

# Digital Innovation in Public Financial Management (PFM):

Opportunities and implications for low-income countries

Main messages

July, 2018



BILL & MELINDA  
GATES foundation

αlphaβeta  
strategy x economics

# Technology opportunities in Public Financial Management

## THE OPPORTUNITIES



Aligning budgets with policy priorities



Allocating public spending more efficiently and deliver services more effectively



Improving tax compliance



Reducing corruption in public procurement



Enhancing institutional accountability

## THE REQUIREMENTS

### Pre-readiness



Traditional approach with no or only limited use of technology

### Basic readiness



Some basic use of technologies in PFM, but limited in scope

### Advanced readiness



Advanced and widespread adoption of relevant technology across relevant PFM functions

## THE LESSONS

1

Know your starting point

2

Be clear on the objectives

3

Adopt a phased rollout

4

Champion digitization in the public sector

5

Focus on shifting mindsets (and not just on skills)

6

Communicate, communicate, communicate!

# Digital Innovation in PFM: Opportunities and implications for low-income countries (main messages)

---

**Governments rely on sound Public Financial Management (PFM) systems to provide targeted services and improve the lives of citizens effectively.** This is even more relevant for governments in low-income countries whose ability to collect revenues and procure basic services is often hampered by widespread corruption, tax fraud and evasion, as well as poor accounting and reporting practices. There has been a global push to strengthen PFM institutions in low-income countries in recent years, including through multilateral agreements such as the Accra Agenda for Action (2008) and Busan Partnership for Effective Development Co-operation (2011).

**Much hope rests on the power of digital technology** to transform the way low-income country authorities raise and spend public money. While it is generally accepted that technology – from digital payment systems to geospatial data analytics – can strengthen the public financial management (PFM) in developing countries, most low-income governments are unaware of the full array of available digital tools in the market, and their potential benefits. So far, the focus has mostly been on the so-called integrated financial information management systems (IFMIS). Although IFMIS remains essential in automating core PFM functions, technological advances and digitization have made it possible for low-income countries to consider a range of other technologies that could radically improve the way low-income countries manage their public finances.

**This research report aims to narrow this knowledge gap.** It screens the existing technology landscape to identify the most powerful digital applications for PFM. Acknowledging that not every technology is equally suitable for every country due to various levels of “technological readiness”, the report also outlines the different requirements governments need to meet before they can digitally overhaul their current PFM systems. It concludes with a set of general lessons from global best practice that seek to guide low-income countries in their efforts of capturing the digital opportunity in PFM.

The report **identifies 60 technology applications with the potential to transform PFM systems** and help authorities in low-income countries overcome key challenges of managing expenses and revenues. These technological applications can be broadly categorized into five groups: 1) digitization of payments; 2) integrated IT hardware and software; 3) citizen and business engagement solutions; 4) identification and recording technologies; and 5) data analytical applications.

The research finds that these technology applications can only be adopted successfully if a country’s overall conditions are conducive for implementation. Regardless of the state of readiness, this report presents six generalizable lessons on how low-income countries can best harness available technologies to improve their PFM systems: 1) Know your starting point; 2) Be clear on the objectives; 3) Adopt a phased rollout; 4) Champion digitization in the public sector; 5) Focus on shifting mindsets (and not just on skills); and 6) Communicate, communicate, communicate!



## Low-income countries face five key PFM challenges

---

- **Aligning budgets with policy priorities.** The role of governments is to produce credible budgets that achieve policy objectives in relation to expected future economic conditions. A lack of robust and timely analysis of current and future economic conditions, and their potential impact on fiscal policy, can complicate government efforts to achieve these policy objectives. Fiscal rules or debt levels can also act as constraints.
- **Improving tax compliance.** Many low-income countries are struggling to deliver public services because poor tax compliance is eroding their tax base and available revenue. Recent OECD data show overall tax-to-GDP ratios in Cameroon (16.1 percent), Rwanda (16.1 percent), Senegal, (20.1 percent), Côte d'Ivoire (17.8 percent), and South Africa (27.8 percent) are significantly below the OECD average of 34.4 percent.<sup>1</sup>
- **Allocating public spending more efficiently and deliver services more effectively.** Delivering services to citizens is at the heart of what governments do, and the public trust in government depends on the quality of these services.
- **Reducing corruption in public procurement.** Public procurement is one of the government activities most vulnerable to corruption; inefficient procurement processes can lead to reduced market competition.
- **Ensuring institutional accountability.** Financial government reports are the core of internal and external audits, as these audits are compromised if the quality of financial reporting is poor. Broad access to financial reports is also necessary to energize public discussions on fiscal policy – an increasingly popular prescription to hold governments accountable for their spending decisions.

## A wide range of digital technologies could address these PFM challenges

---

This study has identified **60 technological applications** with potential to address the key PFM challenges in low-income countries (Exhibit 1). These technological applications can be broadly grouped as follows:

- **Digitization of payments.** These are technologies that relate to transforming cash-based or in-kind payments into digital transfers.
- **Integrated IT hardware and software.** These are technologies that help to integrate different PFM functions, such as budgeting, cash management, and reporting.
- **Citizen and business engagement solutions.** These are technologies that support better engagement with citizens and businesses.

---

<sup>1</sup> OECD, ATAF and AUC (2016), Revenue Statistics in Africa, OECD Publishing, Paris. Available at: <http://dx.doi.org/10.1787/9789264253308-en-fr>

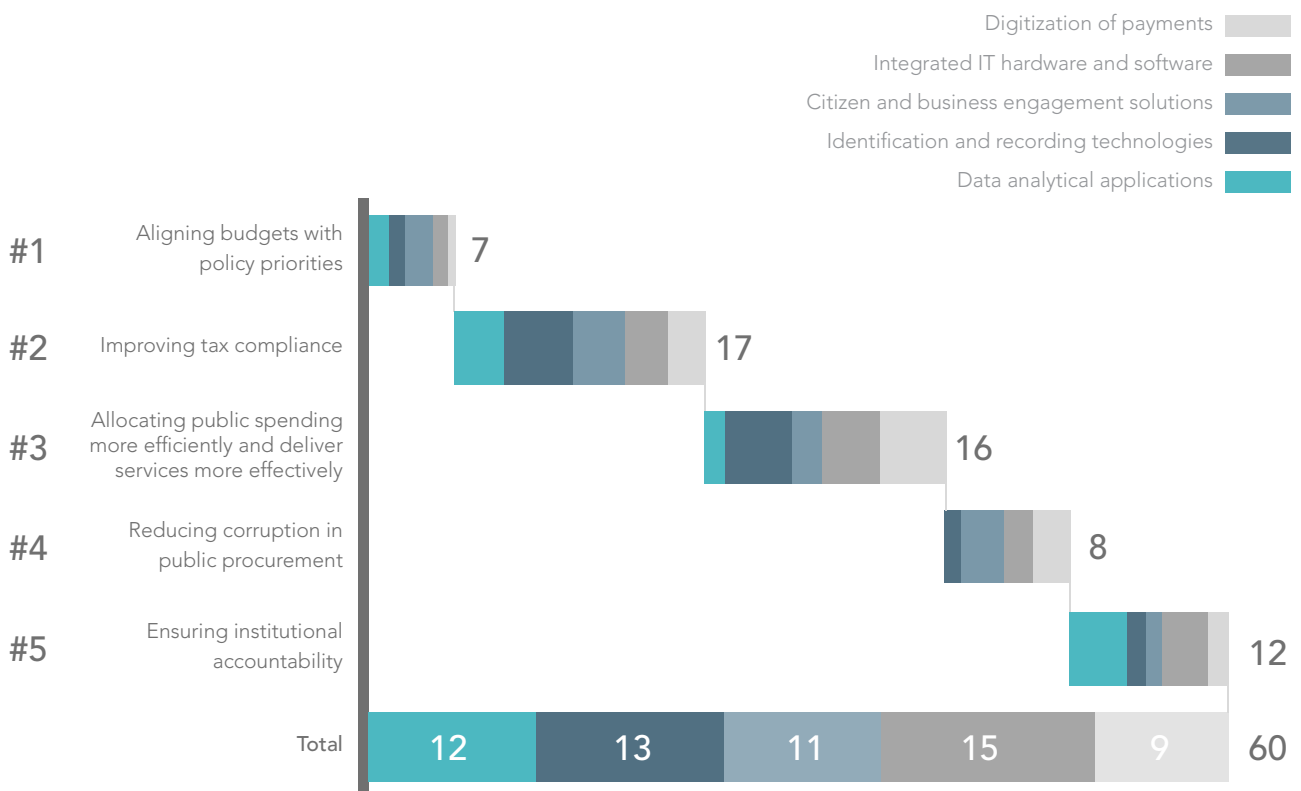
- **Identification and recording technologies.** These are technologies that enhance recording of transactions and identification of key beneficiaries or actors.
- **Data analytical applications.** These are technologies that support enhanced analytics of data related to PFM functions.

## Exhibit 1

# 60 technological applications across the 5 concern areas of PFM have been identified

Technology applications to each PFM concern area<sup>1</sup>

Technology “family”<sup>2</sup>



<sup>1</sup> This exhibit measures the number of technology applications (i.e. the linkage of a technology to a specific area of PFM), rather than the number of technologies. One technology can have multiple applications to different PFM concern areas (e.g., big data could be applicable to multiple PFM concerns). The full list of technology applications can be found in the Appendix.

<sup>2</sup> A Technology “Family” refers to technologies that share similar characteristics in terms of their application.

SOURCE: AlphaBeta analysis

# The potential of these technologies varies, but some have already demonstrated significant impact

Exhibit 2 illustrates how different technologies can help to alleviate some of the most pressing government concerns in PFM. The research focuses on five technologies that have so far received limited attention, but are expected to strongly improve the PFM in low-income countries.

1 **Geographic Information System (GIS)** is a computerized database that is designed to work with data referenced by spatial or geographical coordinates.<sup>2</sup> GIS can make a positive impact in the following PFM areas:

- **Optimize the collection of local property taxes.** Many municipal governments in India have begun to use GIS and geocoding in surveys to improve the mapping, identification, and traceability of properties. Results have been encouraging. For example, GIS mapping allowed authorities in the Indian city of Kanpur to increase the annual revenue from house taxes by more than three times compared to the previous collection system.<sup>3</sup>
- **Strengthen the collection of non-tax revenue such as fines and traffic tolls.** Authorities in Cartago, Costa Rica, switched to an automated system that integrates the city's GIS with a mobile application to issue parking and transit fines in real time. Details of parking infractions and fines are uploaded directly onto the GIS, limiting the likelihood of fraud, tax evasion and corruption. In one year, the number of appeals declined from 72 to 18, the productivity of inspection agents rose 45 percent, and revenue from traffic fines doubled.<sup>4</sup>
- **Enhance effectiveness of tax and audit staff.** The use of GIS in the US city of Westminster, Colorado, which relies heavily on sales taxes for revenue, allows auditors to verify 2000 times more source data (such as addresses on invoices) per hour to determine if taxes were paid correctly.<sup>5</sup>
- **Improve productivity of public spend and service delivery.** Authorities in Latvia successfully used GIS to improve the mapping of more than 300,000 land parcels and their subsidy needs, while Italy used GIS analysis to curb the subsidies paid to farmers who deliberately overdeclared their land holdings.<sup>6</sup> GIS can also be used for strategic budgeting. For example, health authorities commonly use GIS to evaluate the costs and benefits of building public hospitals at different locations.

2 **E-procurement system** is an integrated, centralized, and internet-enabled information system that automates and integrates all parts of the procurement. Such a system could lead to improvements in the

---

2 Star J and Estes J (1990). *Geographic Information Systems: An Introduction*. Englewood Cliffs: Prentice Hall.

3 Kumar R (2012). "GIS Simplifying Property Tax Collection in India." Available at: <https://www.geospatialworld.net/article/gis-simplifying-property-tax-collection-in-india/>

4 Uraia (2016). *The Impact of SMART Technologies in the Municipal Budget: Increased Revenues and Reduced Expenses for Better Services*. Uraia Nicosia Guidelines 2016.






5 Pens J (2009). *Geographic Information Systems: Pinpointing Lost Revenues*. Government Finance Review.

6 The difference between the area declared for subsidies and the actual landholdings declined from 9 percent to just 2 percent in a few years since GIS was introduced to clamp down on fraud. See: Longley P, et al. (2001). *Geographic Information Systems and Science*. John Wiley & Sons

## Exhibit 2

# Available technologies could transform PFM concern areas

The optimal application of technologies could lead to a range of positive impacts on PFM concern areas

PFM concerns	Demonstrated or potential benefits		EXAMPLES
 <p>Aligning budgets with policy priorities</p>	<p><b>3.5 months</b></p> <p>Time savings before fiscal stresses appear by <b>analyzing daily fiscal data</b> instead of quarterly fiscal data</p>	<p><b>Better capture citizens' needs</b></p> <p>Social media facilitated sharp increase in number of cities practicing participatory budgeting in the recent years</p>	<p><b>More efficient budget debates</b></p> <p>East Timor uses budget preparation modules to run simulations of spending scenarios in parliament</p>
 <p>Allocating public spending more efficiently and deliver services more effectively</p>	<p><b>Up to 3x</b></p> <p>Increase in annual property tax collection in Indian cities with Geographic Information Systems (GIS) mapping to <b>update fiscal cadastres and monitor tax evasion</b></p>	<p><b>12.5%</b></p> <p>Rise in Brazil's Federal Tax collection through use of <b>big data</b> to audit corporate tax declaration</p>	<p><b>4.2 million</b></p> <p>MSMEs previously undetected were brought into the formal economy by the tax authority in Mexico mandating <b>e-invoicing</b></p>
 <p>Improving tax compliance</p>	<p><b>US\$20 billion or 1% of GDP</b></p> <p>Estimated amount of savings if India digitizes all its G2P subsidy payments</p>	<p><b>US\$100 million per year</b></p> <p>Average cost savings to the Nigerian government over the last decade from Integrated Personnel &amp; Payroll Information System which removed 60,000 "ghost" workers</p>	<p><b>15%</b></p> <p>Lower administrative costs for the World Food Program in Kenya through using electronic cash payments to food insecure households rather than in-kind distribution</p>
 <p>Reducing corruption in public procurement</p>	<p><b>2.5x</b></p> <p>The increase in number of bidders per public tender in Albania due to its e-procurement system</p>	<p><b>Over 70%</b></p> <p>Share of business survey's respondents who stopped all personal contact with public officials after e-procurement system was introduced</p>	<p><b>~1 million</b></p> <p>Unique visitors to Brazil's federal transparency portal each year which has info on public spending, sanctioned contractors &amp; feedback channels</p>
 <p>Enhancing institutional accountability</p>	<p><b>&gt;1,000</b></p> <p>Types of statutory and management reports that can be generated in real time by IFMIS reporting module in Kenya</p>	<p><b>52<sup>1</sup> to 66<sup>2</sup></b></p> <p>Improvement in Mexico's Open Budget Survey score (out of 100) after enacting fiscal transparency portal in 2011. Marked improvement in overall transparency and accountability of budget processes</p>	<p><b>100 million</b></p> <p>Potential reduction in annual paper transactions in Dubai by moving paper-based recording systems to a public blockchain (i.e. distributed ledger)</p>

1 2012

2 2015

SOURCE: AlphaBeta analysis

following PFM areas:

- **Increase oversight, audit, and overall accountability.** The system in Albania increased transparency of tenders and reduced contact between stakeholders in the procurement stages and is widely credited for promoting integrity and uniformity in the country's public procurement processes.<sup>7</sup> Surveys in Indonesia found that its e-procurement system INAPROC helped to reduce fraud and corruption in public tender processes.<sup>8</sup>
- **Increase competition amongst suppliers.** Empirical research shows that more transparent public procurement processes increased the average number of bidders per tender in India from 3 to 4.5. Public officials also note the higher quality of services and products received as competition intensified.<sup>9</sup>
- **Cost savings from operational efficiencies.** Brazil's federal government saved 4 percent on its purchase of goods and service in the first year of implementation even though just 20 percent of total purchases went through Comprasnet. Savings were derived from reducing unnecessary documents and automating previously cumbersome procedures.

**3 Big data analytics for identifying tax fraud and evasion.** Big data analysis can be described as the analysis of large, often heterogenous and unrelated streams of information from multiple sources to derive meaningful and actionable insights. It has potential to reduce tax leakages:

- **Personal income tax.** India uses big data analytics to track "black money". Algorithms trawl through information from social media sites and the country's national biometric ID scheme to identify potential mismatches between a taxpayer's stated expenses and actual spending patterns. Results are fed back into the national socio-economic database where they contribute to a "taxpayer risk indicator".<sup>10</sup>
- **Corporate tax.** Brazilian tax authorities used data analytics to effect a 50 percent increase of close to R\$3 million per average value of individual audits undertaken (or size of suspected tax fraud), resulting in a 12.5 percent increase in federal tax collections.<sup>11</sup>
- **Value-added tax (VAT).** Austria uses internet monitoring and scraping tools to supplement their compliance measures which has led to extra VAT collection of EUR10 million annually, while Russia is using big data technologies to address a 12 percent VAT shortfall in 2015.<sup>12</sup>

**4 Digital government-to-person (G2P) payments.** A digital payment can be understood as a transfer of value from one payment account to another through a digital device and a digital communications channel; G2P payments include cash payments related to social programs as well as wages, pensions, and other payments. They can have the following positive impacts:

7 The European Bank for Reconstruction and Development (2010). Regional Assessment of Public Procurement Legal Frameworks. Available at <http://www.ebrd.com/pages/sector/legal/procurement/assessment.shtml>

8 Aditya W, Dekar U and Faishal A (2017). The Implementation of E-procurement System: Indonesia Evidence. Universitas Islam Indonesia.

9 Asian Development Bank (2013). E-Government Procurement Handbook.

10 Live Mint (2017), "Project Insight: Taxmen to snoop social networking sites to trace black money" Available at: <http://www.livemint.com/Politics/ae3dQ52YwHooYxQKZ7pVtJ/Project-Insight-Taxmen-to-snoop-social-networking-sites-to.html>

11 Ernst and Young (2016). Tax administration is going digital: Understanding the challenges and opportunities. Available at: [http://www.ey.com/Publication/vwLUAssets/EY-tax-administration-is-going-digital/\\$FILE/EY-tax-administration-is-going-digital.pdf](http://www.ey.com/Publication/vwLUAssets/EY-tax-administration-is-going-digital/$FILE/EY-tax-administration-is-going-digital.pdf)

12 OECD (2016). Technologies for better tax administration: A practical guide for revenue bodies. Available at: <http://www.oecd.org/publications/technologies-for-better-tax-administration-9789264256439-en.htm>



- **Allocative efficiencies through better targeting.** In Brazil, “Bolsa Familia” digitized and consolidated various cash-transfer programs and managed to deliver 80 percent of benefits to the poorest quartile of the population, versus the previous share of 64 percent.<sup>13</sup>
- **Increased transparency & accountability.** In India, switching the payment of social security pensions from manual cash pay-out to smart cards resulted in a 47 percent reduction in the incidence of bribe rates, and a reduction of ghost recipients of 11 percent.<sup>14</sup>
- **Better service delivery.** Recipients of mobile transfers in Niger saved 16 hours of travel and waiting time compared to people being paid in cash.<sup>15</sup>
- **Accelerated financial inclusion.** M-Pesa in Kenya lifted 2 percent of the country’s household out of poverty.<sup>16</sup> It leveraged powerful network effects to dramatically grow the adoption rate of its mobile wallet offerings at much quicker rate than traditional financial services accounts which grow at roughly the pace of national income.

**5 Blockchain for enhancing institutional accountability.** An emerging technology, blockchain is a digital distributed ledger – a continuously growing list of records linked and secured using cryptography. Blockchain promises improvements in the following PFM areas:

- **Enhanced transparency and oversight.** Georgia is using blockchain to secure government records. For example, the National Agency of Public Registry recently moved its land registry onto the blockchain.
- **Improved operational efficiencies.** Dubai plans to move all government transactions onto a blockchain by 2021. It has the potential to eliminate almost 100 million paper transactions and save 25 million work hours required per year to manage these paper documents.<sup>17</sup>
- **Better service delivery.** The UK’s Department for Work and Pension started a trial where claimants use a mobile app to manage their benefit payments. Their spending patterns are tracked on a blockchain so that relevant financial management advice could be given.<sup>18</sup>

13 Lindert K, Linder A, Hobbs J, and Briere B (2007). “The Nuts and Bolts of Brazil’s Bolsa Familia Program: Implementing Conditional Cash Transfers in a Decentralized Context.” SP Discussion Paper 0709, World Bank, Washington, DC

14 Cangiano P, Muralidharan K, Niehaus P, Sukhtankar S (2014). “Payments Infrastructure and the Performance of Public Programs: Evidence from Biometric Smartcards in India”. NBER working paper 19999. Available at: <http://www.nber.org/papers/w19999.pdf>

15 Based upon an average daily agricultural wage, this amount of savings would be enough to feed a family of five for five days. Source: J. Aker, R. Boumnijel, A. McClelland, and N. Tierney (2013). “How Do Electronic Transfers Compare? Evidence from a Mobile Money Cash Transfer Experiment in Niger.” Tufts University Working Paper. Available at: <http://docplayer.net/53281481-How-do-electronic-transfers-compare-evidence-from-a-mobile-money-cash-transfer-experiment-in-niger.html>

16 Vox (2016). “Cellphones have lifted hundreds of thousands of Kenyans out of poverty”. Available at: <https://www.vox.com/world/2016/12/8/13875908/kenya-mobile-money-mpe-sa-poverty>

17 Smart Dubai (2016). “Dubai Blockchain Strategy”. Available at: [http://www.smartdubai.ae/dubai\\_blockchain.php](http://www.smartdubai.ae/dubai_blockchain.php)

18 Computer Weekly (2016). “DWP trials blockchain technology for benefit payments”. Available at: <http://www.computerweekly.com/news/450300034/DWP-trials-blockchain-technology-for-benefit-payments>

# A country's state of readiness dictates the degree to which it is able to capture the technology opportunities

Low-income countries need to be mindful of their existing IT infrastructure and institutional structures when trying to improve their public financial management with the help of technology. The specific situation in each country limits the speed at which governments can transform their PFM systems and deliver better public services.

This report proposes a “readiness framework” to help governments in low-income countries understand which PFM technologies may be most appropriate for their specific context. It outlines policy priorities depending on a country's level of technological readiness: pre-readiness, basic readiness, and advanced readiness. A country should fulfil all the priorities in its state of readiness before transitioning to the next state. Generally, the higher the technological readiness of a country, the larger its scope to implement sophisticated PFM technology across the public sector and achieve maximum impact.

**Countries at the pre-readiness state** lack many of the key enabling conditions to use available PFM technologies effectively. These countries may need to focus on small “pilot programs” or stick with more traditional approaches first, while putting in place a set of basic reforms to enable the more widespread use of PFM technology. For example, before setting up electronic procurement systems, some countries could immediately benefit from very basic actions such as allowing more time between the tender issuance and the award of the contract. In the meantime, they could post tender requests and results in traditional media to improve transparency. **Countries with basic readiness state** have conditions in place that enable them to use PFM technology, albeit still in a limited way. These countries can introduce PFM technology for specific government functions, where conditions allow a smooth implementation. **Countries at the advanced readiness state** are well positioned to widely adopt PFM technology, potentially across the entire public sector.

While a country's readiness level and roadmap to fully harness the potential of implementing PFM technologies will differ depending on the specific technology in question, some broad guidelines exist to facilitate the overall technological adoption, as summarized in Exhibit 3.

A key question is whether it is possible for countries to jump straight from a pre-readiness level to a level of advanced readiness (“leapfrogging”). A case study analysis of five standout technologies (Geographic Information Systems to increase property tax revenues; e-procurement; big data analytics to identify tax fraud and evasion; digital government-to-person payments; and blockchain to enhance auditing) shows that “leapfrogging” within a technology is typically unfeasible for most low-income countries. They have to make gradual improvements to move from one state of readiness to the next.

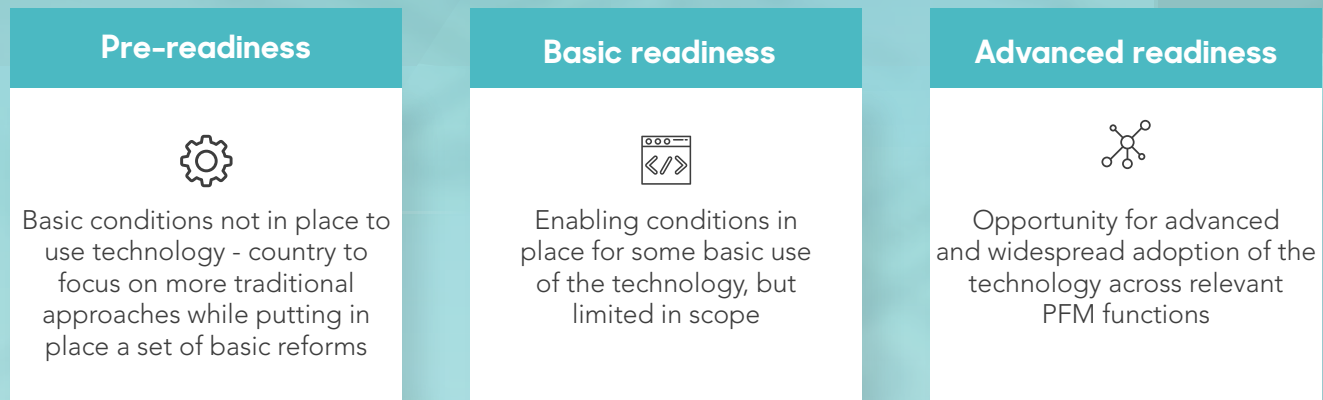
That said, many low-income countries may be in a position to implement many of these technologies and reap their benefits faster than higher-income countries. This comparative advantage exists because low-income countries, unlike their developed peers, are not constrained by legacy systems. Instead of having to change outdated structures, low-income countries can typically start “from scratch”. For example, once the required infrastructure is in place, many low-income countries can digitize paper-based records relatively fast, as their record base tends to be smaller and less complex. Similarly, M-Pesa in Kenya relied on powerful network effects when introducing its digital services to deepen financial inclusion, which citizens soon adopted at a much quicker rate than traditional financial services accounts.<sup>19</sup>

---

19 The New Dawn (2016). “The Promise of Digital Finance”. Available at: <http://www.thenewdawnliberia.com/commentary/6095-the-promise-of-digital-finance>

## Exhibit 3

# There are three states of readiness for countries to utilize PFM-related technologies



### Typical requirements

- Clear and comprehensive legislation (e.g. processes, responsibilities, penalties)
- Appropriate mandate for relevant government department
- Basic accounting and financial reporting skills
- Basic ICT infrastructure
- Sufficient funding to achieve pre-defined objectives
- Technical skills in Ministry of Finance and budget office
- Data-driven culture
- Political support at highest level
- Interoperability between government data systems
- High degree of digital devices
- Comprehensive measures to support data security

SOURCE: AlphaBeta analysis

### Requirements for technological impact at the pre-readiness state:

- **Clear and comprehensive legislation.** Clear and comprehensive legislation is the foundation for low-income countries seeking to enhance the efficiency of their PFM systems. For example, tax evasion is often enabled by three legislative shortcomings: complex and ambiguous tax codes, inefficient filing and payment processes, and insufficient or improperly imposed penalties.
- **Clear mandates for implementing agencies.** The efficiency of the tax collection in many low-income countries is hampered by divisions and blurred responsibilities across government departments. The most efficient tax systems typically operate with a so-called hub-and-spoke system, where a central revenue body is responsible for setting standards and processes, and regional tax offices are then tasked to ensure a smooth execution.
- **Basic financial reporting and accounting skills:** Technologies cannot compensate for the lack of basic financial reporting and accounting skills in many low-income countries, which has contributed significantly to many of the negative PFM outcomes such as delayed or inaccurate budgets and spending reports.

Efforts must be taken to strengthen these capabilities so that the potential of technology can be fully realized.

### **Requirements for technological impact at the basic readiness state:**

- **Basic ICT infrastructure.** Without basic and functioning ICT infrastructure, such as computers and internet access, it is impossible for countries to capture the benefits of PFM-related digital technology.
- **Sufficient funding.** Insufficient funding is a major barrier to technological progress in low-income countries. Governments need to invest in hardware, software and training. They also need funds to improve basic ICT infrastructure, including power supply, data centers, and network connectivity to successfully implement PFM technology. Often, the cost of setting up such infrastructure and of outweighs the immediate benefit from using the new technology. Data collection and maintenance can also be costly in developing cities where spatial data is typically scarce. On a positive note, the relentless pace of technological advances and digitization has also made available attractive options. For example, the abundance of open-source software and peer-to-peer learning platforms is likely to reduce implementation costs considerably for many low-income countries.
- **Access to computing and technical skills.** Governments frequently face a shortage of skilled personnel to implement and manage the latest digital technologies. Stiff competition from the private sector for the limited talent pool adds to the challenge. While international development agencies fund education in low-income countries, training programs could come to a standstill once funding arrangements end.
- **Data-driven culture.** A mindset shift may be required to pave the ground for technological change. Such a shift could mean that government officials need to focus more strongly on data-driven decision-making.

### **Requirements for impact at the advanced readiness state:**

- **Political support at the highest level.** Senior government sponsorship and coordination is crucial for the widespread adoption of many of these technologies. Large-scale technological reforms typically encounter strong resistance and high-level political support can help to appease stakeholders.
- **Interoperability of data systems.** To facilitate the widespread adoption and effectiveness of technologies, governments need to have interoperable data systems. This means using the same file format and other standards between government agencies to ensure a smooth data transfer.
- **High penetration of digital devices.** To improve the data collection and output of PFM technologies, governments need to foster the growth of the digital economy. This includes a high penetration rate of digital devices such as smartphones, laptops, tablets, among others, which are required to generate the sheer data volume for meaningful big data analytics.
- **Comprehensive measures to support data security.** Governments must create mechanisms to address privacy concerns and ensure sensitive data can be transmitted securely. Government records must also be protected from unauthorized access.



# Global lessons on harnessing technological opportunities to improve PFM

---

Regardless of current readiness levels, a look at global efforts to improve PFM systems with available technology holds valuable lessons for low-income countries:

1. **Know your starting point.** Technology adoption must always take into account a country's specific context, its needs and readiness to implement different types of PFM technology. This means not all countries will be able to adopt every available PFM technology. There are scenarios, including for technologies not covered in these case studies, where countries will not meet the minimum conditions required to adopt a more advanced technology. They should instead choose more practical options, including pushing for basic reforms first. Before implementing a technology, public sector officials should develop a good understanding of the benefits and costs of technologies with varying degrees of sophistication, and the overall enabling conditions required to reach different levels of technological adoption. Subsequently, countries need to have an honest assessment of their own capabilities and have realistic expectations of what technology can achieve.
2. **Be clear on the objectives.** Having a clear and realistic understanding of what the implementation of a specific technology should achieve, can significantly lower costs and produce the greatest impact in the shortest period of time. For example, it is important to distinguish essential from non-essential data when adopting GIS for tax purposes, particularly because data creation and collection costs can be prohibitive in low-income countries where geospatial data is not as developed and readily available. Another example is in India and Indonesia, where tax authorities used data analytics to target the "big fish" – the largest taxpayers and institutions expected to yield the highest tax penalties.
3. **Adopt a phased rollout.** Research shows it is generally unfeasible for countries to skip stages of technological development, meaning any implementation needs to occur gradually. Starting to roll out a novel technology in areas where stakeholders are open-minded and enabling conditions are most favorable, can help governments reduce costs, allow time for feedback, and troubleshoot kinks in the system early. It can also help to reduce expectations and, by setting a positive example of change, lower resistance on a broader level. Low-income countries should resist the temptation and political pressure to quickly expand the scope and reach of successful pilot projects, as the service quality may suddenly drop if the right conditions are not in place yet. For example, in an effort to smooth the shift to e-procurement, Turkish authorities created a transition period of almost seven months before launching a pilot tender. In this period, contracting agencies and suppliers could register on the electronic platform and learn how to use it.
4. **Champion digitization in the public sector.** Technological reforms in PFM often encounter strong opposition from influential groups who are deeply vested in the status quo. They can also be slow to implement due to inertia among government officials. Case studies presented in this report show that large parts of an economy need to be digitized before many technologies can be used in an advanced way. This suggests that PFM technology and reform programs will often have to be part of a national drive towards digital inclusion. Global best practice shows that high-level political support can be crucial to achieve

results. A success story is Mexico, which was able to harness the synergies between digitization and PFM after announcing a sweeping National Digital Strategy. The strategy provided the necessary foundation for complex coordination across government agencies.

5. **Focus on shifting mindsets (and not just on skills).** While building skills to support implementation is important, it is also important to focus on creating a digital mindset among government employees. Transforming into a data-driven culture requires a fundamental change in mindset for managers and staff. Government leaders can help by rewarding the development of statistical and computing skills. One expert revealed that South Africa is a leader in incentivizing a data-driven approach, linking performance rewards to the use of data in decision-making.
6. **Communicate, communicate, communicate!** Constant communication with users is an important element of change management, particularly when a large behavioral change is required. Offering opportunities for stakeholders to provide feedback can play a key role to increase trust and lower resistance towards technological change. For example, in Kenya, a hotline was established for recipients that were part of the program for digitizing food assistance payments, where they could ask questions, express concerns, and report grievances without fear of reprisal.

Overall, the report sheds new light on the exciting possibility of using digital technology to improve PFM in low-income countries. Still, many open questions remain and could be the topic of future research. These open questions include the plausibility of open-source and flexible systems to avoid technology lock-ins, and the pros and cons of centralized (by a central fiscal unit like the Ministry of Finance) versus decentralized implementations (local tax offices).





**αphabeta**  
strategy x economics

[www.alphabeta.com](http://www.alphabeta.com)

**Singapore**

1 Upper Circular Road, #04-01, Singapore, 058400

**Sydney**

Level 7, 4 Martin Place, Sydney NSW 2000