

Integrated Financial Management Information Systems in Latin America: Strategic Aspects and Challenges

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INTRODUCTION

Integrated financial management information systems (IFMIS) are systems to support management of public sector budgetary, financial, and accounting operations and promote better public financial management (PFM) with a centralized registry of public sector revenues and expenditures. The IFMIS integrate budgetary, accounting, treasury, and public debt management processes, as well as generate corresponding reporting documents, mainly the financial statements.

The successful implementation of an IFMIS will produce timely, relevant, and reliable financial data to promote fiscal discipline, assist with resource allocation, and improve operational efficiency and fiscal transparency. IFMIS, therefore, constitute a powerful tool to enhance the PFM of countries, although they tend to be very complex and demand significant human and financial resources.

Every country in Latin America has an IFMIS; it is the region where these systems are more prevalent today. In 2011, 45 percent of World Bank projects in Latin America involved a high proportion of information and communications technology (ICT) for financial management purposes; that is, 25 out of 55 projects (Dener, Watkins, and Dorotinsky, 2011). Furthermore, from approximately the mid-1990s onwards, the Inter-American Development Bank (IDB) has supported 15 investment projects at a national level in an effort to strengthen PFM in the countries (IDB, 2010)—a great majority of which include developing an IFMIS.

Following two decades of operation, several countries have engaged in updating their IFMIS, specifically Argentina, Brazil, Chile, the Dominican Republic, Honduras, Nicaragua, Panama, Peru, and Uruguay. Despite institutional differences and varying levels of systems development, there are a number of strategic aspects that should be considered to improve the success of the design and implementation of IFMIS so as to ensure its benefits from the outset. The most significant considerations are the political economy, information technology programming strategy (i.e., in-house, outsourcing, or customized software), software guarantees, and acceptance testing, as well as actual implementation and systems maintenance.

The two key objectives of this chapter in its conveyance of knowledge for an optimum IFMIS are (i) to analyze the main characteristics and establish the state of their development in Latin America, including the upgrade progress of IFMIS that is currently being carried out; and (ii) to identify key aspects that should be taken into account when implementing a new IFMIS including features such as project management, function integration, technological and functional definitions, and process prioritization during the various stages of development.

The chapter is divided into four sections, the first of which is an introduction on the theory of PFM and IFMIS. The second is a description of current characteristics of IFMIS in Latin America and the third includes the key aspects to consider during the updating and strengthening of IFMIS in the region, including the political economy of an IFMIS project; conceptual model; management and administration of the project; information technology programming strategy; improvement of budgeting, accounting, and financial management efficiency; level of integration of these functions; establishment of a treasury single account (TSA) as a module; project development prioritization; importance of the testing stage; guarantee period and systems maintenance strategy; and change management. The fourth section presents the main conclusions and the challenges to implement the IFMIS in the region.

PUBLIC FINANCIAL MANAGEMENT AND INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEMS

IFMIS as Instruments of Public Financial Management

PFM is a broad and complex concept that has a variety of dimensions that take into account the political economy of public institutions and the diverse

fields and disciplines within government (e.g., legal aspects and management systems, organizational theory, computer science, and human resource management) (Allen, Hemming, and Potter, 2013).

The concept of PFM, therefore, is a general term that includes a combination of administrative elements, tools, and management systems that generate information, according to certain processes and rules, to support fiscal policy decision making (Cangiano, Curristine, and Lazare, 2013). PFM is also a set of directly and indirectly related processes and instruments that support macroeconomic estimates and projections to collect and allocate resources and report financial outcomes (Schick, 2013). This group of processes and instruments incorporates some practices such as fiscal rules and fiscal councils, the medium-term fiscal framework, a results-based budget (RBB), and IFMIS.

The main objectives of PFM are prioritized to ensure fiscal solvency, appropriate allocation of resources, and efficient public delivery of goods and services (Schick, 1998). To achieve them, PFM procedures and systems must operate efficiently and integrally within an institutional framework that incorporates appropriate and steadfast rules, structures, processes, and capacities.

The potential of IFMIS to contribute to a better PFM is strong. By generating timely and accurate information, it can streamline processes carried out by the public sector, according to financial management procedures. One of the key objectives of IFMIS is to produce financial data that is relevant to decision making. Information, therefore, should be timely, relevant, and reliable to support adequate fiscal policy decision making and contribute to sustainable development of initiatives that will improve public management. A financial and accounting information system that operates efficiently enhances the government's capacity to allocate and use public resources effectively and efficiently (Dorotinsky and Watkins, 2013).

IFMIS is essential to provide fiscal transparency (i.e., clarity, reliability, frequency, punctuality, relevance, and openness) by gathering data to enable the publication of past, present, and future public finance positions (IMF, 2012).¹ These elements are critical to the effectiveness of fiscal policy.

¹ Clarity refers to the ease with which users can understand reports; reliability reflects the extent to which reports reflect the government's real financial situation; frequency is the regularity of report issuance; punctuality refers to the time span between production and disclosing reports; relevance relates to the extent to which reports provide the necessary information for effective decision making; and openness is the ease with which civil society can grasp fiscal policy decisions that affect them and be able to hold government to account.

IFMIS is also essential for public management reform in its entirety due to the capacity it has to integrate the diverse administrative functions of the public sector and to link PFM to the management of human resources, assets, and the procurement of public goods and services, among others. In effect, the evolution of IFMIS in Latin America has seen many changes in public administration that changed the focus from a legal and formal approach to a more managerial one. IFMIS, therefore, has the capacity to support decision making beyond matters of finance by contributing to the modernization of public administration so that the governments can deliver public services more efficiently (Fariás and Pimenta, 2012).

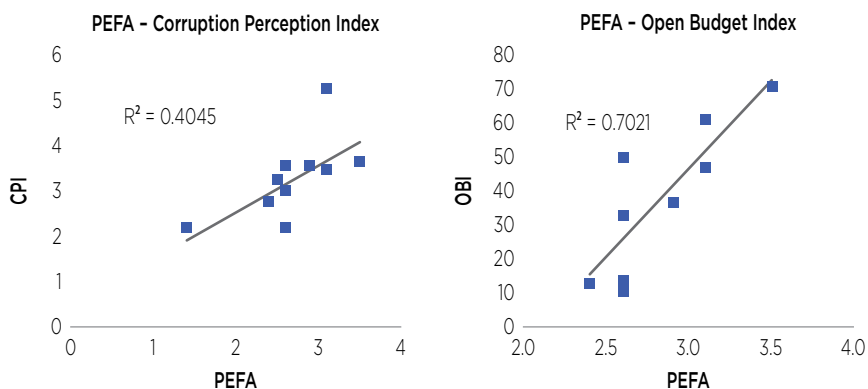
A growing number of empirical studies have highlighted the positive relationship between PFM and fiscal transparency, fiscal outcomes, and the perception of fiscal solvency (IMF, 2012). While significant steps were made during the 1990s to improve fiscal data transparency, the 2008 financial crisis showed that advanced economies also had weaknesses in the scope of information relating to their fiscal situations prospects and the associated risks. Furthermore, a direct relationship exists between the higher evaluation scores of Public Expenditure and Financial Accountability (PEFA) indicators,² the Corruption Perception Index (CPI), and the Open Budget Index (OBI) (Figure 7.1).

Good PFM will significantly increase fiscal credibility and economic development—perhaps not exclusively, but certainly as a contributing factor (De Renzio, Andrews, and Mills, 2011). Over the last decade, according to Dener and Min (2013), IFMIS have become critical in improving budget transparency. Disclosing public financial information to citizens improves fiscal transparency, as long as the published information is accurate, relevant, and accessible. In parallel, the authors indicate that fiscal transparency can enhance the trust that citizens can have in government if information is published consistently and transparently over a long period of time. The authors also state that major challenges still exist in the design of IFMIS to strengthen their capacity to capture the entire sphere of financial activities, as well as disseminate data transparently.

Generating in-year fiscal data will significantly increase transparency of budget information. It is up to government to develop the necessary systems and increase the institutional capacity essential to monitor aggregate expenditures and reconcile with revenue trends (IBP, 2010).

² For more details about this instrument, see www.pefa.org.

FIGURE 7.1 RELATIONSHIP BETWEEN PUBLIC EXPENDITURE AND FINANCIAL ACCOUNTABILITY INDICATORS AND THE CORRUPTION PERCEPTION AND OPEN BUDGET INDICES



Source: Authors' elaboration.

Note: The Corruption Perception Index classifies countries and territories according to the perceptions of the degree of corruption that exists in their public sector. A country or territory's score indicates the perceived level of corruption in the public sector on a scale of 0 (very corrupt) to 100 (very clean). The Open Budget Index is calculated on the basis of a simple average of the responses to the 95 questions contained in its survey, which relate to budgetary transparency and gives each country a score that range from 0 (very little or no information) to 100 (very detailed information).

Despite the benefits that IFMIS have, PFM on its own should be viewed as an open system that is vulnerable to influence, especially those influences that are political and economic in nature which, in turn, can impact on policy-making objectives. While it is possible to analyze individually the various mechanisms that form a part of PFM, its effectiveness will depend significantly on the institutional framework of each; that is, PFM is dependent on the formal and informal procedures of the framework within which various stakeholders will take a stand (North, 1992).

Main Characteristics of IFMIS

IFMIS are computerized systems that automate the financial procedures to register information on the collection of public revenue and commit them to public sector objectives (Fariás and Pimenta, 2012). Although there is a range of definitions for IFMIS in the literature, they generally share the concept that it is a complex computer information system containing financial and accounting mechanisms that relate to the public sector, and that it

comprises a combination of subsystems and processes that are governed by general procedures and guidelines based on a PFM regulatory framework.³

The main objective of IFMIS is to provide the public sector with the necessary information to plan, execute, and monitor public finance. This includes the execution of the budget, consistent and systematic accounting recording, and assisting the Treasury to meet its commitments and manage its payments and debts, while simultaneously ensuring the quality of financial statements.

It is essential, therefore, that IFMIS contain a separate information system for each level of government to its greatest extent possible, in parallel with TSA coverage,⁴ which is reviewed in Chapter 4. The IFMIS should also include the central and decentralized administrations and social security entities to be able to register, at every stage of the budget execution, the revenues, payments, expenditures, pre-commitments, commitments, and accruals of finance and accounting in a timely manner. For this to effectively occur, the budget classification should be entirely consistent with the chart of accounts, in accordance with international standards (e.g., *Manual on Government Finance Statistics*, published by the International Monetary Fund (IMF) and the United Nation's *Functional Classification of Expenditure*).

An IFMIS is a set of sub-systems (modules) that interrelate with each other and which adopt a comprehensive approach to financial management; that is, a set of tools to achieve effective, efficient, and transparent public resource management within a framework for fiscal solvency. From this perspective, an IFMIS should not be viewed as an end in itself, but rather as an instrument that gathers information to support fiscal policy while improving public policy design through efficient resource allocation. As such, under PFM, it will improve the management of public expenditures and strengthen transparency and accountability, as well as macro- and microfiscal policies (Figure 7.2).

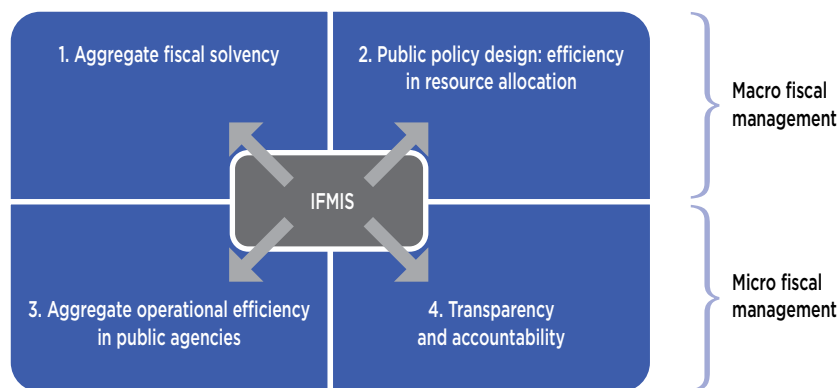
Based on the literature, an IFMIS has three significant operational advantages in terms of budget management:

- Timely, reliable, and secure capture and process of government financial transactions through automated information management

³ These shared concepts are found in Dorotinsky and Watkins (2013), Dener and Min (2013), Uña (2012), Farías and Pimenta (2012), Dener, Watkins, and Dorotinsky (2011), Khan and Pessoa (2010), and Makon (2000).

⁴ The principal TSA concepts used in this chapter are based on Pattanayak and Fainboim (2011).

FIGURE 7.2 RELATIONSHIP BETWEEN MACROFISCAL AND MICROFISCAL POLICY MANAGEMENT AND AN INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEM



Source: Arenas de Mesa and Uña (2012).

systems in compliance with financial and accounting regulations and with a high level of data security and traceability.

- Enhancement of fiscal policy management, based on timely information of the financial position at any given moment—only possible with an accurate and consistently updated database that has wide coverage of the public sector.
- Capture and supply of financial, nonfinancial, and performance data that contribute to efficient and effective public management.

From an ICT perspective, IFMIS are huge systems, each with a large number of users. These users can exceed 4,000 and reach—as in the case of Brazil—almost 100,000. This includes broad geographic and institutional coverage and can include support to regional government agencies, as well as municipalities.

INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEMS IN LATIN AMERICA

Origin, Evolution, Opportunities, and Challenges

Since the mid-1980s, the existence of IFMIS in Latin America has increased; originally, it was a set of tools to address the recurring financial crises of the

region (Uña, 2011). These systems operate at the level of central government and, in some countries, include the regional and municipal levels. They are generally developed for fiscal management under the guidance of the Ministry of Finance.

More specifically, Brazil was the first country in the region, in 1986, to implement an IFMIS (Sistema Integrado de Administração Financeira (SIAFI)) and later, in 1989, Bolivia implemented its Integrated Management System and Administrative Modernization (Sistema Integrado de Gestión y Modernización Administrativa (SIGMA)). In the 1990s, the use of IFMIS expanded into Argentina, Paraguay, and Uruguay and, from 2000 onwards, was put in place in Chile, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, and Nicaragua, as well as in the Caribbean. Aside from their relevance in addressing fiscal crises, the replication of IFMIS was initially driven by various other factors, as a result of advanced concepts of fiscal management and the progress of ICT. To date, IFMIS can be counted among nearly all Latin American and Caribbean (LAC) countries (Farías and Pimenta, 2012).

In terms of technology, a majority of IFMIS systems in the region constitute ICT programming to fit each country needs, including various versions and upgrades of system software. The last ten years have seen an increase in web-based systems as a result of the widespread use of the Internet. The developments of the 1980s and 1990s, in general, were based on a client-server architecture (multilayered), sometimes as monolithic mainframe systems. As of 2000, web-based systems have comprised various multilayered structures.

During the 1980s and 1990s, IFMIS were often developed in-house. This option was as a consequence of rigid and lengthy national procurement and contracting processes that discouraged systems development outsourcing and/or procurement of commercial off-the-shelf systems. Procurement, in some instances, required presidential approval, was cumbersome, and involved the review and agreement of multiple units (i.e., finance, procurement, information technology (IT), and planning), thus creating a delay in IFMIS project completion.

As a result, treasury authorities used to opt for an ad hoc contracting of human resources to speed up the implementation. At the time, furthermore, there was a dearth in the range of commercial systems that could be easily adapted to the public sector, as well as a risk of the Ministry of Finance depending on a specific commercial system, considering that an IFMIS is very strategic to the ministry.

Finally, the persistent financial restrictions in the region gave no further option but to follow this alternative. Procurement, involving several millions

of U.S. dollars at terms exceeding one year execution was not always feasible, given the lack of resources. Instead, an in-house working group would be assigned to IFMIS development, providing authorities the flexibility to manage resource allocations, although the capacity to deliver information on time proved to be very uncertain.

The situation has improved since then. Procurement and contracting procedures are now streamlined and the fiscal situation is better. In many instances, however, the preference for tailor-made systems persists in some countries due to an institutional inertia of ICT units, added to the convenience of changing processes developed in-house at any time.

This inertia often results in the lack of project team continuity at the completion stage due to salary differentials between the consultants and staff in other ministry units, as well as weak ICT capacity. It also is associated with the lack of knowledge and resources to manage more complex projects.

Despite the general availability of IFMIS in the region, not all are designed to fulfill the objectives of producing timely, relevant, and reliable data for fiscal transparency and accountability within a framework for fiscal solvency. In some cases, failure to produce budget information on time has weakened public expenditure management decision making. In others, financial statements (i) may have lacked comprehensive and reliable information on financial and equity positions, thus increasing fiscal risks; (ii) may not have totally complied with international accounting standards, based on the IMF's *Manual on Government Finance Statistics*; and (iii) may not have been published at the frequency required.

A further key aspect relates to the scope of institutional coverage of an IFMIS. Many countries in Latin America have an IFMIS that excludes decentralized entities, universities, and the national social security system. In general, IFMIS should have the same coverage as the TSA which, as Chapter 4 indicates, is not yet fully comprehensive in many countries.

In most of the region, the IFMIS captures and records data at all stages of budget execution, including the accounting records from the stage of budgeting to those of pre-commitment, commitment, liquidation, and payment, with the latter two captured at the accounting level as well. Some countries, however, do not record these stages at the time each one occurs; rather, they record all stages at the moment of payment, whereby the budget is managed on a cash basis, as in the Dominican Republic. Similarly, various countries do not have a budget classifier that is entirely consistent with the chart of accounts, which hampers the generation of automated financial statements, as in Honduras.

The deficiencies in IFMIS implementation and operation result in lost opportunities to strengthen fiscal transparency and accountability for effective fiscal policy coordination and fiscal risk management. According to the IMF (2012), fiscal transparency ensures that the economic decisions of government are based on the precise fiscal position, sound policy making, and adequate financial risk analysis. Moreover, fiscal transparency informs the legislature, markets, and civil society, holding a government accountable for its fiscal performance and use of public resources. Lastly, it facilitates the monitoring of financial performance, while simultaneously mitigating contagion of fiscal instability from country to country. Greater transparency, therefore, has many benefits and can be achieved and strengthened with an IFMIS in place.

IFMIS Currently in Operation

The predominant IFMIS model in Latin America covers four key areas: budget, treasury, accounting, and public debt management. IFMIS also interact with other public resource management systems, such as public investment, human resources and payroll, procurement and contracting, tax administration, and asset management.

This particular model consists of a single central database system with broad coverage, which is centrally administered under the centralized guidance of the Ministry of Finance, but with decentralized operations between public entities and their spending units.

The use of public financial systems in many developed countries is less standardized or centralized compared to Latin America, with the exception of some, including South Korea and France. Other countries, such as Germany, the United Kingdom, and the United States have not adopted a single public finance system that takes into account the entire public sector (Farías and Pimenta, 2012).

Latin America's most common IFMIS model generally comprises two main modules: one that supports the budget formulation phase and the other the budget execution and evaluation phases. The operating logic of the two modules differs completely. In the case of the budget formulation module, the ministry of finance is supported by the module to calculate projections. Projections are then calculated in the sector-based entities—based on ceilings that have been established by the Ministry of Finance, the latter of which ultimately consolidates and adjusts the sector projections. Estimates of physical variables are also included, as in Argentina, as are the drafting of annual operational plans and/or annual investment plans, as in El Salvador and Honduras. There is a trend to incorporate those functionalities into the budget formulation module

to support Medium-Term Expenditure Framework initiatives, such as in Peru—a move that has been spreading throughout the region, especially in Central American countries such as El Salvador, Guatemala, and Honduras.

A further growing incentive in the region is to increase the definition and use of performance data within the framework of RBB initiatives. In particular, Peru includes functionalities by using an RBB approach for multiyear budget planning as part of the budget formulation IFMIS module. In general, however, an IFMIS has only the capacity to process information relating to budget financial allocations. Such is the case in Argentina with its IFMIS (Sistema Integrado de Administración Financiera (SIDIF)). Supplemental performance data from the evaluations of intermediate or final results of public programs must be complemented with data from other systems and sources and reflected in the budget, since the budget is a central component of the RBB.

The operation of an IFMIS execution module is obviously transactional. It captures budget and accounting movements, verifies their relevance, and proceeds to record, store, and consolidate them. The execution module thus contains the financial and accounting procedures that relate to budget, accounting, treasury, and debt management, as well as the functionalities necessary to support the TSA in those countries that have one in place. Public sector financial statements are also generated by this execution module. The current IFMIS in the region generally interoperates with other management systems (e.g., public investment, payroll, and procurement) by using the execution module, based on specific flows between the IFMIS and these other information management systems.

The information system that integrates most efficiently into the region's IFMIS is that of public procurement and contracting (Farías and Pimenta, 2012). In addition, it is increasingly common for IFMIS to either incorporate the payroll system or for such payments to flow through the module. This practice includes public investment systems, especially where there is an exchange of data related to the identification of the investment projects.

Systems for payroll, contracting, and resource planning can be also linked to the IFMIS to improve public resource management. Those data systems that include payroll or procurement modules, as well as functions that are beyond the scope of traditional financial management practice, are known as Enterprise Resource Planning (ERP). Used routinely in the private sector, ERP has a series of integrated system applications that enable organizations to integrally manage their business and finances, including procurement and human resources. Some authors refer to ERPs adopted by the public sector as Government Resource Planning Systems (GRPs).

In the context of Latin America, the use of a single ERP-type system in the public sector is more usual at the subnational level or in single entities—generally public companies or financial institutions. It is in rare cases that there is a single ERP-type system throughout an entire public sector of a country. The strategy at the national level is usually to interoperate the IFMIS databases with other systems as payroll and procurement management. Nevertheless, Nicaragua and Panama are in the process of completing an ERP at the national level—an innovative experience for Latin America.

As mentioned previously, an IFMIS institutionally falls under the guidance of the Ministry of Finance or—as in Argentina, Bolivia, Chile, Colombia, Costa Rica, El Salvador, Honduras, and Peru—the Vice-Ministry of Finance (Vice Ministerio de Hacienda) or Budget Directorate (Dirección de Presupuesto)—or the Vice-Ministry of the Treasury (Vice ministerio del Tesoro), as in the case of the Dominican Republic. In Brazil and Mexico, IFMIS are the responsibility of the National Treasury (Secretaria do Tesouro Nacional and Tesorería General de la Nación), while in Uruguay it is under the Accounting General of the Nation (Contaduría General de la Nación).

IFMIS are being continually updated, an example of which occurs in Argentina, where the set of systems is now in its third generation (e-SIDIF) (Box 7.1). The new version offers better support for results-based management, as well as increased capacity to generate reports.

BOX 7.1 IFMIS IN ARGENTINA (E-SIDIF)

The IFMIS in Argentina (e-SIDIF) is oriented toward performance-informed budgeting, following the PFM reform focused on improving the managing for results framework. The conceptual approach is the public value chain, since it allows for synergies in both the planning phase of public policies and the implementation phase, where the budget gains momentum. This way, the outcomes identified in the performance-informed budget relate directly to strategic goals set by the government.

The e-SIDIF is a web-based online integrated system that manages almost 3 million budgetary, financial, and accounting transactions each year. The system is used in all the 116 financial administrative units of the central administration, and is also working in some subnational governments—such as La Rioja province—and, partially, through the deployment of the TSA in Buenos Aires province.

The design of the e-SIDIF allows for the automatic and simultaneous registration and management of budgetary and accounting operations. In addition, it provides the architecture to incorporate business intelligence (BI) features for data mining, online analytical processing, querying, and reporting, thus promoting and facilitating fiscal transparency. The BI features offer a variety of applications, providing user-friendly, efficient, and reliable access to the public (Sitio del Ciudadano, <http://sitiodelciudadano.mecon.gov.ar/sici/>), vendors (e-PROV), and political authorities (via customized datamarts for effective monitoring and financial programming).

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BOX 7.1 IFMIS IN ARGENTINA (E-SIDIF) *(continued)*

The management and oversight of the development process was in-house, with political and technical staff from within the Ministry of Finance, via a special Steering Committee institutionalized in 2010. The development of the e-SIDIF has combined both in-house and outsourced teams, taking advantage of open-source software. The IFMIS solution programming has been object oriented.

- **Accountability, transparency, and evaluation:** performance-informed budgeting tools included in the FMIS solution (Argentina ranked third in the region in the 2015 IBP survey).
 - Outputs identified for 75 percent of budgetary programs, and outcomes informed and updated quarterly for 40 percent of central government spending.
- **Decision-making support:**
 - User-customized reports and queries, fed by the online database with BI tools.
 - Integrated program outputs and outcomes included in the online database.
- **Management and efficiency-oriented:**
 - Digital signature and electronic trays.
 - Automatization and paperless management.
 - Transaction flow monitoring.
- **Solid policy background:** review of best practices and building on 20 years of PFM reform.
 - Interoperability (revenue agency, banking system).
 - Flexibility (IFMIS solution for the central and subnational government levels).
- **Open budget:**
 - E-Prov portal: web access to government vendors with user validation from the tax revenue services agency.
 - Citizens' portal: public web access to weekly information on budgetary execution, fed by the e-SIDIF database and recognized as a top IFMIS solution regarding open data (Dener and Min, 2013).

Peru is in the process of developing IFMIS II, a third-generation set of systems (Uña, 2012), to maximize its integration capacity and improve the timely issue of financial statements for the central government. The key element is its scope of institutional coverage. Peru is the only one in the region to operate integrally as one single system for all three levels of government (i.e., central, regional, and municipal) (Box 7.2).

Nicaragua and Panama are implementing customized commercial off-the-shelf software as their IFMIS. These are not, therefore, tailor-made systems—a traditional practice over recent decades.

With regard to operational coverage, all IFMIS in the region include the budget execution phase through a single module. Differences exist with the budget formulation stage, for which a separate module is necessary. In the case of Brazil, Chile, and Mexico, for example, coverage at the formulation stage is supported by individual modules that are minimally integrated into the execution module. At the federal level in Brazil, the Integrated

BOX 7.2 THE INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEM IN PERU: SCOPE OF COVERAGE

The IFMIS in Peru was designed to integrate all stages of public expenditure for the national, regional, and local levels of government by utilizing a single budget classifier and chart of accounts as a basic prerequisite for effectiveness. The budget, accounting for 1,450 spending units throughout these three levels, is executed through the IFMIS, while the National Treasury acts as a bank for the regional and municipal governments, which consolidates the revenues of the entire public sector into the TSA. Other countries in Latin America differ in this aspect by controlling the revenues that are collected only at the central level, transferring them to subnational governments. Rarely are these resources executed through a single nationwide IFMIS system.

Furthermore, what is exclusive to Peru's IFMIS is that its budgetary planning module incorporates the results-based budget approach that includes a logical framework with output and outcome indicators. In general, IFMIS only has the capacity to process information relating to goods and/or services allocations.

Peru's Ministry of Economy and Finance (Ministerio de Economía y Finanzas) is currently developing a new IFMIS that covers all levels of government, leading to a results-based budget. It also has a new technology platform that could make the SIAF II more similar to an ERP system than to a traditional IFMIS.

Planning and Budget System (Sistema Integrado de Planejamento e Orçamento (SIOP)) is applied, developed by the Ministry of Planning, Budget, and Management (Ministério de Planejamento, Orçamento e Gestão) with open-source software tools. Mexico employs the Integrated Planning and Budget Process (Proceso Integral de Programación y Presupuesto) for the Ministry of Finance (Secretaría de Hacienda y Crédito Público).

In Chile, there is no single IFMIS for the budget formulation of line ministries. The data is processed in each ministry with their own systems before being sent to the Budget Directorate (Dirección de Presupuestos (DIPRES)) at the Ministry of Finance (Ministerio de Hacienda). The Ministry of Finance then consolidates the data in the Budget Administration System (Sistema de Información de Administración Presupuestaria (SIAP)). This system is able to simultaneously support the DIPRES during the budget execution phase.

Although the general trend in the region leans toward IFMIS administered by the Ministry of Finance, their operational coverage, architecture, and institutional scope varies among countries, as reflected in Table 7.1.

Implementation and Upgrades

International organizations have supported IFMIS implementation in countries in Latin American and the Caribbean since the 1990s. This generally

TABLE 7.1 MAIN ASPECTS OF INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEMS IN LATIN AMERICA: SELECTED CASES

Country	IFMIS	Governing body	Development and programming strategy	Technological platform	Main operational characteristics	TSA
Argentina	Integrated Financial Management System (Sistema Integrado de Administración Financiera (SIDIF)).	Budget Under-Secretary (Subsecretaría de Presupuesto) Secretariat of the Treasury (Secretaría de Hacienda) at the Ministry of Economy and Public Finance.	In-house development.	Multilayer modules in client-server platform and in web platform. Use of open-source software and software protected by intellectual property rights.	The SIDIF covers the phases of budget formulation, execution and evaluation and includes modules for budget, accounting, treasury, and public debt.	The system supports the Treasury Single Account.
Brazil	Integrated Financial Management System (Sistema Integrado de Administração Financeira (SIAFI)), and Integrated Planning and Budget System (Sistema Integrado de Planejamento e Orçamento (SIOP)).	National Treasury Secretariat (Secretaria do Tesouro Nacional (STN)) at the Ministry of Finance (Ministério de Fazenda) for SIAFI. Ministry of Planning, Budget and Management for SIOP.	In-house development.	Federal System of Integrated Financial Management (Sistema Integrado de Administração Financeira (SIAFI)): Mainly monolithic mainframe and multilayer applications in client-server platform, with some web applications. SIOP is open source software by 100 percent.	The SIAFI covers the budget execution phase and has budget, accounting, treasury, and public debt modules. The SIOP covers the stage of budget formulation and supports the budget execution phase.	The system provides support for the Treasury Single Account.

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TABLE 7.1 MAIN ASPECTS OF INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEMS IN LATIN AMERICA: SELECTED CASES *(continued)*

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Colombia	Integrated Financial Information System (Sistema Integrado de Información Financiera (SIIF).	Ministry of the Finance and Public Credit (Ministerio de Hacienda y Crédito Público).	Development initially outsourced, then finalized internally (in-house).	Multilayer system in web platform using Microsoft software products by 100 percent.	The SIIF covers the phases of budget formulation, execution, and evaluation and has budget, accounting, treasury and public debt modules.	The system provides support for the Treasury Single Account.
Chile	State Financial Management Information System (Sistema de Información para la Gestión Financiera del Estado (SIGFE)) and Budget Administration System (Sistema de Administración Presupuestaria (SIAP)).	Budget Directorate (Dirección de Presupuestos (DIPRES)) at the Ministry of Finance (Ministerio de Hacienda).	Development outsourced (SIGFE). In-house development (SIAP).	SIGFE: web platform using service-oriented architecture and budget process management paradigms with Oracle software products by 100 percent. SIAP: multilayer application in web platform using software protected by intellectual property rights and open-source software.	The SIGFE covers the stage of budget execution and has budget, accounting, and treasury modules. Debt management is centralized at the Treasury (Tesorería General de la República). The formulation stage is covered by the SIAP under the auspices of the DIPRES.	The Treasury Single Account has yet to be implemented.

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TABLE 7.1 MAIN ASPECTS OF INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEMS IN LATIN AMERICA: SELECTED CASES *(continued)*

Country	IFMIS	Governing body	Development and programming strategy	Technological platform	Main operational characteristics	TSA
El Salvador	Integrated Financial Administration System (Sistema de Administración Financiera Integrado (SAFI)).	National Directorate for Financial Administration and Innovation (Dirección Nacional de Administración Financiera e Innovación) at the Treasury (Ministerio de Hacienda).	In-house development.	Client-server multilayer platform. Has a data reporting management module that uses a commercial application (IBM Cognos).	The SAFI covers the phases of budget formulation, execution, and evaluation and has budget, accounting, treasury, and public debt modules.	The Treasury Single Account has yet to be implemented.
Peru	Integrated Financial Administration System (Sistema Integrado de Administración Financiera (SIAF)).	Vice-Ministry of the Treasury (Vice Ministerio de Hacienda) at the Ministry of Economy and Finance (Ministerio de Economía y Finanzas).	In-house development.	Client-server platform with multilayer design, using software protected by intellectual property rights and open-source software.	The SIAF covers the phases of budget formulation, execution, and evaluation and has budget, accounting, treasury and public debt modules.	The system provides support for the Treasury Single Account.
Dominican Republic	Integrated Financial Management System (Sistema Integrado de Gestión Financiera (SIGEF)).	Vice-Ministry of the Treasury at the Ministry of Finance (Vice Ministerio de Hacienda).	In-house development.	Web platform with multilayer design using software protected by intellectual property rights and open-source software.	The SIGEF covers the phases of budget formulation, execution, and evaluation and has budget, accounting, treasury, and public debt modules.	The system provides support for the Treasury Single Account.

Source: Authors' elaboration.

has taken the form of loans and technical assistance that includes the review and modernization of fiscal institutional capacity and its processes, as well as the development or acquisition of systems that make PFM reform feasible. It has incorporated the establishment of TSAs for the electronic reconciliation of accounts according to international standards for automated accounting, in addition to the interoperability or integration with other management systems.

The objective has been and continues to be the boosting of public sector institutional capacity to manage all stages of public expenditure integrally, transparently, and efficiently. In the majority of cases, these projects have included modernization or establishment of new IFMIS.

In the case of the IDB, over the last 10 years it has provided technical assistance and loans for PFM projects—the majority of which encompass IFMIS—to Argentina, the Bahamas, Bolivia, Brazil, the Dominican Republic, Guatemala, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, and Uruguay, among others. A total of 42 project loans have been made, amounting to US\$1.095 billion and averaging US\$26.1 million each, depending on coverage, products, and functionalities included. Several of these projects have included IFMIS at the sub-national level, as in the case of Argentina, Bolivia, Brazil, and Honduras (Table 7.2).

With regard to lending policy (based on loans that include reforms) and disbursement (based on compliance with policy commitments), the amounts provided by the IDB have been significantly greater, totaling more than US\$4 billion over the same period. These have been to Argentina, Bolivia, El Salvador, Guatemala, Haiti, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Suriname, Trinidad and Tobago, and Uruguay.⁵

Beyond LAC, the World Bank has financed 87 IFMIS projects between 1984 and 2010 in 51 countries, worldwide, by a total of more than US\$2.2 billion, with an average of US\$25.3 million (similar to that of the IDB). Of these, 29 loans targeted the LAC region, 25 projects of which have been completed and four were active in 2010 (Dener, Watkins, and Dorotinsky, 2011).

Many countries are independently financing the upgrades of their IFMIS. In some cases, finance has come from internal or external resources, including grants for technical assistance from donor countries.

⁵ The amount does not include a total of US\$2.243 billion in policy-based loans made to five Brazilian states during this period.

TABLE 7.2 INTER-AMERICAN DEVELOPMENT BANK LOANS IN EXECUTION TO SUPPORT PUBLIC FINANCIAL MANAGEMENT INVESTMENT PROJECTS (INCLUDING IFMIS)

Country	Project	In thousands of U.S. dollars
Argentina	Productive Institutional Strengthening of Provincial Fiscal Management, Phase II (Programa de Fortalecimiento Institucional Productivo de Gestión Fiscal Provincial, Segunda Etapa (PROFIP II))	36,000
Bahamas	Public Financial Management and Performance Monitoring Reform	33,000
Bolivia	Municipal Management Improvement Program (Programa de Mejora de la Gestión Municipal)	52,000
Brazil	Program for Modernizing Instruments and Management Systems (Programa de Modernización de los Instrumentos y Sistemas de Gestión) (including the budget)	28,600
Brazil	28 Projects: Management Support and Fiscal Integration Program (Programa de Apoyo a la Gestión e Integración de los Fiscos (PROFISCO)) (between US\$6 million and US\$120 million for each project in each of the Brazilian states and one project at the federal level).	678,195
Guatemala	Support for Modernization of the Ministry of Public Finances (Apoyo a la Modernización del Ministerio de Finanzas Públicas)	8,500
Honduras	Fiscal and Municipal Management Consolidation Program (Programa para la Consolidación de la Gestión Fiscal y Municipal)	28,600
Jamaica	Fiscal Administration Modernization Program	65,000
Nicaragua	Public Sector Financial Administration Modernization Program (Modernización del Sistema de Administración Financiera del Sector Público)	10,000
Panama	Fiscal Management Strengthening Program (Programa de Fortalecimiento de la Gestión Fiscal)	50,000
Paraguay	Strengthening and Modernizing Fiscal Administration Program II (Programa de Fortalecimiento y Modernización de la Administración Fiscal II)	9,500
Peru	Modernization of the Public Financial Administration System (Modernización del Sistema de Administración Financiera Pública)	20,000
Dominican Republic	Public Resources Modernization Program (Programa de Modernización de Recursos Públicos)	21,000
Trinidad and Tobago	Strengthening of the Financial Management System (Apoyo al Fortalecimiento del Sistema de Gestión Financiera)	40,000
Uruguay	Public Financial Management Modernization Program (Programa de Modernización de la Gestión Financiera Pública)	14,500

Source: Authors' elaboration.

Key Aspects to Consider when Implementing or Upgrading an IFMIS

This section analyzes nine strategic dimensions of an IFMIS implementation that can be useful to government authorities, civil servants, and consultants involved in these projects, especially those at the Ministries of Finance. These dimensions include the (i) political economy; (ii) conceptual model, project management, and administration; (iii) definition of development and programming strategy; (iv) levels of integration relating to budget, accounting, and treasury management; (v) TSA implementation; (vi) prioritization of efforts during project development; (vii) importance of testing; (viii) guarantee period for service and maintainance; and (ix) change management.

These characteristics have been defined based on various studies and the sharing of experiences in the region of projects financed by the IDB and the World Bank, as well as those that have received technical assistance from the IMF's Fiscal Affairs Department. There is also a growing body of literature concerning public sector governance relating to large ICT projects and the importance of paying attention to the processes, human resources, and management of the project to achieve success during implementation (OECD, 2014; Nichols, Sharma, and Spires, 2011).

Political Economy

Each country's history, sociopolitics, institutions, and actors underpin the success of political decision making. Politics is conditioned by the incentives and constraints placed on various actors amid institutional rules that impact this interaction. From this perspective, the characteristics that make up the institutional and political economy become strategic with regard to the design and implementation of an IFMIS. More importantly, a project has a potential cross-cutting effect on PFM that can impact the entire public sector.

First, it is essential that IFMIS initiatives gain support from high-level public finance officials from the outset so that they are fully aware of the potential benefits and risks. Such a project requires experts to act as strong advocates to set the political stage and to provide the leadership that is essential.

Second, the location and hierarchical status of responsible units for the project are vital. Being under the aegis of the main sponsor or a high-level

authority will send a strong message to the public sector of the importance of the IFMIS and improve its chances for support. In particular, the IFMIS should not be under the ICT unit, as it should avoid the perception that it is merely a technology upgrade initiative rather than a complex project to streamline and strengthen PFM.

Institutional coordination building should take the form of committees. Within the Ministry of Finance, for instance, an ICT or IFMIS committee has the potential to facilitate consensus building for these initiatives.

In the region, IFMIS committees in Chile and Costa Rica are examples that have attracted interest, as have the examples of Honduras and Uruguay. In Chile, an Executive Board (Comité Directivo) comprises DIPRES authorities and the Comptroller General of the Republic (Controloría General de la República), set up solely for the purpose of developing the SIGFE, whereby the Board approves the IFMIS objectives. In Costa Rica, the Financial Management Coordination Committee (Comisión de Coordinación de la Administración Financiera (CCAF)) is tasked with the coordination of technical and operational aspects, ensuring that the views and recommendations of each department of the Ministry of Finance are taken into account. The CCAF falls under the Vice-Ministry of Expenditures (Viceministro de Egresos) and includes the Budget Directorate (Director General de Presupuesto), Accountant-General (Contador Nacional), Directorate of Public Credit (Director de Crédito Público), Directorate General of Procurement (Director General de Administración de Bienes y Contratación Administrativa), Treasury Directorate (Director de Tesorería), Technical Secretariat of the Budget Authority (Secretaría Técnica de la Autoridad Presupuestaria), and the Directorate General of Information Technology (Director General de Informática).

In Honduras, the Information Technology Committee (Comité de Tecnología de la Información) was established as part of the Finance Secretariat (Secretaría de Finanzas) in 2013, with the participation of the Directors of Governing Bodies (Directores Generales de los Órganos Rectores). Its objective is to enhance IFMIS institutionally under the responsibility of the Modernization Unit (Unidad de Modernización) of the Secretariat. In Uruguay, in order to develop the modernization project of the IFMIS (Sistema Integrado de Información Financiera (SIIF)), the Project Executive Board (Comité Directivo del Proyecto) was set up with the authorities of the Nation's Accountant-General, Treasury (Tesorería General de la Nación), and Budget Unit (Unidad de Presupuesto de la Nación). As experience shows, these coordination mechanisms should be replicated, strengthened,

and institutionalized as part of IFMIS development and implementation in the region.

Thirdly, there are incentives in the political economy of each country that can encourage various public sector actors to adopt IFMIS. The promotion of more extensive management instruments by the Ministry of Finance—including IFMIS as an ingredient with various components—will ensure more project encouragement.

Strong commitment of resources and willingness are needed by line ministries and the project team to gain consensus, especially from those who resist change. Behavioral change, supported by programs such as the Management Improvement Program in Chile, is a key to achieving success.⁶

Furthermore, it is essential to bear in mind that the rationale for the IFMIS project is an effort to promote reforms. Recent studies by Andrews (2013) indicate that many countries profess they are reforming their PFM simply by adopting a set of short-term gestures that are, most often, unsustainable over the long term, stemming from the lack of alignment with a country's particularities. This, ultimately, does not represent an ideal combination of solutions and adaptations (Andrews, 2013).

Andrews refers to this phenomenon as an institutional isomorphism, borrowing the term from the biological sciences, whereby some animals seek to resemble others within their environment as a means of security. Similarly, some governments feign the image that they have adopted best international practices in PFM as a means to gain support and credibility in the short term.

Another key aspect—identified by Andrews from an analysis of more than 100 countries independently evaluated with the PEFA methodology—is that reform very often is designed only at the central level (i.e., Ministry of Finance). It is common for these reforms and systems not to be implemented due to a lack of participation of the final users—mainly located in decentralized sector ministries—during the design phase.

In Chile, the Users Committee (Comité de Usuarios) was set up as a component of its SIGFE 2.0 project. It aims to draw participation, at the project stage, of intended users of the system—not only from the central level, but also from other public finance units—in order to address their needs.

⁶ Chile's PFM incorporates training programs in accounting and budgeting for its staff, including courses for the SIGFE, to improve public management. In addition, there is a staff merit scheme—of which PFM is a component—that is linked to performance (World Bank, 2008).

Project Management and Leadership

Due to the relevance and scale, as well as the economic, financial, and human factors associated with IFMIS, an adequate, high-level, and committed expert project team (EPT) should be created. The team should not be composed by only people from the Ministry of Finance, especially if it were made up with staff from the budget, accounting, treasury, and public credit units, who would have the project work added to their daily tasks, preventing them from concentrating on the project alone.

While it is critical to ensure that a dedicated, full-time EPT is in place, it is equally important to include the participation of relevant staff from the various areas within the Ministry of Finance (i.e., budget, accounting, treasury, and debt management) to validate the system's functionalities. Failure to effectively enhance communication between the project team and potential beneficiaries at the design stage may increase resistance by users, which could result in the delay of the project.

To effectively manage the project, there are two significant activities among the various ones that the EPT must focus on. First, it is essential to define precisely the scope and strategy of IFMIS functionality, the outcome of which should be reflected in the conceptual model as a basis for this kind of project.⁷

Second, at the ICT level, the project's technological architecture should be defined by taking into account the technological capacity of local markets so as to avoid the error of depending on next-generation products or paradigms that may not be supported within the country. The level of connectivity in the country should also be considered.

Alternatives at the Programming and Development Stages

Based on the experience of Latin America, there are four alternative methods to develop an IFMIS. These include (i) in-house development; (ii) development through consulting firms; (iii) outsourced development; and (iv) parameterization of commercial off-the-shelf systems.

- i. **In-house development.** Development is under the direct responsibility of the government, with the EPT to be sponsored by the Ministry

⁷ For more details on the scope of an IFMIS conceptual model, see Khan and Pessoa (2010).

of Finance. The hiring of individual experts should include various specializations (e.g., project management, systems analysts and developers, and software architects), ensuring project management coordination. The team will be responsible for the (a) selection, hiring, and management of individual consultants; (b) supervision and coordination of consultant activities; (c) quality control of software development; (d) operational and performance testing of the software; and (e) systems maintenance during production. The government will assume the costs, as well as the potential risks that may occur with regard to software codes during production.

This strategy has been adopted in several countries in Latin America, including Guatemala, Honduras, Peru, and the Dominican Republic,⁸ during the last decade, when the overall management of the project fell under the supervision of the Ministry of Finance due to procurement procedures restrictions, limited range of public financial information systems offered at that time, and the strategic importance of IFMIS. In recent years, the institutional inertia to update their ICT systems has led to incremental adjustments to systems, as necessary. Today, however, there are various alternatives, although the option for in-house development is less usual due to the length of time it takes and the fact that costs frequently exceed budget in the long term. Furthermore, as mentioned previously, it is difficult to break up or redeploy a project team that has been set up by the Ministry of Finance once the project has reached completion.

In-house development, however, has the advantage that the public sector can retain ownership of the source codes, thus reducing costs and needs for external maintenance services. It is also an option that allows for rapid response when changes or adjustments are necessary, especially with regard to new processes and procedures. This may lead to the need to maintain the services of the expert group, raising the costs beyond other available alternatives.

- ii. **Development through consulting firms.** While the Ministry of Finance usually maintains control of systems development, it leaves the contracting of individual specialists to one or more consulting firms, usually at a monthly rate, to minimize the administrative costs of

⁸ Brazil is also an example for in-house development, since the government contracted the public data-processing company (Serviço Federal de Processamento de Dados (SERPRO)) for its IFMIS.



recruiting, selection, contracting, and remuneration. The responsibilities of the project team include (a) defining the profiles of operations and technology specialists; (b) drafting terms of reference for human resource providers; (c) supervising and coordinating the activities of the individual consultants; (d) managing the contracts in liaison with consultancy firms; (e) carrying out operational and technical testing cycles to ensure software quality and performance; and (f) defining and executing maintenance services. The cost of software adjustments caused by errors in the system is met by the government.

The consulting firms assume the responsibilities of (a) hiring the consultants and managing their activities, (b) ensuring the specialists have the required technical qualifications, and (c) complying with the terms of the contract. The responsibility of the firms excludes development activities and the final outcome.

This option was adopted by Chile as part of the data consolidation and reporting component of SIGFE I. Other countries have introduced this alternative by liaising with public universities, such as Brazil, which partnered with the University of Brasilia on its SIOP, and Argentina which partnered with the National University of La Plata (Univesidad Nacional de La Plata (UNLP)) in relation to its e-SIDIF.

The advantage of this option is that it maintains public sector ownership of the IFMIS source codes without the need to select, hire, or pay a large number of consultants. Nevertheless, this option presents the same issues and risks as those of in-house development.

- iii. **Outsourced development.** Under this approach, the development of the system is outsourced to a software factory developer. The outputs of the system are precisely defined and the developer works within an agreed budget. This development model requires the project team to have strong institutional capacities to elaborate the detailed specifications of the system. The project team should be able to (a) define the principal operational and technical aspects of the system; (b) support the software developer in the design and building of the system; (c) carry out the testing of products;⁹ and (d) carry out tests of the individual components and, ultimately, the entire integrated system.

The software developer's role is to (a) hire qualified software development experts; (b) comply with the quality and delivery dates

⁹ Among the products to be tested and/or verified are the components, software codes, execution processes, systems documentation, and manuals of procedure.

of the product; (c) guarantee software quality; (d) adjust the software, if needed, in terms of design and operation during the guarantee period, and (e) provide the hardware and software infrastructure required for systems development and testing. The responsibility of the firm includes development activities and the final outcome.

Chile's development of SIGFE 2.0 followed much the same strategy as Uruguay, at present, with its modernization of the SIIF. Various states in Brazil, such as, Pernambuco, Santa Catarina, and Espirito Santo rely on this particular option with the advantage of maintaining source code ownership. This, as mentioned previously, will not only offset dependency on the consulting company and reduce maintenance costs; it will also avoid the issues and challenges of the other two alternatives previously mentioned.

- iv. **Parameterization of a commercial off-the-shelf system.** This option relates to the products that are available on the market, referred to as commercial off-the-shelf products (also available as World Class software), usually relating to the ERP type of product.¹⁰ Development of the system with this option could take less time than those products that are customized.

This option will require the project team to (a) define the main functional and technical aspects of the system, (b) support the consulting company during the process, (c) establish and manage the service, and (d) conduct product testing of the end product.

The role of the consulting company is to (i) provide qualified experts to customize the software, (b) identify, define, and validate system parameters; (c) deliver services, according to the terms of the contract, particularly with regard to deadlines, and ensure the quality of the developed software modules; (d) establish mechanisms to ensure the quality of the application, and (e) correct software malfunction during the guarantee period.

This off-the-shelf customization option is more often selected in Africa and the Middle East (Dener, Watkins, and Dorotinsky, 2011), as well as in France and South Korea or in countries where public institutions are autonomous in terms of budget management. In Latin America, some budget functionalities of Costa Rica's SIGAF are supported by World Class software, while

¹⁰ These are systems composed of a series of integrated applications, which enable the institution to manage the entire business and financial cycle, including procurement and human resources, in an integrated manner.

TABLE 7.3 MAIN CHARACTERISTICS OF DEVELOPMENT ALTERNATIVES FOR AN IFMIS

	In-house	Development through consulting firm	Outsourced development	Parameterization of the commercial off-the-shelf system
Composition of project team	System management, supervision, and administration	Management, supervision, and coordination External consultants provided by firm to develop system	Internal team to manage and supervise Software developer for system, responsible for final outcome	Internal team to manage and supervise Consulting firm responsible for customizing the application and the final outcome
Main costs	Management team Administrative team Development team Procurement of software and hardware components for development and testing	Management team Administrative team Contracting consulting firm Procurement of software and hardware components for development and testing	Management team Contracting software developer Procurement of basic software and hardware components for testing	Management team Contracting consulting firm to customize application Procurement of basic software and hardware components for testing
Development guarantee	Error correction and improvements to application performance by project team	Error correction and improvements to application performance by project team	Error correction and improvements to application performance by software developer during guarantee period (6 to 12 months)	Error correction and improvements to application performance by consulting firm during guarantee period (6 to 12 months)

Source: Authors' elaboration.

in Nicaragua and Panama, the upgrade of the IFMIS in 2013 and 2014 with commercial software is still in process. Once the system has been acquired, adjustments and maintenance by the consulting firm take place over a two-year period before internalizing systems maintenance and upgrading.

On selecting an option, it is essential that the advantages and disadvantages be carefully analyzed. A risk and cost-benefit analyses of each alternative should be carried out before a decision is made so as to ensure the cost effectiveness and political viability of the product over the long term.

Budgeting, Accounting, and Treasury Management: Levels of Integration

As indicated by Dener, Watkins, and Dorotinsky (2011), one of the main attributes of an IFMIS is its capacity to generate financial statements by processing the information stored in the database. The five main statements are the balance sheet, results statement, statement of changes in equity, cash flows statement, and comparative budgeting (or accounting) statement.

To produce these in a timely and reliable manner, budget, accounting, and treasury modules should be integrated into the IFMIS. This guarantees the simultaneous recording of financial movements, as well as timely economic movements.

Since budgets in the region are generally managed on a modified cash basis where certain expenditures and revenues are recorded under accruals and others remain under cash, especially revenues—according to International Public Sector Accounting Standards (IPSAS)—it is essential to establish “locked flows” to assure the simultaneous registry in the IFMIS. This can be done at the accruals stage when budget and accounting flows have to be compatible so that the IFMIS will process the budget and accounting at the same time, based on the integrated chart of accounts. Treasury and accounting flows should operate in much the same way, as in Chile’s SIGFE 2.0.

Another alternative is the integrated budget-accounting-treasury chart of accounts, which can be designed to ensure that the IFMIS will automatically create an accounting registry for financial transactions. In this case, the integrated chart of accounts is measured by, for example, the budget program classifier that identifies the ledger accounts that are associated with budget transactions as assets/liabilities or income statements. This alternative was adopted in Brazil’s IFMIS (Box 7.3) and in Guatemala. Honduras used this approach in the design of the Integrated Municipal Administration System (Sistema de Administración Municipal Integrado (SAMI)).

BOX 7.3 THE BRAZILIAN IFMIS: AN EXAMPLE OF AN INTEGRATED APPROACH

The IFMIS in Brazil has operated since 1987 and currently covers more than 4,000 spending units throughout the country, with more than 100,000 users. It includes the three branches of government, the social security fund, and decentralized agencies.

The system automatically reconciles the budgetary, financial, and accounting functions and an automatic reconciliation with the TSA and produces the balance for the entire central government. The two fundamental elements of the system are a single chart of accounts for accounting, budgetary and financial operations, and the tables of events. The latter assists in creating various automated accounting entries in a single register.

More recently, the Brazilian Payments System (Sistema de Compensação Bancária) was integrated into the IFMIS so that the federal government's cash position is a part of the entire national banking system and is captured in real time.

Finally, a prerequisite for achieving budget and accounting integration is to harmonize the budget classifiers and chart of accounts. The update should be carried out in line with international standards, such as the IMF's *Manual on Government Finance Statistics* and the IPSAS.

IFMIS Support of a Single Treasury Account

A TSA is a crucial element of PFM reform in terms of cash management, and is an essential part of an IFMIS. This unified structure for the bank accounts of the government enables consolidation and optimal use of cash resources, including the capture and control of financial transactions, and contributes to debt management (Pattanayak and Fainboim, 2011). The output relating to the cash position at the end of each day is based on the fungibility of government resources, irrespective of source or destination.

For the TSA to operate smoothly there is a distinction to be made between each cash transaction by way of the accounting module, as is done in some countries that have different accounts for collection and payment purposes. This eliminates the need to manage each type of transaction within multiple bank accounts.

The design of a TSA should include the (i) scope of its coverage, (ii) structure of government bank accounts, (iii) role of the central bank and commercial banks in terms of TSA management, and (iv) a system to process transactions and corresponding cash flows (Pattanayak and Fainboim, 2011).

The fourth aspect depends on the IFMIS to process cash transactions. To facilitate this, transactions should be automated in parallel to electronic payments systems (Pessoa and Williams, 2012).

The IFMIS accounting and treasury modules must be designed so that it will record and gather data on all transactions, irrespective of the cash flows of specific bank accounts. The various cash transactions (i.e., receipts and payments) may be treated separately and should be captured by a system that consolidates the accounts in such a way as to allow the monitoring and control of annual allocations, as well as facilitate the issuance of monthly and quarterly statements by the Ministry of Finance.

To support the TSA, the IFMIS—at the design stage—should incorporate a chart of accounts and a budget classifier, configured so that it can identify the various accounts and disaggregations. This will facilitate the capture of revenues, payments, financing, and investment of surpluses.

Electronic interaction between the treasury, spending units, and banks (including commercial banks) is important. This will reduce transaction costs, allow for electronic payments, and capture receipts on a daily basis.

As Pessoa and Williams (2012) point out, an IFMIS is essential to carry out the core requirements of modern treasury management. An efficient set of systems will manage, monitor, control, reconcile, and produce budget and accounting reports on account balances in particular on the TSA itself.

In addition, the TSA should be able to project cash flow collection and payments over the short term; make projections that reflect information relating to the delay between payments and disbursements; compile three-month projections of daily cash flows administrated by the TSA, in addition to year-end forecasts; and monitor as close to real time as possible the variations in the aggregated TSA balance. Although IFMIS, in general, lack a module for cash flow forecasting—done by way of Excel-type spreadsheets in Latin America—they do hold historical data relating to daily collection and payments that are essential to prepare an accurate cash flow projection.

To effectively implement a TSA with the requirements of PFM, the IFMIS should be able to consistently produce timely data on budget commitments, accruals, and actual treasury transactions. Coverage should also be as broad as possible.

Prioritizing Project Development Efforts

The establishment of an IFMIS requires significant human and financial resources. Efforts, therefore, must be prioritized throughout every stage. A distinction should also be made between the original and new functions of the system.

According to the literature and based on the experiences gained in the region, project development that takes place in various incremental stages has less risk of failure than if it were carried out in one stage (Dener, Watkins, and Dorotinsky, 2011; Barros, 2012). The project, therefore, should be divided into three stages to reflect the budget cycle (i.e., formulation, execution, and evaluation, with the exception of the approval stage which is carried out by the legislature), so that the relative components can be designed sequentially and independently. These stages can be grouped into two: budget formulation in one and budget execution and evaluation in the other. What links these two phases together is the local Budget Law (Ley de Presupuesto), drafted with the support of the budget formulation module that captures the data on the allocation of funds between institutions, budget items, and/or programs, and forms the starting point of the execution phase.

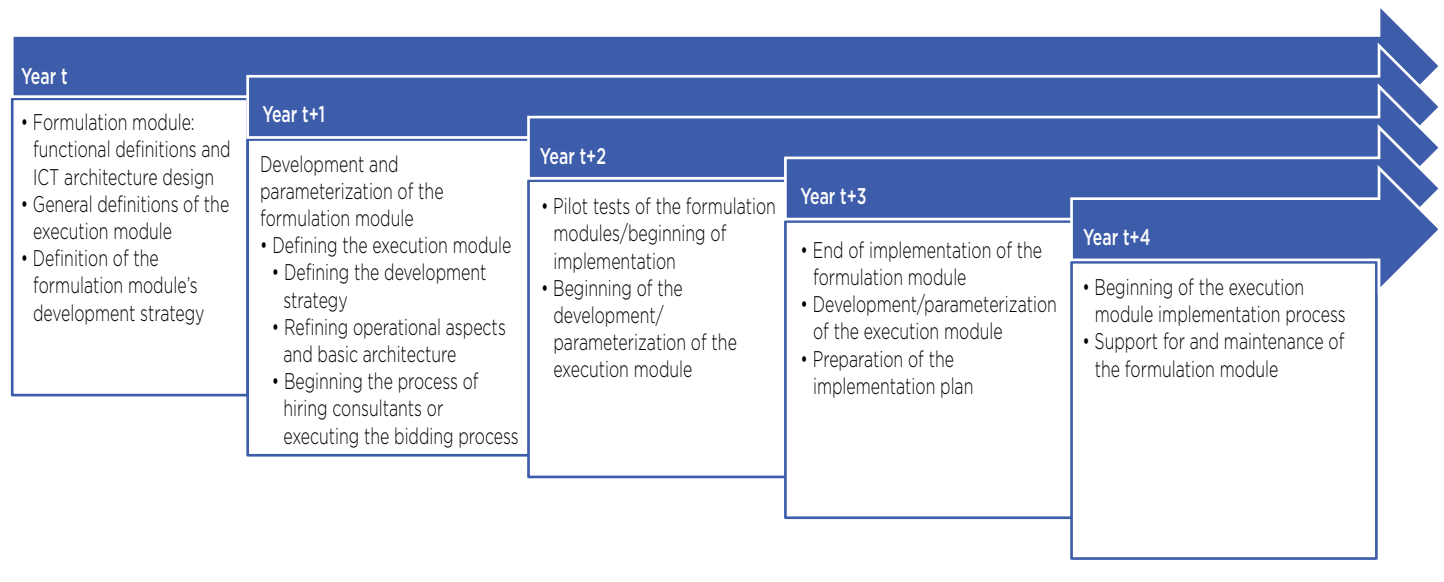
Given the complexity of the execution module, a strategy should be put in place to prioritize the update of the budget formulation module, as in the case of Honduras and Peru; strengthen the role of the project team; and enable them to adjust the consolidation mechanisms, streamline processes, and increase learning with regard to the technological innovations necessary to effectively execute module implementation—a more complex feat than that of the budget execution and evaluation module. A project of this complexity will require four to five years to become fully operational, despite the sequential stages (Figure 7.3). In this light, and to maintain the support of the Ministry of Finance, it is critical that tangible results are demonstrated in the short term (referred to as quick wins). This strategy should make the achievement of objectives easier and define the start of part of the new IFMIS upgrade within the project's second year, with the implementation of the budget formulation module as a first result of this initiative.

Importance of the Testing Stage

The execution stage should be sufficiently robust to include a testing phase, which is essential for efficient implementation of the IFMIS. By testing the operation and performance of the new system, errors can be corrected.

To effectively test systems functions, testing should include routine and easy processes, as well as ones that will be able to identify unusual business flows or atypical functions from a particular public institution. Furthermore, procedures pertaining to transaction statements, as well as the validations

FIGURE 7.3 PRIORITIZATION STRATEGY FOR THE IMPLEMENTATION OF AN INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEM



Source: Authors' elaboration.

between the various system components must be comprehensively tested,¹¹ especially with regard to upgrades during development and/or the customization stage.

Performance and volume tests should take place in test conditions that are equivalent to a production environment.¹² Failure to recreate these conditions, or if they are done too quickly, may present challenges; thus, a volume of data equating at least one year's worth of transaction processing should be considered for testing. Data reporting tests should also be conducted—again, using a significant volume of data to ensure that response times are appropriate.

Standard parameters to the number of errors in the software are usually known as incidents. These are most certainly present in systems at the production stage. The unit of measure is the number of lines of code in the system, calculated in thousands of lines of code (KLOC). The average in the software development industry is 30 errors per KLOC at the time of testing. One error usually occurs when testing is done on World Class products, which is an acceptable result, although this can increase to between two and four errors per KLOC (Beckett and Putnam, 2010; Reifer, 2004; and McDermid and Kelly, 2007).

The criteria required by the Ministry of Finance for the testing phase should be determined. These should encompass (i) functionality issues, based on operational testing; (ii) technical issues, including the definition of performance-related parameters, scalability, and data volume management, and (iii) systems documentation with regard to operational and procedures manuals.

With regard to functionality, various types of incidents should be determined by level of seriousness, such as (i) blocking, which hampers the module's basic operation and/or capabilities that make up the system; (ii) critical, which relates to the ceasing of basic function execution and/or systems flows or the challenge in producing reports; (iii) normal, which relates to the failure to complete secondary requirements, such as atypical business cases or business procedures that are not central to the system; and (iv) minor,

¹¹ For example, in the case of developed software, the procedures that relate to transaction statements and validations should be tested at the business and presentation levels within the database. Special attention should be paid to pagination and transaction block mechanisms at the business level within the database.

¹² This means that the production environment does not have to be reproduced in terms of basic software and hardware components, but it must be equivalent on a smaller scale.

TABLE 7.4 ACCEPTANCE CRITERIA AND OPERATIONAL THRESHOLDS OF CHILE'S SIGFE 2.0

	Types of incidents			
	Blocking	Critical	Normal	Minor
Maximum number of incidents in each operational test	0	5	10	20
Maximum percentages of each type of incident applied to the record of incidents during development stage	0%	15%	35%	50%

Source: Uña (2013).

defined by actions being successfully completed with little impact on the system procedures.

Table 7.4 contains the acceptance criteria and operational thresholds of the SIGFE 2.0 in Chile. These were applied by the software developer during the testing of the entire system.

Guarantee Period and Maintenance Strategy

In a project the size and complexity of an IFMIS, it is necessary not only to carefully plan the implementation stage; it is essential to establish the guarantee period and maintenance service program. In the case of outsourcing (e.g., commercial or customized software), the guarantee period is a variable that will impact project costs. Conversely, in-house development or the option of hiring a consulting firm, where the guarantee cost is not fixed, may represent higher costs resulting from project delays due to error corrections. The experience of various countries, such as Guatemala and the Dominican Republic, are particular interesting examples.

The recommended guarantee period for an IFMIS project should be extended by a minimum of 6 to 12 months, which includes at least one year-end closure of the budget cycle and covers a significant number of public entities. For instance, Uruguay's Ministry of Economy and Finances (Ministerio de Economía y Finanzas) requested bidders to include the rates for three guarantee options in relation to the SIIF 2 (i.e., 12, 18, and 24 months). On this basis, the Ministry was able to select the most convenient guarantee period.

Various strategies are necessary during project execution with regard to IFMIS maintenance, so that the technical and operational knowledge gained by the project team is retained for the maintenance stage. The team's participation at the initial stage of system operation is, therefore, vital.



Furthermore, it is essential to decide whether maintenance should be carried out using internal resources, by hiring consultants, or by outsourcing the service. Given that maintenance of the system is essential during at least the first two years of operation, it should be carefully planned while taking into account the costs and benefits.

A Change Management Strategy

The change management strategy for an IFMIS project is essential and should include consensus building around the reforms proposed. As indicated by Allen, Hemming, and Potter (2013), the importance of identifying the stakeholders, developing institutional capacities, and actively managing change are equal to, if not greater, than those aspects that relate specifically to the technical design of PFM systems. The State of Sao Paulo, Brazil, exemplifies the importance of this dimension, whereby the IMF supported the implementation of a Public Services Costs System (Sistema de Custos dos Serviços Públicos). The organization has recommended the adoption by the Finance Secretariat (Secretaría de Fazenda) of a change management strategy to strengthen the implementation of the cost system that forms part of PFM.

An analysis of change management in projects of a technological nature by López (2013) indicates that although there is a definite point of departure and ultimate goal, it represents an extended, nonlinear process in which the image of what is to be achieved is constantly changing. The modification of an IFMIS project, therefore, may be faced with the resistance of various interest groups whose work routine may be affected. This situation can be managed by having a plan in place that defines the objectives, identifies the main groups that will be most affected, and outlines the relevant activities.

An outline of activities can help reduce opposition and include such examples as knowledge sharing events, whereby the experiences of those who have undertaken the process can be shared with the various interest groups to inform them of the benefits of change. The technical support offered by such multilateral organizations as the IDB, IMF, and World Bank is crucial in the area of knowledge management and dissemination of information throughout the entire region.

The establishment of an IFMIS User Committee, such as that for Chile's SIGFE, is a powerful way to promote change management by involving users of the system during the early stages of development and to take into account their requirements and recommendations. The modernization process of the SIIF in Uruguay, led by the Ministry of Economy and Finance,

convened relevant governing bodies to discuss and determine the improvements for the new version of their system. In parallel, the User Committee launched an implementation plan for public entities, based on their familiarity with the project, as a way of tempering resistance.

The strategy for change should target Ministry of Finance staff in key departments, including those of Budget, Accounting, Treasury, and Debt Management. Operational training in the new IFMIS functions should be provided to enable efficient use of the new or upgraded systems that comprise the IFMIS so that they can be adopted throughout the line ministries.

As previously mentioned, the support of senior ministerial authorities is critical. It depends very much on the political and economic aspects of the project and, therefore, every effort should be made to obtain this support.

CONCLUSIONS AND CHALLENGES

The establishment of IFMIS requires considerable financial and human resource commitment over a significant period of time—at a minimum, four to five years. A series of aspects that directly impact the initiatives to implement or modernize these systems need to be examined to inform an effective project management strategy. These include the political economy, project direction and management; IT programming and development plan; development and integration of main functions; IFMIS support to a TSA; essential testing; guarantee period; and systems maintenance service program. This chapter has reviewed these aspects with specific attention to the integration of IFMIS as instruments of PFM modernization, and it has examined the recent experiences of Latin American countries that are in the process of implementation or have recently upgraded their systems. The outcome of this analysis is that IFMIS is a key element of PFM. The capacity of the systems to provide data that is relevant, timely, and of good quality through streamlined processes, as well as support public sector financial management procedures, makes them a powerful tool for Treasuries and other entities in the public sector. It is important for Latin America to recognize that the significant efforts to consolidate a TSA have been possible as a result of the marked advances of some countries' IFMIS in recent decades.

A key element to success is the drive and support that the highest authorities in government—especially those at the Ministry of Finance— should provide to facilitate the implementation or upgrade of such systems, as well as the careful consideration of the various aspects that have been highlighted

with regard to strategy. These contributions will ensure IFMIS establishment or upgrading in order to achieve fiscal solvency, transparency, efficient resource allocation, and operational effectiveness among public entities.

Various Latin American countries currently face five major challenges in their ongoing efforts to modernize PFM information systems. First, subsequent to the strengthening and standardization of budget management seen in recent decades, there are now initiatives to incorporate IPSAS, as in the case of Brazil, Costa Rica, and Mexico. These initiatives consider accounting to be central to fiscal data, and have overcome challenges to improve the management of fiscal risk. Appropriate adoption of these initiatives requires a careful review of the chart of accounts, its integration with the budget classifier, correct and updated assessment of assets and liabilities, and a redraft of administrative processes. The units responsible for operating the IFMIS should consider how these demands will impact their data structures and processes so as to determine solutions to strengthen public accounting modernization efforts.

A second challenge relates to the strengthening of RBBs through IFMIS, which have yet to achieve optimal integration. Undoubtedly, an IFMIS—as a tool—has the capacity to record indicators relating to goods or services in budget programs. It is not, however, obvious that these kinds of indicators present the same level of aggregate value in the provision of services in such sectors as education and health as they do in those associated with government administration (e.g., diplomatic relations or offices of the presidency). It is therefore essential to establish good international practices so as to systemize these experiences; disseminate them as guidance for countries in the progress of integrating financial allocations and performance indicators within the framework of RBB initiatives, as in Chile, Mexico, and Peru; and seek more empirical evidence.

The third regional obstacle is the creation of data regarding unit costs of public services and the contribution of IFMIS in this process. In general, costs are restricted to particular programs and institutions in aggregate format, rather than at the level of cost centers or public services (e.g., hospitals, schools, prisons, primary education). Cost accounting and its integration in IFMIS for this type of data are relatively uncommon in the region, with the exception of the State of São Paulo, Brazil.

One of the lessons learned from the Brazilian example (see Chapter 6) is the importance of initially using the information that is already available in the IFMIS prior to investing time and money in a new separate system for costs relating to public goods and services. Based on this experience, it is

recommended that a system to capture such data be introduced into the IFMIS in addition to other information components. What should be clear is that an IFMIS is not one that generates information about public sector costs, products, or results (outputs and outcomes); rather, it provides the data to be consolidated with information from other sources. The only system in the region that can process such information within the IFMIS is Peru by way of its RBB module, as well as the ERP-type systems in Nicaragua and Panama.

IFMIS are faced with a fourth challenge relating to alternatives for modernization. Although the trend over the last 30 years in the region has been for the tailor-made option, there is growing interest in using commercial applications for financial management accounting. There is an increase in the number of examples that use business intelligence applications for reports with data that is captured and stored by IFMIS, as in the case of El Salvador and Honduras.

At the same time, as previously mentioned, Nicaragua and Panama have new IFMIS based on commercial software. These are not the tailor-made examples that have been used over recent decades. The lessons learned from these successes and challenges can be applied to future IFMIS upgrade programs and will effectively shorten the time it takes to implement such projects.

The fifth and last issue has been the application of modern or ERP-type IFMIS at the subnational level, which is still relatively rare. The first requirement is to set the same accounting standards throughout all levels of government, as in the case in Brazil since the 1960s and recently adopted by Argentina and Mexico for their respective provinces and states. Application of accounting standards is fundamental to ensure that the information reported by subnational governments is timely and comprehensive and that consolidation represents the public sector in its entirety. It is crucial that the financial systems of central government are aligned to those of subnational governments either by adapting them to the levels of government, as Brazil did with its states in the 1990s, or having the resources to buy or develop their own systems.

In conclusion, IFMIS implementation or modernization is a tremendously challenging undertaking which demands a high level of commitment from the authorities and staff of the Ministry of Finance. It also requires significant financial resources and a high degree of effort and dedication from project teams. There is no doubt whatsoever that an IFMIS is an extremely important PFM tool which, with the right ingredients, will strengthen the development of the region.

REFERENCES

- Andrews, M. 2013. *The Limits of Institutional Reform in Development: Changing Rules for Realistic Solutions*. New York: Cambridge University Press.
- Allen, R., R. Hemming, and B. Potter. 2013. *The International Handbook of Public Financial Management*. New York: Palgrave Macmillan.
- Arenas de Mesa, A. and G. Uña. 2012. "Sistema Integrado de Información Financiera: modelo conceptual de alto nivel en el marco de la gestión del gasto público." Montevideo, Uruguay: Ministry of Economy and Finances.
- Barros, A. 2012. "Modelo de análisis costo-beneficio para sistemas integrados de administración financiera." Discussion paper IDB-DP-194. Washington, DC: Inter-American Development Bank.
- Beckett, D. and D. Putnam. 2010. "Predicting Software Quality." *Journal of Software Technology* 13 (1).
- Cangiano, M., T. Curristine, and M. Lazare. 2013. *Public Financial Management and Its Emerging Architecture*. Washington, DC: International Monetary Fund.
- Dener, C. and S. Min. 2013. *Financial Management Information Systems and Open Budget Data: Do Governments Report on Where the Money Goes?* Washington, DC: World Bank.
- Dener, C., J. Watkins, and W. Dorotinsky. 2011. *Financial Management Information Systems: 25 Years of World Bank Experience on What Works and What Doesn't*. Washington, DC: World Bank.
- De Renzio P., M. Andrews, and Z. Mills. 2011. "Does Donor Support to Public Financial Management Reforms in Developing Countries Work? An Analytical Study of Quantitative Cross-Country Evidence." Overseas Development Institute, Working Paper 329. London: Overseas Development Institute.
- Dorotinsky, W. and J. Watkins. 2013. "Government Financial Management Information Systems." In: R. Allen, R. Hemming, and B. Potter (eds.), *The International Handbook of Public Financial Management*. New York: Palgrave Macmillan.
- Farías, P. and C. Pimenta. 2012. "Sistemas integrados de administración financiera para la gestión pública moderna." In: A. Corbacho (coord.), *Las instituciones fiscales del mañana*. Washington, DC: Inter-American Development Bank.
- IBP (International Budget Project). 2010. *Guide to Transparency in Government Budget Reports: How Civil Society Can Use Budget Reports for Research and Advocacy*. Washington, DC: International Budget Project.

- IDB (Inter-American Development Bank). 2010. "SIAFs en América Latina: tendencias y lecciones para su adopción." Treasury Management Seminar Program for Latin America, held on April 15-16, 2010, in Lima, Peru.
- IMF (International Monetary Fund). 2012. "Fiscal Transparency, Accountability and Risk." Board Paper, Washington, DC: International Monetary Fund.
- Khan, A. and M. Pessoa. 2010. "Conceptual Design: A Critical Element of a Government Financial Management Information System Project." IMF Technical Notes and Manuals No. 10 (Fiscal Affairs Department). Washington, DC: International Monetary Fund.
- López, C. 2013. "Gestión del cambio en la implementación de SIAF." International Workshop for IFMIS Coordinators. Washington, DC: Inter-American Development Bank.
- Makon, M. 2000. "Sistemas integrados de administración financiera pública en América Latina." Public Management Series N° 3. Santiago, Chile: Economic Commission for Latin America and the Caribbean.
- McDermid J. and T. Kelly. 2007. "Software in Safety Critical Systems: Achievement and Prediction." *Nuclear Future 2* (3).
- Nichols, K., S. Sharma, and R. Spires. 2011. "Seven Imperatives for Success in IT Megaprojects." In *McKinsey on Government*, No. 7 (Autumn 2011). McKinsey and Company.
- North, D. 1992. *Instituciones, cambio institucional y desempeño económico*. Mexico, DF: Fondo de Cultura Económica.
- OECD (Organisation for Economic Co-operation and Development). 2014. "Recommendation on Digital Government Strategies." Public Governance and Territorial Development Directorate. Paris, France: Organisation for Economic Co-operation and Development.
- Pattanayak, S. and I. Fainboim. 2011. "Treasury Single Account: An Essential Tool for Government Cash Management." Technical Notes and Manuals No. 4 (Fiscal Affairs Department). Washington, DC: International Monetary Fund.
- Pessoa, M. and M. Williams. 2012. "Government Cash Management: Relationship between the Treasury and the Central Bank." IMF Technical Notes and Manuals No. 2 (Fiscal Affairs Department). Washington, DC: International Monetary Fund.
- Reifer, D. 2004. "Industry Software Cost, Quality and Productivity Benchmarks." White Paper No. 2, Reifer Consultants Inc.
- Schick, A. 1998. "A Contemporary Approach to Public Expenditure Management." World Bank Institute, Governance, Regulation, and Finance Division. Washington, DC: World Bank.

- _____. 2013. "Reflections of Two Decades of Public Financial Management Reforms." In: Cangiano, M., T. Curristine and M. Lazare (eds.), *Public Financial Management and its Emerging Architecture*. Washington, DC: International Monetary Fund.
- Uña, G. 2013. "Principales aspectos funcionales del SIGFE 2.0." Working Paper. Dirección de Presupuestos. Chile: Ministerio de Hacienda.
- _____. 2012. "Estrategias de desarrollo e implementación de Sistemas Integrados de Administración Financiera (SIAF): Experiencias y lecciones para América Latina." Discussion paper IDB-DP-197. Washington, DC: Inter-American Development Bank.
- _____. 2011. "Desafíos para el presupuesto en América Latina: el presupuesto basado en resultados y los sistemas de administración financiera." XXIII° Regional Seminar on Fiscal Policy. Santiago, Chile: Economic Commission for Latin America and the Caribbean.
- World Bank. 2008. "Chile: Estudio de evaluación en profundidad del programa de mejoramiento de la gestión." Poverty Reduction and Economic Management Unit, Latin America and the Caribbean Region. Washington, DC: World Bank.

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