

# Digital Technologies for Transparency in Public Investment

## New Tools to Empower Citizens and Governments

Theodore Kahn  
Alejandro Baron  
Juan Cruz Vieyra

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# DIGITAL TECHNOLOGIES FOR TRANSPARENCY IN PUBLIC INVESTMENT

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## ABSTRACT\*

Improving infrastructure and basic services is a central task in the region's growth and development agenda. Despite the importance of private sector participation, governments will continue to play a defining role in planning, financing, executing, and overseeing key infrastructure projects and service delivery. This reality puts a premium on the efficient and transparent management of public investment, especially in light of the considerable technical, administrative, and political challenges and vulnerability to corruption and rent-seeking associated with large public works. The recent spate of corruption scandals surrounding public procurement and infrastructure projects in the region underscores the urgency of this agenda. The emergence of new digital technologies offers powerful tools for governments and citizens in the region to improve the transparency and efficiency of public investments. This paper examines the challenges of building transparent public investment management systems, both conceptually and in the specific case of Latin America and the Caribbean, and highlights how a suite of new technological tools can improve the implementation of infrastructure projects and public services. The discussion is informed by the experience of the Inter-American Development Bank in designing and implementing the MapalInversiones platform. The paper concludes with several concrete policy recommendations for the region.

**JEL Codes:** D73, H1, H5, O1, O2, O3, O4, R1, N46

**Keywords:** citizen participation, corruption, infrastructure, open government, public investment, technology, transparency

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\* Authors' information: Theodore Kahn, Adjunct Lecturer and Visiting Scholar at the Johns Hopkins University, School of Advanced International Studies (SAIS), tkahn1@jhu.edu; Alejandro Barón, Consultant at the Inter-American Development Bank (IDB) and Coordinator of the MapalInversiones initiative, abar@iadb.org; Juan Cruz Vieyra, Moderinization of the State Specialist at the IDB and Team Leader of the MapalInversiones initiative, juancr@iadb.org.







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## INTRODUCTION

The goal of this paper is to encourage a discussion of how new technologies can increase the transparency of public investments in Latin America and the Caribbean (LAC) and why such an approach is needed to control corruption and improve public services and infrastructure in the region. It begins by presenting contextual information on the links between public investment, corruption, and growth in LAC. It then identifies some of the key governance challenges for Public Investment Management Systems (PIMS), both conceptually and in the specific case of LAC countries, and examines how transparency and information management can strengthen these systems. The following sections address the role of technological innovation in enhancing transparency and efficiency in PIMS and analyze a concrete case: the MapalInversiones initiative. The paper concludes with several policy recommendations.

The LAC region has been experiencing a growth deceleration in the second decade of the 21st century, which is threatening the development gains of the early 2000s boom.<sup>1</sup> It is urgent to reverse this trend and return the region to a path of strong growth. Expanding and improving access to and the quality of public goods, infrastructure, and public services—from

roads, ports, and electricity grids to medical clinics and sanitation systems—is critical to achieving the faster and sustained growth needed to support inclusive development in the LAC region.

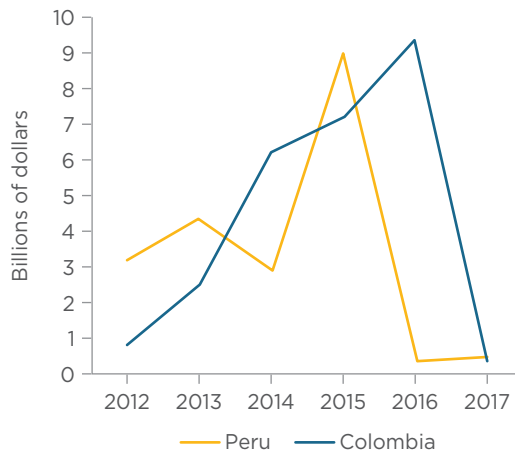
As a significant body of literature has pointed out, public investment is the main funding source for crucial economic and social infrastructure.<sup>2</sup> Standard economic theory holds that because infrastructure and services are public goods and produce positive externalities, the private sector will tend to undersupply them,<sup>3</sup> leaving the government

<sup>1</sup> The average growth rate in the region dropped from 4.0 percent between 2003 and 2011 to 1.4 percent between 2012 and 2018. Meanwhile, emerging economies in Asia and Europe grew at an annual rate of 6.7 and 4.2 percent, respectively, between 2012 and 2018. These figures are based on the IMF World Economic Outlook data.

<sup>2</sup> Public investment can be carried out by a variety of actors, including central, regional, and local governments as well as other entities such as state-owned enterprises (SOEs). While this paper does not delve into the specific issues raised by subnational governments and SOEs, the discussion is applicable to public investment by these actors.

<sup>3</sup> Pure public goods are non-rivalrous (i.e., one person's consumption of the good does not decrease the opportunity for others to consume it) and non-excludable (i.e., no one can be prevented from the good, once it is produced). These characteristics depress the private return

**FIGURE 1: PPP INVESTMENTS IN COLOMBIA AND PERU**



Source: Public Participation in Infrastructure Database, World Bank.

responsible for ensuring adequate provision. While the trend toward privatization of basic services and public-private partnerships (PPPs) in recent decades has challenged this assumption, public investment still provides the lion's share of resources for basic infrastructure and services.

On this point, LAC does not fare well. Even though the average annual investment in infrastructure was 3.5 percent of the regional GDP between 2008 and 2017, the region's public investment and infrastructure gap is longstanding and well documented. Coverage of basic transportation infrastructure in LAC lags emerging Asian and OECD economies,<sup>4</sup> and governments in LAC still devote fewer resources to public investment (relative to GDP) than most countries in Asia and Europe (Armendáriz et al., 2016). Moreover, public investment as a share of total government spending in LAC has decreased steadily over the past two decades, and public investment tends to be the first item cut when reducing expenditures (IDB, 2018b), leading to considerable volatility in investment levels. Additionally,

PPP investment in the LAC region has experienced a sharp decline since 2015, just as major corruption scandals emerged, according to de Michele, Prats, and Losada Revol (2018). As discussed in IMF (2015), PPPs present similar management and institutional challenges to public investment projects, so many of the issues addressed in this paper are also relevant to PPPs.

More public investment, however, will not necessarily generate an increase in the high-quality infrastructure and services needed to drive growth in the region. The contribution of public investment projects to growth depends critically on their efficiency—that is, the relationship between the amount of public spending on capital goods and the coverage and quality of these goods (and in some cases, services).<sup>5</sup> The amount “lost” to inefficiencies is often large: Gupta et al. (2014) find that the actual public capital stock in low- and middle-income countries is around half of the amount suggested before adjusting for efficiency. As a result, countries with the most efficient PIMS get twice the growth “bang” for every “buck” invested in comparison to their least efficient counterparts (IMF, 2015).<sup>6</sup> Accordingly, studies

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to the production of public goods, leading to underinvestment by the private sector in infrastructure and services, such as roads, power grids, education, and health care.

<sup>4</sup> On the World Economic Forum's Global Competitiveness Index, LAC scored 3.3 out of 7 on the infrastructure pillar, a performance on par with Sub-Saharan Africa and well below the levels of Europe and North America (4.3) and East Asia (4.7).

<sup>5</sup> Coverage refers to the physical quantity of economic and social infrastructure and is generally measured through quantitative indicators such as schools, hospitals, roads per capita. Quality of infrastructure refers to qualitative aspects of these goods and services, generally based on impressions of users of social and economic infrastructure.

<sup>6</sup> PIMS refer to the array of institutions that govern the various stages of the public investment lifecycle. Most conceptualizations of PIMS

that ignore investment efficiency end up grossly underestimating the potential for productivity of public investments,<sup>7</sup> notably through a larger public investment multiplier<sup>8</sup> (Gupta et al., 2014; IDB, 2018b).

There are many reasons why public money spent on investment projects may not generate growth-enhancing public goods, but corruption, rent-seeking, and state capture are especially harmful for efficiency. Corruption generates waste, scarcity, and inflated prices, as well as bottlenecks in project management.<sup>9</sup> These outcomes, in turn, result in an insufficient quantity and lower quality of public goods and services, hurting citizens who rely on them. In light of this, strategies to improve PIMS in LAC, including greater transparency, reducing corruption risks, and engaging citizens to enhance accountability, are critical steps in the path toward sustained, inclusive growth.

In this regard, there is cause for optimism. Initiatives to reduce corruption and enhance transparency in LAC have advanced on various fronts, including national legislative and institutional reforms, community and local projects, civil society initiatives, and adherence to international transparency and governance standards. At the national level, countries throughout the region have bolstered their legal frameworks and institutional capacity to enhance transparency and fight corruption over the past two decades. These actions have included judicial reforms to ensure the independence of prosecutors and bolster their technical capacity to investigate corruption (Vieyra, 2016). In addition, countries throughout the region strengthened autonomous government audit organizations charged with oversight of the public sector<sup>10</sup> and expanded access to information laws.<sup>11</sup> These legal mechanisms have provided a critical resource for civil society organizations and investigative journalists, playing a crucial but often unheralded

role in exposing major corruption episodes in the region (de Michele, 2017).

These national reforms have been fostered by LAC countries' adherence to a range of international initiatives to promote transparency and access to information. Participation in these multi-stakeholder schemes not only helps ensure that relevant laws, regulations, administrative procedures, and implementation processes adhere to rigorous standards, but also helps lock in commitments to transparency across political cycles. Brazil and Mexico were among the eight founding members of the Open Government Partnership (OGP), which an additional 17 LAC governments (including three subnational ones) have since joined.<sup>12</sup> In a complementary initiative, nine national and

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identify four key competencies that correspond to the following stages: (i) strategic planning and appraisal; (ii) allocation and project selection; (iii) project implementation; and (iv) ex post evaluation (Armendáriz et al., 2016; Dabla-Norris et al., 2012; IMF, 2015).

<sup>7</sup>Pritchett (2000) made this point in a seminal paper that inspired more recent efforts to measure public investment efficiency.

<sup>8</sup>Increasing this multiplier means that the growth increase from a given amount of public investment becomes even greater.

<sup>9</sup>Price overruns generated by corruption and inefficiencies are passed on to the user.

<sup>10</sup>During the 1990s and 2000s, 16 LAC countries passed new legislation enhancing the institutional standing and bolstering the competencies of these organizations, which have been crucial to the identification of systemic corruption risks in countries such as Brazil, Chile, and Colombia. However, the effectiveness of these institutions has varied widely, due to institutional design, problems of coordination with other public oversight agencies, and broader political economy (see Casas-Zamora and Carter, 2017).

<sup>11</sup>Starting in 2002, 18 LAC countries approved such legislation, and in cases such as Chile and Mexico, implementation has been supported by the creation of independent agencies to ensure compliance across public agencies and help train officials to apply new norms.

<sup>12</sup>Launched in 2011, participation in the OGP entails developing detailed plans and targets to enhance transparency, citizen participation, and public sector integrity, using new technologies such as open data platforms.

over 20 local and state governments in LAC have adopted the International Open Data Charter, building on the region's strong commitment to e-government beginning in the early 2000s.<sup>13</sup> In addition to these cross-cutting initiatives, countries in the region have ascribed to the Extractive Industries Transparency Initiative (EITI) and Construction Sector Transparency Initiative (CoST), which are particularly relevant for improving transparency and governance of public investment.<sup>14</sup>

Has the strong momentum behind transparency led to better public investment management in LAC? In this all-important area, there has been progress, but there are also several pending tasks. On the positive side of the ledger, every country in LAC has a formal, integrated system for managing public investment information across government agencies (ECLAC, 2014), and many countries in the region have made great strides in enhancing budget transparency, encouraged by participation in the OGP and EITI.<sup>15</sup> As a result of these efforts, the region in general fares well on existing (although still limited) cross-country indicators of public investment management institutions. In the first major effort to assess PIMS, Bolivia, Brazil, Colombia, and Peru (four of the ten LAC countries in the sample) ranked in the top seven of 71 low- and middle-income countries (Dabla-Norris et al., 2012).<sup>16</sup> A subsequent study by the IMF (2015), which also constructed an index of public investment management institutions based on similar pillars, found that LAC had one of the best results of any region.

At the same time, public investment, and especially public works has been at the center of the recent corruption scandals in LAC—including the Odebrecht case that has engulfed much of the region, as well as other high-profile investigations in recent years (Casas-Zamora and Carter, 2017). These episodes dramatically illustrate

the inherent corruption risks in large public works: the difficulty of estimating the appropriate costs of large, one-off projects and the enormous amounts of money involved create ample opportunity for rent-seeking.<sup>17</sup>

There are considerable data—at both the global and regional level—to support the notion that publicly tendered infrastructure projects are especially vulnerable to corruption. According to the UN, procurement and public purchases amount

<sup>13</sup> Between 2001 and 2014, all governments in LAC created a national e-government system to expand the use of digital technologies in the public sector. A recent review by the World Bank found that LAC countries such as Brazil, Colombia, Mexico, and Peru ranked in the top ten globally in e-government adoption (World Bank, 2016a).

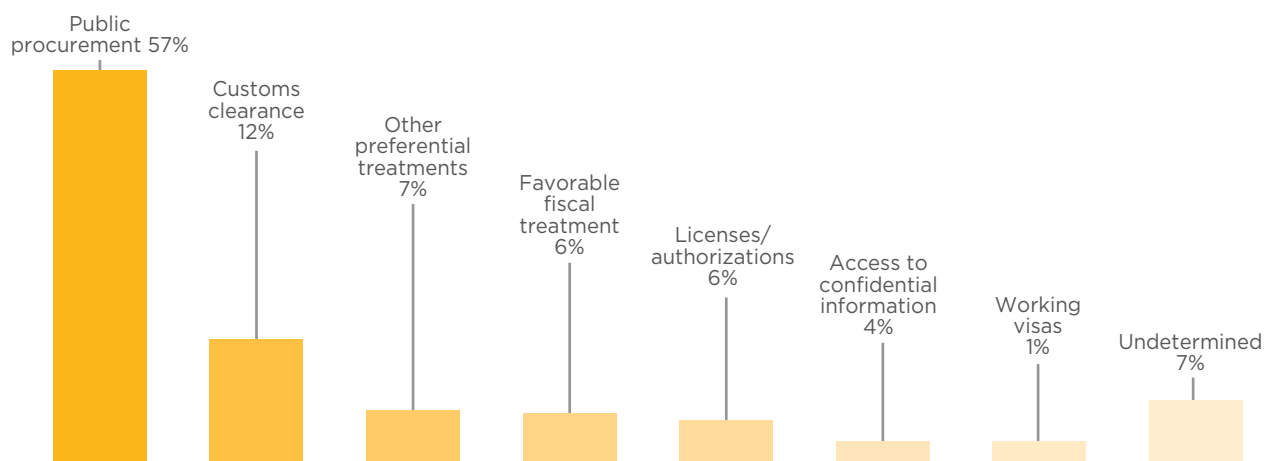
<sup>14</sup> Meanwhile, the CoST project aims to improve countries' information reporting and oversight of public procurement cycle. These commitments—which require disclosure of information on contract details, cost, and selection criteria among others—directly address several of the key flashpoints for corruption and inefficiency in public investment projects. Costa Rica, Guatemala, Honduras, and Panama currently participate in the CoST initiative. See <http://infrastructuretransparency.org/where-we-work/>.

<sup>15</sup> For example, Brazil, Mexico, and Peru score above the OECD average on the Open Budget Index, a cross-country measure of budget transparency, and other countries such as the Dominican Republic, Guatemala, Chile, and Costa Rica are well above the global average. However, there is great variation among LAC countries. See <https://www.internationalbudget.org/open-budget-survey/>.

<sup>16</sup> As discussed above, the index created by Dabla-Norris et al. (2012) consists of four main pillars that correspond to the main phases of the investment project cycle: (i) strategic guidance and appraisal; (ii) project selection and budgeting; (iii) project implementation; and (iv) project audit and evaluation. Each of these includes sub-components assessing the existence of appropriate administrative procedures, rules, and practices in each of these areas.

<sup>17</sup> The Odebrecht investigation, for example, has revealed corruption perpetrated by the firm in 10 LAC countries. It is estimated to have paid US\$788 million in bribes across the region to win 100 projects, which earned the company as much as US\$3.3 billion in profits between 2001 and 2016. See “How the Odebrecht Scandal Has Shaken Latin America”, *fDi Intelligence*, February 15, 2018. <https://www.fdi-intelligence.com/Locations/How-the-Odebrecht-scandal-has-shaken-Latin-America>.

**FIGURE 2: WHERE DOES BRIBERY OCCUR?**



Source: OECD (2016b).

to 15–30 percent of GDP in many jurisdictions. An estimated 10 to 25 percent of the value of public contracts is lost to corruption (IDB, 2018a), and transnational companies are more likely to pay bribes in the context of procurement than to avoid taxes or influence the judicial system, according to the World Economic Forum. In addition, the OECD report on International Bribery indicates that 57 percent of cases brought under the Convention to Combat the Bribery of Foreign Public Servants in International Business Transactions involve bribes to lock in public contracts.

In the case of LAC, there is also evidence that the region’s public investment systems remain prone to corruption and mismanagement. According to World Bank enterprise surveys, LAC firms pay more than twice the amount in bribes to public officials for contracts than their counterparts in OECD countries; in some countries, such as Mexico, the gap is as much as nine times higher.<sup>18</sup> In addition, 17 percent of firms in the region believe that it is expected to give gifts or payments in exchange for public contracts. The expectation of payment in the context of public

procurement, moreover, is significantly more common<sup>19</sup> than for other interactions with the government.<sup>20</sup>

While public investment efficiency and corruption risks pose considerable challenges for the region, a new type of solution is already on the table. Innovations in information and communication technologies (ICT) are showing great potential to increase the transparency, oversight, and efficiency of public resources in the region. Applications of digital technology include open data initiatives, the use of big data and data mining to enhance public investment management, and social media

<sup>18</sup> See <http://www.enterprisesurveys.org/>.

<sup>19</sup> By comparison, 12 percent of firms expected to give gifts to secure a construction permit, 10 percent to receive an operating license, and 5 percent to obtain an electrical connection.

<sup>20</sup> LAC scored below East Asia, Europe and North America, Eurasia, the Middle East, South Asia, and Sub-Saharan Africa on indicators of diversion of public funds, favoritism in the decisions of government officials, and efficiency of public spending metrics on the 2017-2018 Global Competitiveness Index. The indicators are based on an executive opinion survey. See <http://reports.weforum.org/global-competitiveness-index-2017-2018/>.

platforms to encourage citizen participation in the public investment cycle. These new tools build on and complement existing anti-corruption efforts in the region, such as the strengthening of judicial systems and auditing institutions; adherence to international transparency standards; and access to information laws.

These new and powerful technological tools clearly have the potential to transform transparency and anti-corruption initiatives. However, their rapid emergence presents a set of important questions. What are the preconditions to effectively put in practice technological innovations to enhance transparency in public investment systems? What are the channels through which new technologies can bolster these effects? What are the key lessons learned during the implementation of technological innovations in this field? These are some of the key issues that motivated this paper. The main inspiration has been the

implementation of the MapalInversiones initiative, an Inter-American Development Bank (IDB) project that leverages georeferenced maps and data visualizations to enhance transparency and monitoring of public investment projects in the region, an example of the potential of technology-based initiatives to improve public investment management.

The next section goes into more detail on the specific governance challenges facing public investment management. Section three discusses the role of transparency and information management in strengthening PIMS. Section four examines the potential of technological innovation for achieving greater efficiency and transparency, and section five presents the concrete case of the MapalInversiones initiative. The concluding section provides policy recommendations for improving the transparency of public investments in LAC through technological solutions.





## KEY GOVERNANCE CHALLENGES FOR PUBLIC INVESTMENT SYSTEMS

The prevalence and magnitude of inefficiencies in public projects point to the challenges governments face in implementing them, especially for large infrastructure projects.<sup>21</sup> Public investments carried out in the context of weak institutions tend to be inefficient and often fail to produce sustained growth. In a study of major public investment between 1960 and 2011, Warner (2014) concludes that large increases in public investment yield at best a temporary increase in growth due to poor (or non-existent) project evaluation, the lack of basic information on project impacts, rent-seeking by public and private actors, and political pressure to continue spending on flawed projects.

Weak institutions and corruption risks also increase the price tag of public investment and service provision by imposing a higher cost of capital on governments and generating more overhead in public sector agencies (Coolidge and Rose-Ackerman, 1997; Dal Bo and Rossi, 2007).<sup>22</sup> Accordingly, greater public expenditure is required to produce a given level of infrastructure or service provision, thus depressing efficiency. Keefer and Knack (2002; 2007) echo these results by finding that in countries with poorer governance, a given

amount of investment improves the *quality* of infrastructure less than in countries with stronger institutions.<sup>23</sup> Taking this into account, some salient challenges for public investment efficiency are as follows:

- **Project management is often complex.** These projects are usually technically demanding, they involve multiple stages and intense coordination among different actors, and they require long time horizons across different administrations. As a result, real-time management, monitor-

<sup>21</sup>The discussion about major works in this section focuses mainly on large public works such as roads, ports, communication and energy grids, but also on other sectors such as education, health, and other public services that require the construction of physical infrastructure, such as schools and hospitals, as part of service delivery.

<sup>22</sup>Overhead consists of the operating costs of public entities that carry out investments. In a study of 80 public utilities in 13 Latin American countries, Dal Bo and Rossi (2007) show, for example, that higher levels of corruption are associated with more employees per output (i.e., lower labor productivity) and higher maintenance costs.

<sup>23</sup>In contrast to the studies discussed below, these papers look at the effect of countries' overall governance environment and political institutions, rather than specific institutions and procedures for managing public investment.

ing, and oversight of project implementation are inherently difficult (Flyvbjerg, 2009). These features mean that public sector capacity to manage public investment projects is often limited.

- **Information asymmetries abound.** The underlying information asymmetry between public and private actors, as well as fragmentation and information gaps within different state agencies, create ample opportunities to inflate contracts and distribute the resulting rents, leading to rent-seeking and corruption. Moreover, the one-off nature of large public works means that public sector decision makers cannot easily assess costs and benefits based on comparisons with prior projects (Rose-Ackerman, 1975). Moreover, Collier and Venables (2008) argue that insufficient information and technical capacity for ex ante project evaluation, as well as the prevalence of rent-seeking, lowers the development impact of public investment in low-income countries.
- **Control and oversight are crucial.** These risks are exacerbated when institutional controls such as effective oversight bodies as well as checks and balances within the public sector and competitive bidding processes are absent or weak. A lack of effective monitoring by citizens and civil society further undermines oversight and control. Countries with higher levels of corruption and weaker governance institutions tend to spend more on public investment after controlling for other variables (Keefer and Knack 2002, 2007; Tanzi and Davoodi 1997) and less on other goods such as education (Mauro, 1998), increasing the amount of public resources subject to rent-seeking and capture by private interests.
- **Politics matter.** Politics can also interfere with efficient public investment management. Project selection may

respond more to the goal of shoring up political support rather than promoting economic efficiency (Robinson and Torvik, 2005). Moreover, major projects, once begun, can be politically difficult to stop or alter, even when technical criteria indicate the need to do so. These dynamics are exacerbated by the mismatch between project lifecycles and electoral calendars: while the dividends of projects in developing countries often take decades to fully emerge, political terms usually last from four to six years (Arslanalp et al., 2010). Similarly, Gupta et al. (2016) find that levels of public investment vary in response to electoral cycles, a practice that is at odds with rational investment planning.

## Public Investment Management in Latin America and the Caribbean

The current state of public investment management institutions in LAC reflects these issues. Despite progress in recent years, there are several pending tasks in strengthening the region's PIMS. A recent review by ECLAC (2014) concludes that PIMS in the LAC region present weaknesses when it comes to strategic planning and ex ante project evaluation, auditing and ex post evaluation, and access to information and mechanisms for citizen participation.

Methodologies and technical capacity to perform rigorous (i.e., ex ante and ex post) project evaluations are limited.<sup>24</sup> Most countries also fail to incorporate citizens'

<sup>24</sup>For example, Chile was the only country in the sample of six LAC countries that performed short and medium-term evaluations based on project costs, timeframes, magnitudes, and operation and maintenance costs. Similarly, while China had 37 methodologies for ex ante evaluation of different types of projects, other countries employ a one-size-fits-all methodology.

views into their evaluation of investment projects, a potential valuable source of input for improving the capacity to manage projects. Moreover, while information portals on public investment projects exist across the region, these tools are hampered by incomplete information; the absence of standardized, best-practice formats for easy citizen use; and failure to incorporate advanced technology (e.g., cloud computing, open data platforms). Finally, the study found that project monitoring is primarily financial rather than physical, meaning that it is concerned with regular, timely execution of budget funds assigned to the project rather than actual progress on the public work in question.

A more recent survey sheds further light on the state of PIMS in the region. Armendáriz et al. (2016) construct an index of public investment institutions in LAC that covers the four stages of the public investment cycle assessed in Dabla-Norris et al. (2012) but also includes an additional, “general characteristics” pillar to capture cross-cutting features of countries’ PIMS. This pillar consists of the strength of legislative frameworks, the technical capacity of public sector personnel, transparency and public scrutiny, and support systems for public investment institutions.<sup>25</sup> These features allow for a more accurate portrayal of the de facto functioning of a country’s PIMS, which may diverge from its de jure institutional and administrative framework.<sup>26</sup>

The results of this exercise are revealing. First, similar to ECLAC (2014), the authors find that LAC countries on the whole exhibit poorer performance in strategic planning and guidance and ex post evaluation and auditing, while project selection and implementation are relatively strong. Specifically, methodologies for project preparation and ex ante evaluation, social precautions, and the selection of projects on technical criteria show weaknesses. Also, the “general

characteristics” pillar suggests that countries’ performance on these cross-cutting pillars lags the overall institutional development of PIMS.<sup>27</sup> Closer scrutiny reveals that the lower scores are driven by the access to information/public scrutiny and support systems components. The authors conclude that information systems in public investment tend to be centralized and not user-friendly.<sup>28</sup>

This result is echoed by ECLAC (2014), which argues for the use of technologies such as cloud computing, open data formats, and social networks to manage and disseminate data and encourage citizen participation. Along these lines, a recent analysis of public sector support for open government and open data in the region found that despite strong momentum, there are still considerable gaps in implementation and engagement with end users

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<sup>25</sup> This index is based on both a survey of high-level officials responsible for public investment management and secondary sources, whereas previous indices such as that developed by Dabla-Norris et al. (2012) drew mainly on secondary sources.

<sup>26</sup> Dabla-Norris et al. acknowledge that their index may provide a better picture of the de jure features of PIMS more than how systems work in practice (2012: 243-44).

<sup>27</sup> The general characteristics component is not strongly correlated with other phases of the PIMS, which means the inclusion of these measures adds new information to the index and underscores that countries can advance on the formal institutional side despite lingering weaknesses in cross-cutting functions. For example, Chile, one of the highest-ranked countries on the overall index, scores below the Dominican Republic, Ecuador, and Honduras on general characteristics. Some countries such as Argentina improve their performance once the general characteristics component is included in the index.

<sup>28</sup> These findings are similar to those of the Open Budget Index, a measure of transparency of countries’ broader budget frameworks. The region generally scores well on variables measuring the quantity of information made public but registers much weaker performance on encouraging citizen participation. See <https://www.internationalbudget.org/open-budget-survey/>.

(OECD, 2016a). While a large majority (77 percent) of LAC countries surveyed had an open data portal at the national level, only half included a user feedback section and only 53 percent carried out regular consultations with end users. The lack of mechanisms to coordinate with civil society and the private sector was identified as the most important challenge to successful implementation of open government in the region. In addition, only two countries held regular training for public officials in the analysis of open data systems.

In sum, the balance of evidence in these studies points to a divide between the formal, de jure institutional and administrative features of the region's PIMS and their de facto operation. This characterization seems to apply also to the specific issue of transparency of public investment processes, which exists formally in most countries but could and should have a greater positive impact on efficiency. Given this scenario, there is a need for specific interventions and tools to improve the quality and quantity of information flows both within the public sector and between public

agencies and citizens, as well as steps to ensure that stakeholders are analyzing the information in an effective and timely manner. This implies putting forward specific efforts to engage with area experts in civil society, academia, and other interest groups.

As examined in more detail below, the adoption and effective use of cutting-edge technologies is critical to the success of any such strategy. Such initiatives build on governments' efforts and commitment to enhance transparency and efficiency in public investments and offer a practical entry point for citizens and civil society groups to engage with public entities to help improve public services and infrastructure. Advancing on this front is fundamental to reversing the troubling deterioration in trust in government in LAC caused by worsening perceptions of corruption. The next section analyzes the mechanisms through which transparency and information management can enhance public investment efficiency, setting the stage for the discussion of the application of digital technologies in this area.



# THE ROLE OF INFORMATION AND TRANSPARENCY IN IMPROVING PUBLIC INVESTMENT MANAGEMENT

To design effective, targeted interventions, it is important to identify and explore the various pathways leading from stronger PIMS to better public investment outcomes. In general, there are two broad and complementary channels to bring about greater public investment efficiency. First, stronger public investment systems can increase the *incentives* to manage public investments efficiently by bolstering accountability mechanisms both horizontally (i.e., among public officials, executing agencies, and control institutions), and vertically (i.e., from citizens, journalists, civil society groups, etc.). This channel emphasizes how effective monitoring and oversight can alter the costs and benefits of inefficient or corrupt practices. The second channel to realize efficiency gains has to do with the *capacity* of officials across various public agencies to plan, select, implement, monitor, and evaluate these complex, multi-stage projects. This channel assumes that there are public sector actors who intend to carry out projects based on rational criteria but who may lack the technical expertise, relevant information, technological tools, or proper administrative procedures to do so.

## Improving Information Management and Transparency: How to Make the Most of PIMS

Information management and transparency are central to the activity of PIMS and critical to activating the two channels discussed above.<sup>29</sup> The IMF has identified transparency in PIMS as a critical aspect to strengthen the public investment cycle. Meanwhile, a recent review of public sector management in LAC by ECLAC (2014) also pointed to the importance of transparency in PIMS to disseminate information with citizens. To see why, it is useful to explore the

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<sup>29</sup> Information management refers to the capacity to generate, organize, and analyze relevant data as well as ensure its efficient flow across relevant entities and actors within an organization (in this case the public sector). Transparency, by contrast, involves the open publication of information about the operations of public sector agencies to outside actors, including citizens, civil society groups, government auditing institutions, and other public entities charged with monitoring and oversight. As discussed below, transparency requires that information be published so that it enhances these actors' understanding of government activities.

various components of PIMS, which correspond to the stages of public investment:<sup>30</sup>

- **Strategic planning and appraisal.** This phase consists of designing a portfolio of investment projects aligned with a country's development objectives but within its budgetary restrictions. Effective planning requires technically sound, transparent, ex ante evaluation of the costs and benefits of the projects, based on standardized methodologies.<sup>31</sup> Appraisals can be conducted inhouse or by outside experts to combat "optimism bias" in planning (Rajaram et al., 2014). Some analyses include fiscal rules, binding policymakers to sustainable levels of investment spending over a project's multi-year life cycle, as important tools for strategic planning (IMF, 2015).
- **Allocation and project selection.** Once projects have been identified and appraised, officials must choose which projects to pursue and how to finance them. Effective project selection and budgeting involves managing a portfolio of potential projects and assessing their feasibility in light of current fiscal conditions. This stage of the cycle also requires a clear and transparent project selection and budgeting process, based on technical criteria and backed up by appropriate institutional checks and controls, as well as public disclosure to enhance transparency over the process (Dabla-Norris et al., 2012; Rajaram et al., 2014).<sup>32</sup>
- **Project implementation.** This phase entails several processes. First, an efficient allocation of resources demands competitive and transparent bidding and procurement. Additionally, real-time reporting on the physical and financial status of projects during construction and operation is crucial (Dabla-Norris et al., 2012; Flyvbjerg, 2009).<sup>33</sup>

- **Ex post evaluation.** Finally, PIMS must allow this evaluation, including in-house and external audits. However, auditing and evaluating are difficult without information on the economic and social impacts of the project. The results of these exercises should be made public to shed light on the impact of public investments and thus bolster accountability.<sup>34</sup> Sound evaluation and auditing of existing projects generate valuable information to inform the planning and appraisal of future projects, thus boosting public sector capacity for efficient management (IMF, 2015).

At each of these stages of the public investment cycle, information management and transparency can play a central role in activating the two channels—increasing capacity and generating incentives—for improving efficiency through stronger PIMS. Better information management within the public sector enhances the capacity of officials to administer complex public works

<sup>30</sup> The four stages discussed here were identified in Dabla-Norris (2012), the first comparable, cross-country index of public investment management. Subsequent work by Gupta et al. (2014), IMF (2015), and Armendáriz et al. (2016) adhere closely to this approach.

<sup>31</sup> Ideally, public agencies should develop tailored methodologies for evaluating different types of projects (ECLAC, 2014).

<sup>32</sup> For example, the Dabla-Norris et al. (2012) index identifies multi-year forecasts linked to annual budget policies that consider recurrent project expenditures; formal review processes for project selection; and public access to information on these procedures, as important features of the selection and budgeting phase, among others.

<sup>33</sup> The project implementation component therefore includes indicators on whether procedures for awarding contracts are competitive, as well as the existence and operation of a procurement complaints mechanisms, and of internal audit controls in executing ministries (Dabla-Norris et al., 2012).

<sup>34</sup> The mechanisms linking information dissemination, transparency, and accountability are discussed in detail below.

effectively and efficiently. In addition, greater transparency in the public investment cycle encourages monitoring and oversight, strengthening incentives for efficient management. While conceptually distinct, the two channels are highly complementary, as the discussion below highlights.

With respect to information management, it is clear that high-quality, reliable technical information is a critical input for efficient, rational public investment management across various stages. Rigorous project appraisal depends on the existence of information on past project performance, generated either by the public sector itself or by external evaluators, which is readily available to decision makers. Next, effective project selection depends on a variety of informational inputs, which demand a timely flow of updated information between public entities responsible for budgets and planning, environmental and social impacts, and frontline executing agencies. At the implementation phase, officials in different parts of the public sector need access to quality, real-time information on the physical and financial status of projects to effectively oversee them, respond to operational issues, and ensure timely financial disbursements. Here again, timely, reliable, and secure information flows across different public entities are crucial. Finally, auditing and ex post evaluation are naturally impossible without accurate information on project costs, technical characteristics, and economic and social impacts. All these functions entail considerable demand for effective information management and analysis across different public sector entities, levels of government, and electoral cycles.

### *Transparency to Enhance Monitoring and Oversight*

In addition to improving the capacity to manage public investment, disseminating

information on the public investment cycle can increase the incentives for efficient management through greater monitoring by actors within and outside of government. Monitoring can increase the likelihood that corruption or mismanagement will be exposed and punished,<sup>35</sup> thus raising its costs and potentially reducing its occurrence.<sup>36</sup>

Actors within the public sector (horizontal accountability), such as government audit institutions, and planning and/or oversight departments within line ministries, can perform effective monitoring. Monitoring by citizens (vertical accountability), who directly benefit from public investments, can potentially be more effective.<sup>37</sup> In most cases, horizontal and vertical monitoring are complementary: government oversight and auditing represent an important source of information to be shared with the public, while citizen monitoring can provide valuable inputs for public sector watchdogs (Fox, 2015; Joshi, 2014).

Feedback from end users (citizens) on the quality of public services and infrastructure can also be very useful. Such information provides important input into different stages of public investment management. Perceptions of citizens and/or civil society stakeholders on the quality of infrastructure and services, for example, can inform project evaluation. Feedback can also take the form of citizen participation in formulating priorities for future investment planning. There are growing opportunities to

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<sup>35</sup> Punishment can take various forms including formal criminal penalties, career damage, social sanction, or being voted out of office in the case of elected officials (Joshi, 2014; Olken, 2007).

<sup>36</sup> The conceptualization of corruption as function of the relative costs and benefits of committing corrupt acts derives from Becker and Stigler's (1974) rational choice models of crime. See also Rose-Ackerman (1978) and Klitgaard (1988) for a similar view.

<sup>37</sup> See O'Donnell (1993) and Mainwaring and Welna (2003) on horizontal versus vertical accountability.

design transparency tools in such a way to encourage user feedback, thus enhancing their potential impact.

Thus, initiatives to increase the transparency of public investment management have great potential to improve efficiency, especially given the complexity of public investment projects. The provision of information at each stage of the investment cycle allows for stronger monitoring and control over public investments and service delivery: (i) the disclosure and publication of the methodologies, procedures, and results of project appraisals facilitate review and validation by outside stakeholders, helping identify areas of weakness and corruption risks; (ii) greater transparency in project selection and budgeting also encourages citizen oversight of these processes; (iii) at the implementation stage, competitive, open tenders can expand the potential population of firms competing for contracts, directly improving efficiency; and (iv) the publication of the results of ex post project evaluation is critical for both citizens and public sector watchdogs.

### *Making Transparency Work: How to Disclose Information*

Numerous studies show that openly publishing information about public investment and services can bring major efficiency gains, underscoring the importance of these dynamics.<sup>38</sup> However, the balance of research in this area shows that information provision per se is generally not enough, all other factors being equal, to trigger effective citizen monitoring (Fox, 2015; Lieberman, Posner, and Tsai, 2014). In general, there are two critical links in the chain between transparency and better public sector outcomes: (i) citizen action, or the actual use of information for effective monitoring; and (ii) government response,

consisting of changes in the public sector to improve performance.<sup>39</sup>

On the first point, there is no guarantee that the provision of information by the public sector will be used productively. To catalyze effective monitoring and accountability, information needs to have certain characteristics and to be disseminated in such a way that it actually enhances understanding of how the public sector is operating and encourages different types of potential users to interact with it.<sup>40</sup> Accordingly, the literature on the impact of transparency initiatives clearly indicates that information disseminated by public agencies should have the following characteristics:

- *Quality and timeliness:* There is potentially wide variation in the quality of information. If information is not accurate, complete, up to date, and specific, it will not be amenable to analysis that allows users to assess the performance of public services and investments (Fung, Graham, and Weil, 2008; Joshi, 2014).
- *Credibility:* If potential users do not view the information produced and published by government agencies, their incentives to engage with the information and incorporate it into monitoring efforts will be limited. In this regard, efforts to ensure the credibility of the data, such as external validation or inputs by civil society, can enhance the effects of transparency initiatives.

<sup>38</sup> See, for example, studies by Bjorkman and Svensson (2009), Olken (2007; 2009), and Reinikka and Svensson (2005).

<sup>39</sup> This conceptual discussion applies equally to horizontal monitoring by actors within the public sector, in addition to vertical by citizens. In the former case, the characteristics of information necessary to encourage monitoring may differ given the more specialized nature of the users. See below for further discussion.

<sup>40</sup> As discussed below, Fung, Graham, and Weil (2008) describe transparency initiatives with these characteristics as “targeted transparency.”



- *Ease of understanding and relevance:* Information must be formatted and presented to end users in a way that is comprehensible and relevant to their concerns. In this regard, more is not necessarily better. An overload of highly technical information on public works projects is unlikely to help citizens better understand public sector performance. By contrast, targeted indicators of the physical progress and financial status of projects, set against initial goals, can facilitate effective monitoring (Fung, Graham, and Weil, 2008). Here, it is important to highlight that the standard of understandability and relevance will vary for different classes of users. Specialized audiences can have greater technical capacity to interact with more complex data (and may demand a greater degree of complexity and nuance to use information effectively).<sup>41</sup> For non-specialists, the publication of information via intuitive, comparable performance indicators may be necessary to facilitate citizen monitoring. This demands prior analysis and aggregation of raw data.
- *Comparability:* Providing information that facilitates relevant comparisons, for example among different jurisdictions and groups of users, can be an important impetus for collective action. If citizens in one jurisdiction see that they receive lower quality public services than their neighbors, they may be more likely to demand improvements than if their level of service is presented without relevant context (Joshi, 2014).
- *Ability to share and disseminate:* Sharing information among different stakeholders is critical to several of the steps linking transparency to better public investment management. Sharing information can scale up monitoring efforts, thus strengthening incentives for public

officials to reduce corruption, improve efficiency, and enhance the power of citizens to demand better results from the public sector.

It is important to highlight that public entities on the front lines of investment projects and service delivery must have strong systems for collecting, managing, and reporting information on their operations to produce data with the characteristics discussed above. In addition, agencies responsible for budget management need real-time tools to monitor and report disbursements and outlays to different projects to ensure the quality of information on projects' financial status. These considerations once again point to the close links between better information management within the public sector and greater transparency via the dissemination of high-quality information to citizens and government oversight agencies. Solid information management by governments is a key prerequisite for effective transparency initiatives.

### *From Transparency to Accountability*

Even if effective monitoring occurs, the question of whether and how public sector actors respond to evidence of corruption, inefficiencies, or poor performance remains.<sup>42</sup> The range of possible state

<sup>41</sup>The policy implication is that initiatives to enhance transparency should be designed with the needs of different types of users in mind.

<sup>42</sup>The nature of the government response is central to the concept of accountability, which generally includes the component of answerability or the effective right of citizens to receive information or explanations for government actions, as well as enforceability, or the ability of citizens to pursue effective sanctions if government actions do not meet legal or administrative standards or contravene formal or informal norms. See World Bank (2004).

reactions includes sanctioning offending officials as well as deeper and more systematic responses such as reforming processes (e.g., instituting competitive bidding), changing administrative structures, advocating for reforms at higher levels of government, or mobilizing more resources to improve service provision or investment performance.<sup>43</sup> In addition to such “positive responses,” it is also possible that monitoring efforts will be met with negative responses such as reprisals, intimidation, or even violence (Fox, 2015).

That said, the revelation of corruption or mismanagement may not bring about an effective institutional response. There are various reasons why the discovery of corruption risks or inefficiencies in PIMS may not produce the desired response from the government. First, public officials will have no incentive to improve performance if there is no credible threat of sanctions or pressure to improve performance. Second, actors in the public sector may have every intention to redress the issues raised by citizen monitoring but may lack the capacity to do so. This point further underscores the complementarity between efforts to improve information management within the public sector and transparency initiatives to encourage effective monitoring, since the former set of interventions can strengthen the latter.<sup>44</sup>

In such cases, citizens, civil society stakeholders, and/or reform advocates within government need to pursue additional actions to bring about increased efficiency, such as pursuing legal and administrative channels to pressure public agencies, organizing protests, and/or voting against corrupt officials (Joshi, 2014).<sup>45</sup>

This requires sustained collective action and relies on a broader institutional environment conducive to expression of citizens’ demands.<sup>46</sup> Transparency initiatives are increasingly leveraging new technologies to nurture this type of broader, collective citizen response.

Finally, in some cases, the mere likelihood of greater monitoring (either horizontal or vertical) spurs public officials to take steps to increase efficiency.<sup>47</sup> This is called the monitoring effect. As Reinnika and Svennson conclude from a seminal study on information provision in Uganda, greater transparency can lead officials “to rationally believe the threat of punishment increased,” causing them to reduce corrupt behavior (2011: 959). Still, in light of this discussion, transparency and information management initiatives should be designed to facilitate effective monitoring (horizontal and vertical) and encourage a positive response by public sector actors. As the next section shows, an array of new technologies can be leveraged to this end.

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<sup>43</sup> As Joshi (2014) points out, the government response may also take the form of further information disclosure, providing an important positive feedback mechanism.

<sup>44</sup> See Joshi (2014) on how successful monitoring can encourage further monitoring efforts, including in neighboring jurisdictions.

<sup>45</sup> See Ferraz and Finan (2008) for evidence on how information dissemination can enhance accountability via the ballot box.

<sup>46</sup> The ability of citizens to express their preferences and thus influence the actions of the government is generally referred to as “voice” (World Bank, 2004: 79), following the seminal characterization of A. O. Hirschman.

<sup>47</sup> See Lagunes (2017) for experimental evidence of the prospect of monitoring leading to greater efficiency in Peru.



## THE WILD CARD: TECHNOLOGICAL INNOVATION

The way in which information management and transparency initiatives are implemented is critical to activating the various channels through which information can improve public sector efficiency. The rapid advance of ICTs, including digital technologies, mobile applications, big data, blockchain, cloud computing, and many others, has greatly expanded the toolkit for implementing effective transparency and information management reforms.

These technologies have enormous potential to improve public investment management and, in so doing, increase the economic dividends from investment projects. The following examples show how technology can be used to strengthen the channels linking information to efficiency discussed above: internal information management, horizontal monitoring, vertical monitoring, user feedback, and citizen voice. They are meant to be illustrative of the potential applications of new technologies to this area, but are by no means exhaustive.

*Effective, in-depth public sector oversight:* New ICTs can also enhance the capacity of oversight agencies and departments in the public sector to identify and control inefficiencies and corruption risks in the

public investment cycle. Blockchain technology, for example, can ensure that each step in the procurement process is tracked, recorded, and secured on an unalterable platform. Blockchain thus creates an incorruptible “digital ledger” that can offer an invaluable tool to public sector auditors.

In addition, advances in data analysis techniques are rapidly expanding the tools available to auditors and oversight agencies. Data mining, which employs advanced statistical analysis and machine learning, can analyze databases that are orders of magnitude larger than traditional data (so-called big data), identifying patterns and, increasingly, generating predictions. These tools allow public sector auditors to subject massive numbers of transactions to systematic scrutiny and, potentially, identify corruption risks in real time. Brazil’s Observatory of Public Spending, a unit within the country’s Office of the Comptroller General, has implemented data mining tools that allow officials to audit around US\$5 trillion of public spending. In 2015 alone, the unit raised red flags in more than 7,500 cases, amounting to contracts worth US\$104 million (Moreno, 2017).

By increasing the reliability, quality, and timeliness of information at the disposal of

comptrollers and other government watchdogs—as well as exponentially enhancing their capacity to analyze this information—these technologies have great potential to bolster horizontal accountability in the public sector.

*Targeted transparency:* Fung, Graham, and Weil (2008) introduced the concept of targeted transparency. In a nutshell, targeted transparency consists of the disclosure of information in a way that allows consumers and users of public services to better understand and evaluate the performance of firms and government agencies and make better decisions based on this information.<sup>48</sup> To bring about sustained, positive change in information users and disclosers, however, the information must: (i) have perceived value to users to advance their goals; (ii) be compatible with users' decision-making routines; and (iii) be comprehensible to them.

Technological tools such as interactive web platforms, mobile apps, and data visualizations can ensure that the information provided by public agencies reaches citizens in an intuitive, user-friendly format. An example of this is geo-referenced maps, which use GPS technologies to show the geographic location of public investment projects. These maps allow users to identify how resources are being spent in their jurisdiction and make comparisons with neighboring locales. In addition, the implementation of these tools requires coordination across government entities to aggregate and harmonize different sources of data, helping strengthen capacity for information management. The combination of incentives for more vigorous citizen monitoring and better management and oversight of data can have a notable impact on efficiency. In Peru, increased monitoring of projects through INFOBRAS, a web portal with data on over 70,000 public works

hosted by the country's Office of the Comptroller General, decreased project costs by half (Lagunes, 2017). Meanwhile, the implementation of the MapaRegalías platform in Colombia significantly increased completion in those projects included in the platform (see Section V).

A particular application of targeted transparency in this field is electronic procurement, or e-procurement. E-procurement systems publish online all the details, relevant technical information, and outcomes of public sector tender processes and, in some cases, allow firms to bid directly through the same web portal.<sup>49</sup> These systems facilitate horizontal and vertical monitoring of procurement processes while expanding the population of potential bidders, leading to greater competition and helping break up bidding cartels;<sup>50</sup> finally, e-procurement systems that allow for online bidding help eliminate corruption

<sup>48</sup>The authors define the concept fully as follows: "Targeted transparency offers a more focused approach often used to introduce new scientific evidence of public risks into market choices. Government compels companies or agencies to disclose information in standardized formats to reduce specific risks, to ameliorate externalities arising from a failure of consumers or producers to fully consider social costs associated with a product, or to improve provision of public goods and services. Such policies are more light-handed than conventional regulation, relying on the power of information rather than on enforcement of rules and standards or financial inducements."

<sup>49</sup>Publishing information on tendering opportunities is referred to as informational e-procurement, while the ability to submit bids online is known as transactional e-procurement (World Bank, 2016b). E-procurement falls into the category of e-government, which includes a wide range of policies to increase the use of digital technologies in the public sector and improve service delivery and streamline bureaucratic processes via the internet (ECLAC, 2014).

<sup>50</sup>For example, Lewis-Faupel et al. (2014) find that e-procurement improves quality of public works by encouraging bidding by more qualified contractors, although they do not find an impact on project cost.

risks that arise from interactions with public officials in the tender process.<sup>51</sup>

*Information management for performance and security:* The effective management of public investment requires the production, analysis, and sharing of different types of information by different public agencies. ICT tools such as information or data dashboards, which track, analyze, and display relevant performance metrics for a particular project or program on a single interface, can help officials aggregate information inputs from different sources and monitor several indicators in real time (Edwards and Thomas, 2005; Lake, 2013). Dashboards thus help ensure that information on the performance of public investments is accurate, up-to-date, and accessible to all relevant agencies through a user-friendly visualization. In this way, the tool can help identify inefficiencies and corruption risks as they arise.

Blockchain can also help break down information silos across government agencies by providing a platform to record and secure information on public resource management across government and transactions between public and private entities (Santiso, 2018). A distinctive feature of blockchain is that each data record contains a unique timestamp and identifier (ledger). Some argue that this technology can therefore be used to record transactions in a verifiable and permanent way on a single platform that actors across government can access (Santiso, 2018).

That said, there are at least three counter-arguments that need to be considered regarding the adoption of blockchain. First, according to some authors, blockchain has evolved into a tool for the creation of sophisticated Ponzi schemes,<sup>52</sup> particularly through the use of bitcoin and other digital or cryptocurrencies. The main reason is that digital currencies are not formally

regulated by any financial authority, and their ecosystems lack checks and balances. Secondly, blockchain could potentially benefit companies or individuals engaged in money laundering. A recent report of the U.S. Drug Enforcement Administration (DEA),<sup>53</sup> for example, claims that bitcoin is being used to facilitate trade-based money laundering schemes. Thirdly, corrupt actors could be at the end of the ledger, encrypting information to legitimize it, or benefiting from the governance loopholes existing around the use of this technology.

Finally, the use of cloud computing technologies can save public agencies on IT costs and help overcome physical storage constraints (Wyld, 2010). In this sense, governments and international organizations such as the World Bank (World Bank, 2016b) and the OECD (OECD, 2017) are vouching for the adoption of this technology. Cloud-computing services can help improve processes for PIMS by hosting complex management tools; fostering a secure digital environment for innovations within public agencies; allowing for a granular analysis of wide-ranging databases; and streamlining the interactions between governments and citizens through the real-time and secure storage of citizen-generated content and feedback. Governments in Chile, Estonia, the Netherlands, the United Kingdom, and the United States as well as

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<sup>51</sup> On this point, it is relevant to report the finding from the World Bank's enterprise surveys that 17 percent of firms in LAC believe they are expected to give gifts to secure a government contact. This figure is higher than in the case of other interactions with the public sector, such as securing a construction permit, obtaining an operating license, or getting an electricity or water connection (See <http://www.enterprise-surveys.org/>).

<sup>52</sup> See <https://www.theatlantic.com/technology/archive/2017/05/cryptocurrency-ponzi-schemes/528624/>.

<sup>53</sup> See [https://www.dea.gov/docs/DIR-040-17\\_2017-NDTA.pdf](https://www.dea.gov/docs/DIR-040-17_2017-NDTA.pdf).

supranational (the European Union) and subnational (Chicago, Paris, Cape Town) governments and agencies (e.g., the New York Public Library) already function partially and totally with their services and processes stored on the cloud.

*User feedback and citizen participation:* As discussed above, information flowing from end users to governments—user feedback—can provide valuable information to public officials on the performance and quality of public services and infrastructure. Interactive, web-based platforms allow citizens to flag problems in service delivery, report issues regarding interactions with public servants, and propose ways to improve government performance. These tools are increasingly making use of mobile apps, taking advantage of the rapid spread of smart phones to facilitate use of these channels. Examples of mobile apps for user feedback in the LAC region include Mexico's Incorruptible app, which allows citizens to report bribe solicitations, and PorMiBarrio in Uruguay, an app where residents of Montevideo can report public infrastructure in need of repair and monitor the government's response.<sup>54</sup>

Increasingly, opportunities for citizens to provide input into the government's activities are going beyond feedback on specific public services and investment projects to include other areas. In Rio Grande do Sul (Brazil), citizens can vote to include different projects in the municipal budget via an online platform. This broader citizen engagement can take the form of crowdsourcing or others forms of collaboration. Mexico's Secretaría de la Función Pública, a ministry charged with ensuring integrity in the public sector, has created a "smarter crowdsourcing" strategy that brings together subject matter experts and civil society organizations to identify and implement strategies to support the country's new Anti-Corruption

System.<sup>55</sup> Another underappreciated feature of technology-enabled tools is their ability to provide anonymous, secure channels for whistleblowing,<sup>56</sup> which lowers its (often considerable) costs. In this way, user feedback enhances the capacity of the public sector to identify and root out corruption risks.

While user feedback tools are conceptually distinct from transparency as government disclosure, there are clear synergies between them. First, user feedback and other participatory platforms can enhance transparency by tracking and publishing how governments respond to citizen complaints or suggestions, as in the case of Uruguay's PorMiBarrio app. Peixoto and Fox (2016) find that user feedback initiatives that share such data create stronger incentives for accountability. In the case of PorMiBarrio, around 50 percent of complaints are resolved—a high response rate in comparison with two dozen similar initiatives worldwide (Peixoto and Fox, 2016). In addition, web-based transparency initiatives present an important opportunity to embed citizen feedback channels, thus enhancing their utility for government and citizen users. Citizen feedback portals both encourage engagement and interaction with the information and potentially generate valuable information to enhance public sector oversight and performance.

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<sup>54</sup> The inclusion in the PorMiBarrio app of a feature that monitors and displays the government's *response* to issues reported by citizens provides a useful example of the potential synergies between soliciting user feedback and enhancing transparency. See below.

<sup>55</sup> This initiative applies a methodology developed by New York University's Governance Lab and is supported by the IDB. See <http://thegovlab.org/smarter-crowdsourcing-against-corruption/>.

<sup>56</sup> Whistleblowing generally refers to the exposure of high-level or systematic corruption or wrongdoing within organizations (including the public and private sector). It thus differs from the denunciation of bribery solicitations by citizens in everyday interactions with public officials.

*Voice and diffusion:* Efforts to improve public sector efficiency often run into collective action problems. Even if individual citizens or groups have the tools to monitor the government, their ability to exercise voice and influence government action will be limited without collective action. However, the ever-expanding menu of social media platforms dramatically increases the potential for citizens and civil society organizations and increases the power of vertical accountability by raising the cost for officials who do not respond to citizen demands. This is particularly true in LAC, given the widespread use of social media in the region.<sup>57</sup> Social media have been critical in organizing massive protests against poor public services in Brazil, high university fees in Chile, and corruption in Guatemala, which led to the resignation of President Pérez Molina in 2015 (Casas-Zamora and Carter, 2017).

A good example of the power of social media to project voice is the recent 3x3 campaign in Mexico. This civil society-led initiative to promote legislation requiring all Mexican public officials to declare and publish their tax statements, asset ownerships, and conflicts of interest made use of Twitter, Facebook, Youtube, and other platforms to rally support for its cause. As a result of these efforts, the movement, led by the civil

society organizations Plataforma Ciudadana and Instituto Mexicano para la Competitividad, amassed more than 630,000 signatures in three months—enough to require the national legislature to consider its proposal. The body approved the 3x3 initiative and included it in the first package of new laws under Mexico’s National Anticorruption System in June 2016.<sup>58</sup>

The ability of social media to enhance voice through diffusion can strengthen the relationship between information, citizen action, and a positive state response, thus ensuring that transparency leads to better efficiency. These links help guarantee that in cases where corruption, mismanagement, or inefficiency is exposed, there is sustained citizen action. Transparency initiatives can easily encourage such broader engagement by embedding options to share information via social media platforms into the web-based information platforms discussed above. The IDB’s MapaInversiones project, discussed in the following section, provides an example of this integration of user-feedback-into-transparency platforms.

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<sup>57</sup> As of 2015, 41 percent of Latin Americans used Facebook and another 25 had Youtube accounts (Casas-Zamora and Carter, 2017).

<sup>58</sup> See <http://ley3de3.mx/es/introduccion/>.







## A PRACTICAL CASE: MAPAINVERSIONES

In 2016, the IDB officially launched the MapalInversiones (MI)<sup>59</sup> regional initiative, an online platform that allows users to monitor the physical and financial progress of public investment projects through data visualizations and geo-referenced maps. Following the principles of targeted transparency discussed above, the MapalInversiones platforms enable easy interaction with public investment data, including the ability to search along a variety of dimensions, to download information to an Excel spreadsheet, and to share information through social media links embedded in the site. MapalInversiones platforms encourage citizen participation through a module that allows users to send comments, recommendations, and demands to policymakers and contribute to the monitoring of public works by sharing photos and impressions of the progress of projects.

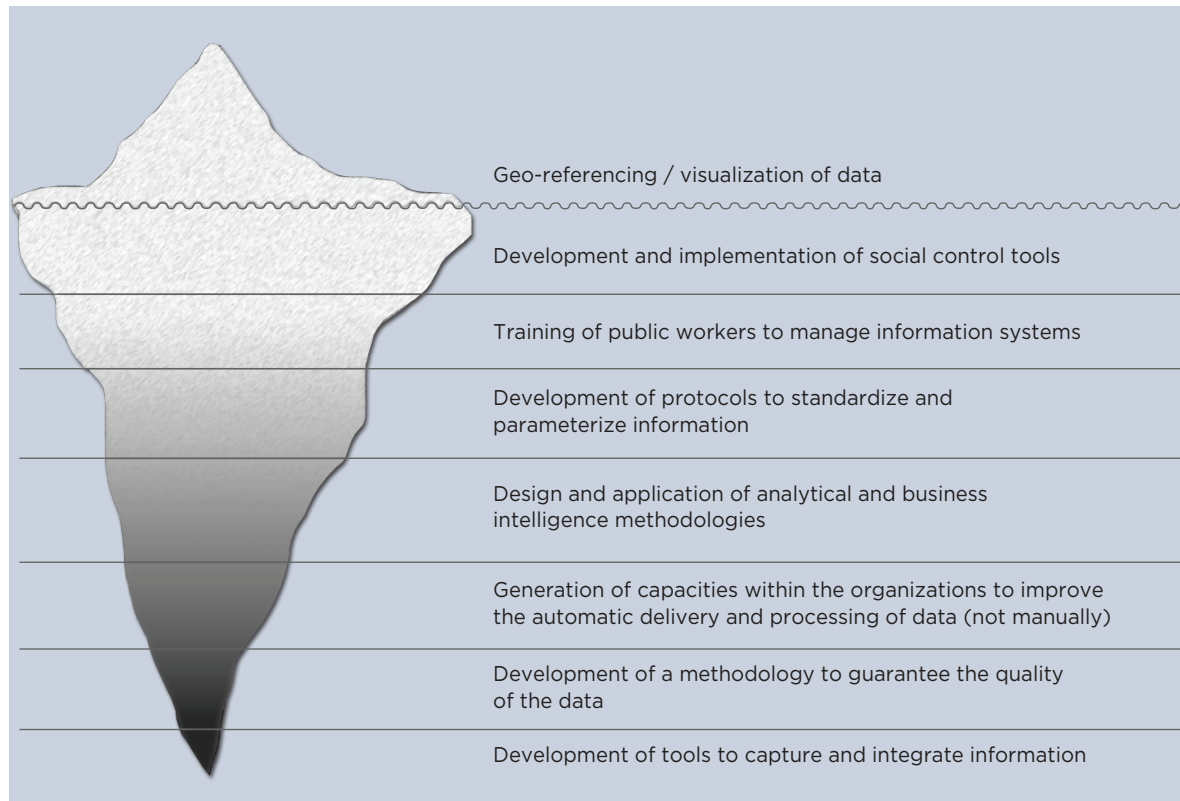
MapalInversiones is more than just a technological innovation, however. The initiative is based on the principle of access to information about public investments, not only with respect to its allocation but also during its execution. MapalInversiones is made possible by the existence of legal provisions, such as the Freedom of Information Acts (FOIA), which have been sanctioned and implemented in most countries in LAC. In this sense, MapalInversiones is

both an innovative way for public officials to fulfill FOIA requirements proactively and a tool to improve the way that information is managed and disclosed to the public.

Developing the back end of a MapalInversiones platform involves several steps within the responsible public agency to ensure that the information eventually made public through the platform is complete, up to date, accurate, and suitable for complex analysis. These steps follow a bottom-up approach created by the MI technical team (Figure 3). A country can implement all of them at once, or gradually in several phases: (i) the institution has to develop structures to capture and also integrate information and data that are often not in place; (ii) the institution must generate capacities to ensure that information is automatically delivered and processed (switching from manual to automatic uploading); (iii) protocols must be put in place to standardize and parametrize the information captured; (iv) the information captured requires (even at a basic stage) implementing a methodology to guarantee that it has the minimum quality standards; (v) once the information flows automatically into the institutions' systems, analytical and

<sup>59</sup> Also referred to as MapalInversiones, in English; see [www.iadb.org/mapainversiones](http://www.iadb.org/mapainversiones).

**FIGURE 3: THE BACK END OF MAPAINVERSIONES**



Source: Authors' elaboration.

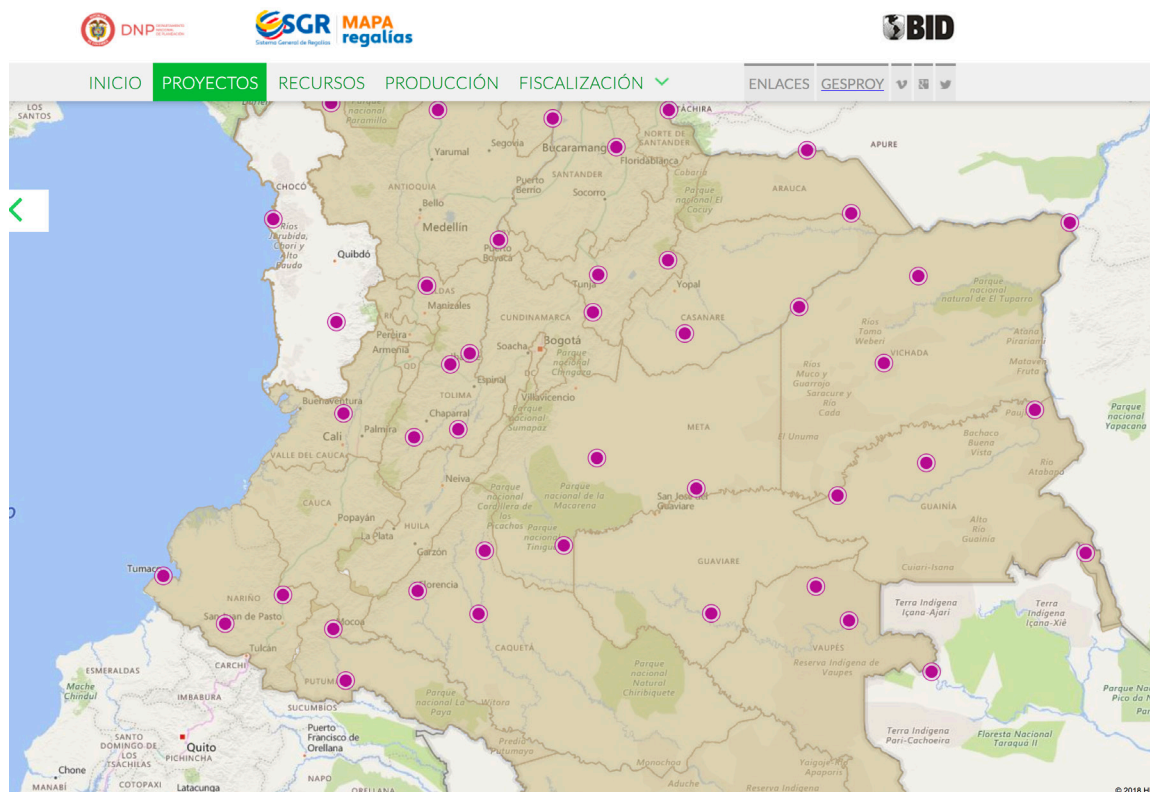
business intelligence software components can be constructed to improve analytical capabilities; (vi) public workers must be trained to manage the tools created; (vii) social control tools can be activated in the platform to allow citizens to monitor public works; and (viii) data can be georeferenced and visualized. The ultimate objective of this methodology is to create information management tools that are able to foster a cultural shift in the way the public perceives and monitors public investment.

The MI intervention was first developed in Colombia in 2013, with the Mapa-Regalías pilot. In this instance, the platform has been used to improve transparency and information management surrounding the allocation and use of mining and hydrocarbon royalties. A crucial source

of revenue for the resource-rich country, these royalties have been vulnerable to corruption risks and inefficient spending, especially by local governments.<sup>60</sup> In response to this situation, the national government reformed the system for sharing royalties among subnational governments in 2011, creating the General System of Royalties (Sistema General de Regalías, or SGR), which established new rules for

<sup>60</sup> Royalties from oil and mineral exploitation make up around 30 percent of Colombia's total government revenue. This income is distributed among the country's 32 departmental and 1,101 municipal governments, which use the income to finance investment projects. The commodity boom of the 2000s led to a massive increase in the resources at the disposal of these entities, leading to several cases of corruption and mismanagement (Arisi and González, 2014).

## MAP 1: HOME OF THE MAPAREGALÍAS PLATFORM, COLOMBIA (LINK)



Source: MapaRegalías platform, Colombia.

the distribution, administration, oversight, and use of royalties. Among the goals of the new system were more equal distribution among local entities and more rigorous oversight of the spending financed by these revenues. However, the central government's National Planning Department (Departamento Nacional de Planeación, or DNP), the ministry responsible for the SGR, lacked an integrated information system to effectively monitor the resources.

In the years since its implementation in 2014, MapaRegalías has contributed to a reduction in project implementation time and preventive suspensions of royalty distributions and has been well received by both citizen and public sector users. The number of Colombians using the platform increased from 20,000 in 2014 to over

75,000 by 2016, and the tool has been evaluated positively by municipal government officials in executing agencies. Images of nearly three-quarters of all public investment projects financed through royalties in Colombia are now uploaded, up from only 6 percent in 2014. Additionally, thanks to MapaRegalías, the number of irregularities detected and referred to a control institution (mainly the Attorney General) rose from just 57 in 2013 to over 1,000 in 2016.<sup>61</sup> Finally, an upcoming publication with the evaluation of the platform provides evidence that the intervention caused an approximate 11 percentage point increase

<sup>61</sup> Data extracted from the SMSCE (Monitoring and Evaluation) Information System of the National Planning Department (Colombia).

in project completion rates.<sup>62</sup> Colombia recently introduced an expanded version of the platform, which covers all public investment projects.

In 2018, MapalInversiones platforms were launched in [Costa Rica](#) and in [Paraguay](#). In addition to these two countries, technical work has already begun on the development and implementation of platforms in Argentina, the Bahamas, Jamaica, and Peru. MapalInversiones Costa Rica visualizes all the public investment in the country, equivalent to approximately US\$8 billion in projects in execution contained in the database of the Public Investment Bank of the Ministry of National Planning. Through this initiative, Costa Rica seeks to improve transparency in public investment and provide key information to citizens, especially social actors interested in monitoring public investment. In addition, the platform is an input to help Costa Rica meet international commitments such as the CoST Transparency standard.

MapalInversiones Paraguay visualizes the public investment data contained in the Projects Bank of the country's National Public Investment System (Sistema Nacional de Inversión Pública, or SNIP). The IDB team collaborated closely with SNIP and the Ministry of Finance so that US\$4 billion in public projects can now be viewed on the platform. In addition, the development in Paraguay included conducting focus groups and in-depth interviews with key stakeholders in the country,<sup>63</sup> which was crucial to improve the platform's functionalities at a regional level. The MapalInversiones platform supports Paraguay's efforts to comply with its commitments undertaken in international standards, such as the Open Government Partnership.

How does the MapalInversiones initiative work? MapalInversiones projects are created by governments at the national

level that demonstrate an interest in joining the initiative, and an IDB multidisciplinary team in charge of the design and technical guidance during the development of the platforms. Countries first undertake an inventory of existing information systems for public investment to identify institutional and technological barriers to implement the platform. This diagnostic applies an Enterprise Architecture (EA) methodology to develop operational solutions that ensure a high-quality platform.<sup>64</sup> In this way, implementation of MI requires that governments improve their internal information management systems for public investment as an initial step toward operationalizing the platform, helping to boost efficiency independent of monitoring efforts.

The development and implementation of the platform involves the design of pilot data visualization tools, mechanisms to update the quality and timeliness of the data visualized in the platform, and various institutional strategies to optimize information management and oversight based on the data presented on the site. Once operational, the site consists of a home page, a localization view, and a project view. The localization view presents government spending and income data and the portfolio of projects in a given jurisdiction. The project pages provide access to information on several important components

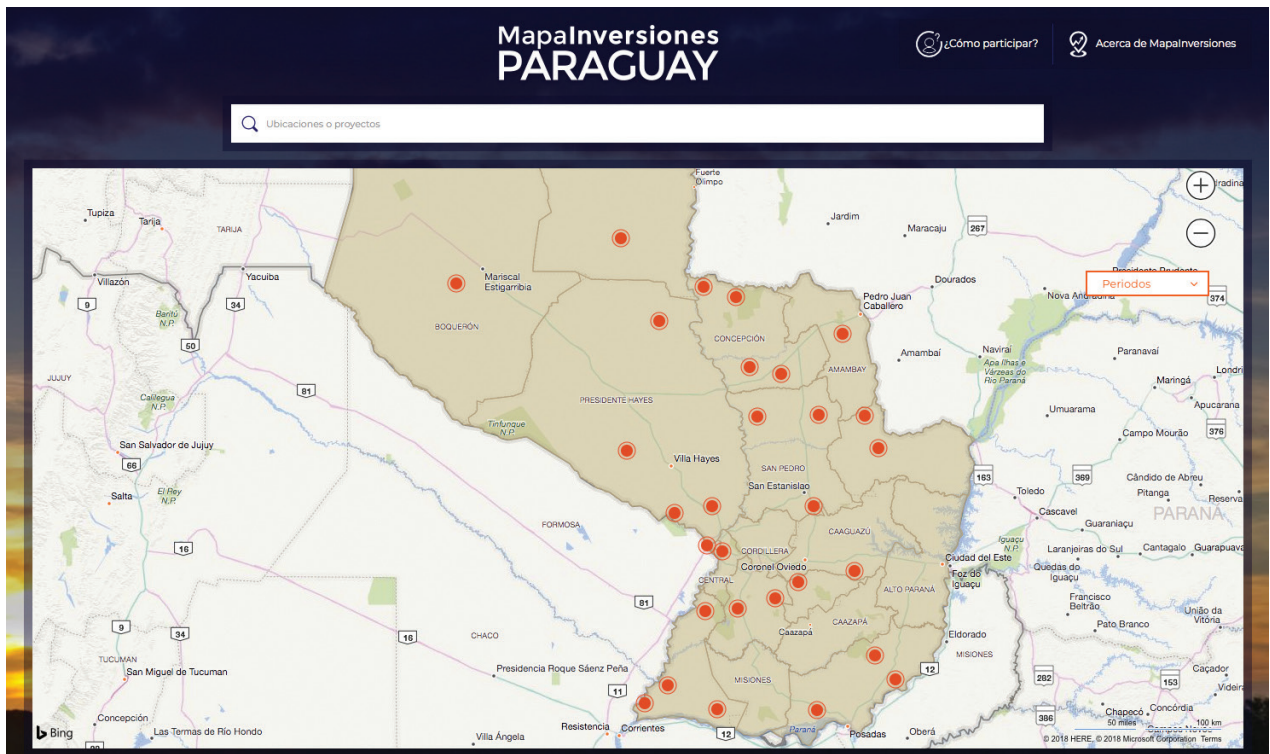
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<sup>62</sup> In addition to this, rigorous impact evaluations are being carried out in Costa Rica and Paraguay (where the tool was launched in 2017) in order to assess their impact.

<sup>63</sup> For more information see: <http://mapainversionessnip.economia.gov.py/documentos/Usabilidad%20Paraguay%20BID%2010-17.pdf>.

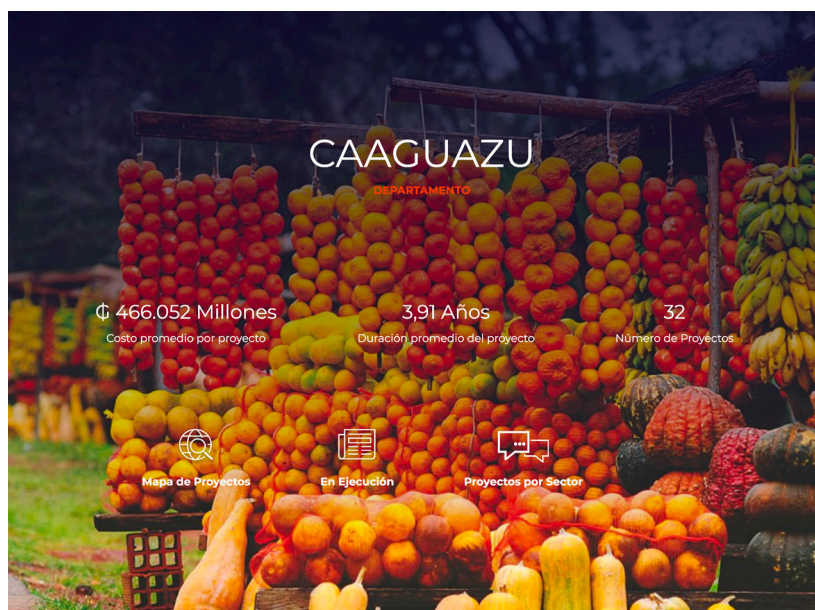
<sup>64</sup> This analysis includes test to ensure the data on public investments that forms the basis of the platform is high quality, which resulted in a doubling of the average data quality in the cases of Costa Rica and Paraguay. It also involves a thorough review of relevant legal and regulatory frameworks to establish the extent of information that can be published.

**MAP 2:** HOME, MAPAINVERSIONES PARAGUAY ([LINK](#))



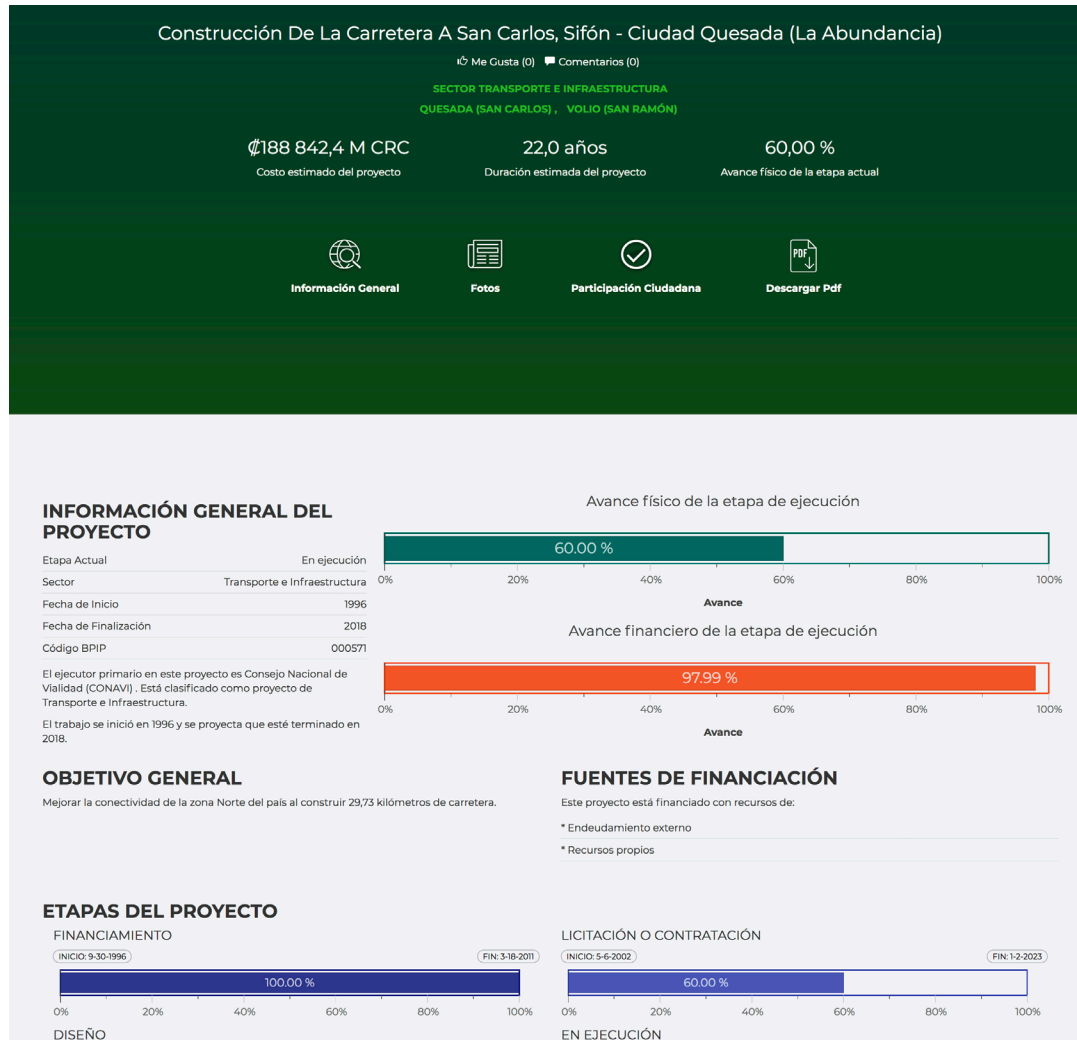
Source: Mapainversiones platform, Paraguay.

**IMAGE 1:** CAAGUAZÚ DEPARTMENT PROFILE, MAPAINVERSIONES PARAGUAY ([LINK](#))



Source: Mapainversiones platform, Paraguay.

**IMAGE 2:** PROJECT PROFILE “CONSTRUCTION OF THE ROAD FROM SAN CARLOS, SIFÓN - CIUDAD QUESADA” (LINK), MAPAINVERSIONES COSTA RICA



Source: MapalInversiones platform, Costa Rica.

of investment projects: sources of funding, amounts spent, project objectives, executing agencies, project contractors,

compliance goals, and indicators of the physical and financial status of the project and its social and economic results.



## POLICY RECOMMENDATIONS

This paper concludes with concrete policy recommendations for improving the transparency of public investments in LAC through technological solutions. This section draws on the lessons from the MapaInversiones initiative and other experiences supported (or promoted) by the IDB, as well as a review of evaluations of the region's PIMS and transparency and anti-corruption efforts more broadly. The recommendations fall into two categories. The first consists of specific strategies to enhance the effectiveness of technology-based initiatives to improve transparency and information management in public investment. The second addresses the broader political economy and institutional challenges in the public investment cycle. Given the complexity of managing public investment projects, it is critical for governments to take a holistic view of the risks to investment efficiency and the array of possible solutions. It is also important to underscore that solid legal frameworks remain an important requirement for effective PIMS. As the example of MapaInversiones shows, robust legal provisions in areas such as access to information, competitive public procurement, and budget transparency continue to form the backbone of strong public investment management and provide the basis

for the innovative application of digital technologies.

### Improving Project Design and Implementation

**The design and development of technological solutions should be tailored to client needs.** Off-the-shelf platforms often present issues in terms of adaptation to client needs and compatibility with existing information systems. To mitigate these risks, the MapaInversiones team crafted a methodology to identify prerequisites for the development of the platform. These diagnostics included an EA exercise carried out with government officials (especially with those in charge of public investment) in every country that participates in the initiative. This methodology is fundamental to identify, structure and operationalize the needs and requirements of the client in an orderly manner and transfer the highest quality standards to the determined solution. As a result, the platforms have responded to critical gaps both in countries' public investment management (allowing for the capture, processing, and visualization of quality information) and in their information systems (allowing for

improvements such as the capture of the physical progress of investment projects).

**There is no open data without quality data.** Access to data will do little to improve information management and transparency in public investment projects if the data are not high quality. Efforts to ensure data quality are therefore a fundamental prerequisite for the success of any information management or transparency intervention. In the case of the MapalInversiones initiative, a preliminary diagnosis of data quality is carried out at the start of the development phase. Based on this exercise, the team develops a targeted plan to implement in each country (using the Six-Sigma methodology), prior to the launch of the platform. In the cases of Costa Rica and Paraguay, this process has enabled them to increase the quality of the data (or reduce the half the number of errors per million data) in critical project variables in just six months both in Costa Rica and Paraguay.

**Engage with users.** Technological solutions must be designed to encourage active use by citizens and civil society. As such, governments must ensure that the information is disclosed in a format and context that is understandable and relevant for different classes of potential users by working with these groups. Critically, this collaboration should be attuned to the range of capacities and interests of different information users: civil society, the private sector, specialized journalists and academics, and the general public. In preparing the MapalInversiones platforms, the IDB convened a comprehensive usability exercise with different types of potential users of the platform to improve its design and usability. This exercise was carried out in Paraguay in 2017, and resulted in the formation of three focus groups with (i) specialized journalists, (ii) NGOs, and (iii) civil society, including

the private sector and four interviews with government and opposition policymakers specialized in public investment ([report here](#)). During the sessions, concerns of civil society and journalists surrounding the extent and quality of information as well as the robustness of mechanisms for citizen interaction were raised. These discussions led to recommendations to include more contextual information on the MI tool and public investment in the country, expand the options for user feedback, and better integrate the platform with social media, among others.

**Use citizen feedback strategically.** The impact of transparency initiatives can be multiplied by facilitating “citizen feedback.” This channel of communication from citizens to the government not only provides valuable information with which officials can improve the management of particular projects but also provides more general data on the preferences and priorities of different groups of citizens to inform future investment planning. In addition, governments can encourage feedback from specialized groups by targeting academics and civil society, especially in technical areas such as project appraisal and ex post evaluations. Soliciting and responding to citizen feedback—and publishing the response—is a powerful way for governments to build trust with the public.

PorMiBarrio, a mobile app, is a good example on why encouraging citizen feedback is crucial. This app allows residents of Montevideo to identify public infrastructure in need of repair and to monitor the government’s response to these concerns. These features have helped achieve a high rate of resolution of issues flagged by citizens. Likewise, the MapalInversiones platforms include a citizen participation module embedded in the profile of each project, allowing users to send feedback about specific projects to



project managers. The development of the platform for Argentina—currently underway—will enhance citizen feedback by linking users of the platform to specific locales, facilitating a more targeted government response. A future application in this direction would be allowing the platforms to conduct virtual, face-to-face audits between citizens and project managers.

**Measuring impact is crucial.** Despite considerable theoretical and empirical evidence, governments still may be hesitant to devote resources to develop technology-enabled transparency initiatives. Generating data on the impact of such interventions is crucial for consolidating support for them and justifying future investments in this area. Projects should therefore be designed to include robust impact evaluations. On this point, the implementation of MapalInversiones platforms has included an innovative strategy to measure impact, which will provide an important source of data on the effect of the platforms on key outcomes such as project completion and actual cost relative to projected costs. The method consists of randomly assigning a subgroup of projects or executing agencies to be included in the platform at an earlier stage (the treatment group) than the rest of the projects or agencies, which make up the control group. Due to the random nature of the assignment, any observed differences in project completion or cost between the control and treatment groups can be attributed to the causal effect of inclusion in the platform and the expectation of greater monitoring. Whenever random assignment cannot be applied, other methods can be used. For example, the impact evaluation for MapaRegalías featured a pre-test/post-test single group quasi-experimental design, comparing the projects before and after their inclusion in the platform. This revealed an 11 percent

increase in project completion rates in the seven months following the adoption of the platform, compared to prior implementation rates. Moreover, quantitative assessments will be complemented with qualitative and mixed-methods techniques, including surveys, focus groups, and in-depth interviews, among others.

## Managing Political Economy and Institutional Challenges

**Strengthen the link between public investment management and national development strategies.** The strategic choice of investment projects based on technical, high-quality ex ante evaluation, and their alignment with broader development objectives is key for leveraging public investment to drive growth. However, the reviews of LAC's PIMS discussed in this paper suggest that governments in the region often lack the capacity to carry out rigorous appraisals to inform budgetary allocations and project selection. As a result, this important first step in the public investment cycle is weak. There is ample opportunity to leverage transparency and information management strategies to improve this phase of public investment management. First, facilitating the availability and analysis of information on past project performance through new technologies can greatly enhance the capacity of the public sector to carry out project appraisal and make strategic decisions about future investments. In addition, greater transparency on the methodologies and criteria used in project appraisal can help encourage more active citizen participation—including from specialized groups—to improve these functions. Finally, citizen feedback on investment projects can provide valuable information on the priorities of different groups, helping guide the strategic allocation of public resources across different sectors.

**Promote coordination across levels and sectors of government.**

One unavoidable reality of public investment management is its complexity. Any project necessarily involves the intervention of a number of public sector agencies, from finance and planning ministries to auditing and oversight offices and front-line project implementors, often at the local level. As a result, no effort to improve efficiency and transparency can prosper without effective coordination. This point needs to be considered at the onset by identifying all the relevant public sector actors and ensuring buy-in for any new initiative. The importance of strong interinstitutional coordination among relevant public agencies is illustrated well in the case of Costa Rica. In designing and implementing the MapalInversiones platform, the IDB worked closely with four key ministries—the National Planning Ministry, the Ministry of the Presidency, the Ministry of Public Works and Transportation, and the Ministry of Finance. This was critical to establish common objectives regarding data quality standards, the definition of user categories, and citizen participation mechanisms.

**Be aware of the limitations and opportunities of the specific context.**

There is no one-size-fits-all intervention to improve public investment management. This is especially true for the application of cutting-edge

digital technologies, which often require a high level of technical competence among potential users. Initiatives to improve transparency and efficiency, therefore, must consider these limitations and constraints to ensure their effectiveness and avoid creating unrealistic expectations. Two examples from MapalInversiones illustrate this point. In Colombia, the implementation of MapaRegalías took place shortly after a Constitutional reform, which changed the rules for managing and distributing natural resource revenues among subnational governments. In this context, there was a consensus on the need for an integrated information system to monitor royalties, leading to strong motivation and support across various governmental institutions for the MapaRegalías platform. In the case of Paraguay, the launch of the MapalInversiones platform represented a dramatic step forward in the level of information available about public investments in the country. While this was clearly a welcome development, the unprecedented nature of the project also meant that potential users had less experience with such transparency tools and the information they contain. The site was modified accordingly to include supporting data and context surrounding public investment in the country to ensure the public investment information in the platform is understandable and relevant to users.

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