muzzini 2003: 215.

Indonesia's DAK (Dana Alokasi Khusus), a special purpose grant providing fund to subnational governments that carried with it a requirement for performance measurement, nevertheless failed to incorporate standards in account in the funding process.⁵¹

The selection of *indicators and targets* to monitor is the next important step if one is to capture intended outcomes; but for this to work, subnational governments must not only have the "right" incentives to perform the monitoring role, but also be in a financial position carry out its monitoring task. For example, at first glance Changsha, the capital of Hunan province scored well when monitored on wastewater treatment by national and regional authorities, but upon further examination of the operations, it turned out that it was operating at only 50 percent or less of designed capacity due to lack of funds for operation and maintenance.⁵² This is because the higher level governments monitored only the infrastructure targets that were based on the treatment capacity of completed wastewater treatment plants, a practice that omitted the monitoring of volume of treated discharge or the quality of receiving water bodies. In this case, Changsha operated its current wastewater treatment plants at half capacity by simply diverting the remaining incoming flows directly into the Xiang River (a branch of the Yangtze River) at the same time that it was planning to build a new wastewater treatment plants with higher capacities. A similar problem arises when infrastructure targets such as cost targets specific to a locality are imposed by a "higher" level of government on a local government, but then some of the costs turn out to not be under control of localities.

Performance agreements can be arranged between central government and subnational governments, between governments and service providing companies. For example, in Sierra Leone, the Strategic Policy Unit in the President's Office has performance agreements with ministries, departments and agencies. In Albania, local government units are supposed to have performance agreements with local-government-owned water companies so that they can monitor the operation and maintenance of water infrastructure performed by these companies. However, due to the lack of funding from the local governments to these companies, there has been no commitment from these companies to the local governments to report on the performance of these companies.

Monitoring Tools

Good practice suggests that the *project planning and design* should build in the monitoring criteria. Weak planning without requirements on monitorable outcome indicators, progress indicators and implementation beyond financing make it difficult for the government to monitor progress towards clearly defined objectives. In many countries, however, the inclusion of monitoring in planning is not common. For example, in the set of the nineteen Eastern Europe and Central Asia countries surveyed by the World Bank, only four have monitoring incorporated in strategic planning for water infrastructure (See Table 3). In a similar manner in

⁵¹ Peterson and Muzzini 2003: 214.

⁵² Peterson and Muzzini 2003: 217.

Sierra Leone, the general lack of documented project objectives, projected timelines, and appraisal analysis makes it almost impossible to assess whether a completed project has achieved its intended objectives and whether the objectives were met on time at the approved cost.⁵³

Project reporting is another monitoring tool. It has been a good practice at subnational governments to have reports on the project implementation progress submitted frequently (e.g. quarterly) to a mayor. Governor or other representative body in an understandable format accompanied by an explanation of delays, cost overruns, funding and construction problems and proposed corrective actions.⁵⁴ Yet, in some donor dependent countries, it is hard for the government to monitor donor-financed projects because different donors impose their own reporting format and the often-weak-capacity government is not capable to issue and/or enforce a standardized reporting template. For example, in Sierra Leone, there are no national or sectoral project implementation manuals nor standardized reporting templates with the result of a monitoring system that is described very weak.⁵⁵

Progress meetings between project managers and monitoring agencies have also been shown to increase the effectiveness of decentralized monitoring. In a study on public investment management that included Arlington County, Virginia in the U.S, Petersen and Vu found that weekly progress meetings held between infrastructure project managers and the county finance officers resulted in an institutional ability to address implementation problems in infrastructure project in a timely and effectively manner.⁵⁶

The site visit is a useful monitoring tool in verifying visible effectiveness of an infrastructure project and project reports. At the minimum, site visits would help detect such obvious problems as ghost schools and ghost hospitals in a number of developing countries.⁵⁷

Information system management provides another monitoring tool whereby all (or, at least some core set) of information about infrastructure from planning to implementation and operation and maintenance is recorded. A “good” information system report for project construction includes project title, responsible department(s), and start date, estimated completion date, key contact people, percentage of completion, funding, and budgeted vs. actual costs.⁵⁸ In Chile, all information relating to investment initiatives and projects from formulation to appraisal and implementation is recorded in the National Investments System (SNI) and posted in the Integrated Projects Bank (BIP). Many institutions interact within this system and take part in the process of public investment management. The Ministry of Public Works also uses the information recorded in the system to carry out its monitoring role.

⁵³ Petrie (2013).

⁵⁴ Kaganova 2011: 44-45.

⁵⁵ Petrie (2013).

⁵⁶ Petersen and Vu (2013)

⁵⁷ There have been ghost schools and ghost hospitals in developing countries where school and hospital building projects are reportedly completed without the real construction of any school or hospital. (See Shah in this volume)

⁵⁸ Kaganova 2011: 44-45.

*Performance management systems for monitoring combine the audit function with statistical reporting. These have proved to be a useful monitoring tool, but can be difficult to establish at subnational government level due to capacity constraints. Thus in China, although the National Audit Office has achieved remarkable success in pushing for performance management reform over the past 15 years at the national level, the progress in subnational government is limited due to a lack in many local governments of a staff that is adequately trained in performance evaluation. As a result, monitoring and auditing is constrained to financial compliance rather than economic assessments, performance, and value for money.*⁵⁹

5. Bottom- up Monitoring: The Role of Civil Society

Developing Economies

Infrastructure management and monitoring may also be undertaken by citizens and civil society community organizations. In community-driven development (CDD) projects, much (sometimes all) of the management of the project from planning, implementing, operation and maintenance is done by citizen organizations. Such infrastructure projects are often of small scale and may receive support from international organizations such as the World Bank, the Asian Development Bank, and the United Nations Development Programme along with support from bilaterals and the central or local government. And there can be a demonstrable efficiency gain.

For example, Gross and others in their study on water infrastructure projects in 15 countries⁶⁰ found that access to community households to services was higher and the services are more sustained when women participated in monitoring project implementation.⁶¹ Local people including women have good local knowledge about what works and what can be sustained. The knowledge can be utilized when the agencies of water infrastructure projects “consult and listen to them, and give them some responsibility for and influence on the quality of project implementation”⁶².

In **Indonesia** the World Bank’s Kecamatan Development Program introduced a process for citizen choice relating to small infrastructure projects for Indonesian sub- districts and as part of that process explicitly includes support for building the capacity for community monitoring of the “quality and effectiveness of infrastructure projects” (Wong 2003).⁶³ Moreover, there some

⁵⁹ Wong 2013b. A Kecamatan is a sub-district of a city or regency, which are in turn local government units of local government “below” the provincial level.

⁶⁰ The study looks at a random sample of communities chosen from 18 projects in 15 countries, funded by a range of donors, NGOs and governments. The sample comprises 88 communities that had managed and sustained water supply systems for three or more years. 15 countries are from five regions: Bolivia, Colombia, Ecuador and Peru in Latin America, Kenya, Malawi, South Africa, and Zambia in East and Southern Africa, Cameroon and Ghana in West Africa, Indonesia and the Philippines in East Asia, and India, Nepal and Sri Lanka in South Asia.

⁶¹ Gross, van Wijk, Mukherjee (2001).

⁶² Gross, van Wijk, Mukherjee (2001): 20.

⁶³ The Kecamatan Development Project’s objectives are to raise rural incomes, strengthen kecamatan and village government and community institutions, and to build public infrastructure through labor intensive methods. There are four components (i) block

evidence that the cost of monitoring is less than that of similar construction projects run through a Ministry of Public Works contracts.⁶⁴

In the **Bangladesh** a World Bank Social Investment Program Project (SIPP) was launched (2003) that supported community monitoring through a citizens participatory processes whereby information was collected regarding on spending projects ranging from rural roads to tube wells. This information is publicly displayed in most villages and then communities graded the performance of their Village Development Committees (VDCs) using a report card mechanism. A social accountability framework was established to allow community members to directly demand accountability from their leaders and service providers on infrastructure and to participate in monitoring their performance (Box 2).⁶⁵

Box 2. Community Assessment Process in Bangladesh Villages

Fewer than two World Bank projects, a number of villages in Bangladesh have been applying a Community Assessment Process (CAP) to assess the quality of public services including those of infrastructure. CAP is a process through which village people participate in assessing the performance of public services provided by their village committees and assuring the public services meet their needs. In the process, the village council (*Gram Parisad*) identifies the services to be evaluated, the service provider's responsibilities, the planned and used resources, the outputs, and the indicators of performed service. Service providers and service recipients separately assess the performance and quality of public services through score cards in which they give scores to each of the identified public services, justification for the scores and recommendations for future improvement of the service. Service providers include Village Committee (*Gram Samiti*) and other committees such as Procurement Committee, Finance Committee, and Sub-project Committee. Service providers and service recipients (village people) present their score card results in a joint meeting with Village Council, discuss and agree on final assessment. Then, service providers and recipients jointly prepare an action plan to improve the services. Social Audit Committee monitor the implementation of the action plan and Village Council arrange CAP every six months.

Source: World Bank, Social Investment Program Project in Bangladesh (2009, 2011a)

OECD Countries

Non-governmental “watch dog” organizations may also play an important role in monitoring infrastructure that is managed by subnational governments. For example, in the United States, a

grants; (ii) technical assistance for implementation; and (iii) monitoring and (iv) policy studies.

www.worldbank.org/Kecamatan Development Project, May 13, 2013. Also see Wong (2003).

⁶⁴ Peterson and Muzzini (2003). : 215.

⁶⁵ Roughly two million people have been benefited from community infrastructure activities ranging from rural roads to schools and tube-wells.

well-funded non-partisan research foundation (Pew Foundation) conducts research and analysis to develop a dialogue on issues of state infrastructure management (Box 3).⁶⁶

Box 3. The Pew Performance Matrix, United States

The Pew Center of the Study of the States periodically issues infrastructure “report cards” on all fifty U.S. states. Based on an explicit set of performance criteria, the grading has been done for four times in 1999, 2002, 2005, and 2008 in four management areas—Information, Infrastructure, Money and People. Each of the four management areas received a score ranging from A to D (including the ten possible grades of A, A-, B+, B, B-, C+, C, C-, D+, and D). The PEW studies assessed state infrastructure project monitoring to determine whether a state has an effective process for monitoring infrastructure projects throughout their design and construction. The criteria included that of whether a state (i) adequately monitors, evaluates and detects project-cost overruns, delays and safety compliance; and (ii) effectively intervenes to take corrective action, as necessary, in managing the construction of capital projects. Pew’s state-by-state surveys are carried out by journalists and academics and involve interviews of elected and appointed officials, questionnaires, and document reviews. The evaluations are based on data collected from more than 12,000 different sources—including surveys, written documents and interviews with over 1,000 persons in all 50 states.

Source: Pew Center on the Study of the States (<http://www.pewcenteronthestates.org>), *Grading the States Report, 2008*.

Also in the U.S every four years the American Society of Civil Engineers (ASCE) releases an on-line *Report Card for America’s Infrastructure* that depicts the condition and performance of the nation’s infrastructure in the familiar form of a school report card by assigning letter grades to each major type of physical infrastructure. The *America’s Infrastructure Report Card* organized by both by state and by type and mode of physical infrastructure.⁶⁷ The *Report Card* is based on information for each of the infrastructure categories—including reports, studies, articles, surveys and other research materials—from professional societies, non-profit associations, and local, state and federal agencies. Civil engineers from across a given state then use these materials to develop a detailed picture for the state, examining the condition of the state infrastructure, its performance, funding and service capacity versus a measure of the capacity “need”.⁶⁸ Based on an explicit set of engineering criteria, grades are then assigned to each category.

The *Report Card* provides grades and details of the state of infrastructure in a given locality and, *inter alia*, estimates the costs to improve it for each category. Infrastructure categories examined

⁶⁶ There are other assessments on infrastructure status and needs such as the American Society of Civil Engineers’ Infrastructure Report Card, and annual reports on infrastructure needs and surveys of major projects by the Urban Land Institute and Ernst & Young.

⁶⁷ ASCE Report Card, <http://www.ascecareportcard.org>.

⁶⁸ A word of caution: The engineer’s measure of infrastructure capacity “need” (typically workload x average unit cost) may not be the same as the economists concept of quantity demanded for a flow of infrastructure services (which accounts for change in relative prices).

include transportation (roads, bridges, dams, levees and ports), waste, water (drinking water, storm water, waste water) navigable waterways, parks and recreation, rail, school, and transit. The ASCE has archives of report cards so infrastructure states for a given locality can be compared over time.

A report card on infrastructure in a given state includes:

- A summary of state of infrastructure and its need for renewal
- A mini report card, a summary of grades given in each infrastructure category
- A summary of justification for grades given in each infrastructure category
- A Citizen's Guide, a detailed report of facts and analyses for each infrastructure category and a guide for citizen's understanding of infrastructure state of their locality and what can be done to improve it.

Similar “watch dog” activities are occurring elsewhere. In 2012 in Canada a consortium of professional engineering associations and the Federation of Canadian Municipalities recently initiated the *Canadian Infrastructure Report Card* project that surveyed municipal road systems and water systems (drinking, waste and storm water) in 123 municipalities in ten (10) of Canada's 13 provinces. The Canadian report is instructive for other countries contemplating such “report card” monitoring in that because it was a first of its kind exercise for Canada's municipalities, it provides in addition to its main report and analysis a concluding section on “Lessons Learned” regarding data requirements, data collection techniques, and how a survey process may have to be adjusted to survey communities of different size and degree of development.⁶⁹

Two other countries that have developed community-based monitoring include Germany and South Korea. In Germany, as noted above, there is a government-issued website whereby citizens can provide their feedbacks on road construction across the country. South Korea provides project information upon request according to Information Disclosure Act (a process that which often involves a long response time lag).

6. Concluding Comments

Countries commit millions...billions...of capital investment monies on infrastructure. The reasons are well documented: physical infrastructure is about a society's foregoing of current consumption in order for future consumption. The societies that do this well become developed societies. Those who do it poorly are ...poor. Thus launches the infrastructure management sequence: planning, implementation, operation and maintenance. Once one is past the planning stage, the need to integrate monitoring into the next three steps of implementation, operation and maintenance is crucial to making it all work. Quite simply, for the capital investment to create

⁶⁹ Canadian Infrastructure Report Card (2012).

that platform for development one monitor to learn if the infrastructure management sequence is working effectively and efficiently to provide for the flow of services that become that platform for growth and poverty alleviation. The history of the world is replete with societies that monitored infrastructure well and those that did not. Again, as a generalization (but a reasonable one), to create, use and manage infrastructure well make a difference as to whether a country will be developed or undeveloped; rich vs. poor.

Next the question arises: who monitors? As adequately documented elsewhere in this book, spatial considerations reveal that except in a very few cases physical infrastructure has a multi-jurisdictional character. Within a country (which is the frame of reference for this book and paper), that means that the monitoring task is inherently intergovernmental or “multi-tier”. Moreover, as again reported elsewhere in this book but also referenced in several places in this paper, the decentralization and monitoring of infrastructure has two types of payoffs. The first is political: decentralization of provides a political vehicle for citizens to engage with and hold accountable their government representatives. Indeed, in some cases—post conflict Cambodia is an example—decentralizing infrastructure can be a strategy for a recreate a people’s trust in the very notion of “their government”.

The second is economic: decentralization of infrastructure can have high efficiency payoffs in terms of not the metrics of economic growth and poverty reduction, but also in the overall “well-being” of a people. But, for this result to be realized, that infrastructure must be technically well monitored throughout the infrastructure management sequence. Here it should be clearly noted that while decentralization of the infrastructure monitoring task has been shown to have payoffs in terms of sustainability and efficiency, decentralization is not the *sine qua non* for infrastructure generated development and poverty alleviation. It’s just that, as noted, it has been demonstrated that when a country is intergovernmentally capable, there are economic gains from decentralized monitoring of infrastructure.

But, one of the clear findings of this paper is that many countries are not ready for decentralized monitoring. That is they have not met the “pre-conditions” of a well-designed (or, in many cases, even a partially well-designed) intergovernmental system: there is a gap to be addressed in terms of organizational, institutional or individual (or all three) types of capacity development. This is the case for many countries. And, even when a country might be judged intergovernmentally capable, it does not necessarily follow that it is getting its component of decentralized monitoring of infrastructure “right”. Indeed, as pointed out in the above text, project monitoring can be more art than science. It can also be more opportunistic than “well designed”. And with those lessons, one can draw some conclusions regarding decentralized monitoring of fiscal infrastructure. There are at five:

The first, which repeats the comments above, is that decentralized monitoring matters. There are, or can be, measurable political and economic efficiency gains.

Second, there should be clear guidance and standards for infrastructure monitoring at all government levels. When there is a national or regional interest in how an infrastructure system will work, national/regional standards and targets should be discussed with the subnational governments to insure that if monitoring is to be decentralized that the decentralized monitoring unit can meet those standards and carry out its monitoring task in an autonomous manner. In this context an example to avoid is that as cited in the text of a “local” staff that responds to central government incentives for salary and promotion.

Third, decentralized infrastructure monitoring should be imbedded the full project management cycle so that there is a multi-tier agreement on infrastructure service modalities (e.g., timelines, funding, monitoring measures and tools, and outputs and outcomes).

Fourth, recognizing that every decentralized infrastructure project or system is different in some manner than from all others, there are also many technical, political, financial, and economic similarities for knowledge sharing from place to place. Different jurisdictions that have the same type of infrastructure investment may nevertheless have different monitoring strategies, measures and tools— and, that’s knowledge to be shared.

And fifth, community monitoring of multi-tier infrastructure can play an important role in the monitoring, and thus, the delivery, of infrastructure services and should be encouraged. If governments and civil society agencies cooperate in providing reliable information and feedback, the case for decentralized monitoring will be enhanced.

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