

Digitalization and management capacities

● Adoption of technologies for internal process management

● Use of technologies to manage city and urban services

● Structural factors enabling the adoption of digitalization strategies

● Digitalization of procedures and services for citizens and businesses



Key messages

1 Digital tools can help subnational governments improve three major areas of responsibility: internal administrative processes, procedures for citizens and businesses, and the deployment of technology to manage cities.

2 Internal processes that can be enhanced through digitalization include cadastre management, administrative and financial operations, and public procurement. Digitizing and modernizing cadastral systems can increase real estate tax collection capacity and enable the use of cadastral data in territorial planning.

3 The availability of digital services and procedures offered by local and regional governments remains limited. Most websites are used primarily to provide information about administrative procedures but do not enable users to complete those processes online.

4 Deploying technology in the field—such as cameras and sensors—offers the ability to collect information for managing public safety, traffic, or natural events. However, the effective use of these tools largely depends on the capacity and governance systems established to process the data generated and to respond appropriately.

5 Developing and adopting digital tools is expensive and may be cost-prohibitive for smaller jurisdictions. National governments play a central role in providing standardized systems, templates, and horizontal services—such as digital signatures and identity verification—not only to facilitate adoption but also to promote interoperability.

6 Access to and use of ICT in the region remains uneven, with significant geographic and demographic gaps. Recognizing connectivity and digital skills deficits is essential to ensure that digitalization strategies do not exclude segments of the population from accessing government services.

Digitalization and management capacities¹

Introduction

One of the key pillars of modernizing public administration is the application of digital technologies and solutions in governance. The premise is that these tools, by automating processes and generating data, enhance public policy formulation and targeting, improve service delivery, prioritize scarce resources, and increase transparency for citizens.

National governments tend to adopt digital solutions before subnational governments. This is due, in part, to their role in establishing regulatory frameworks and the governance and institutional structures for data and systems. Furthermore, centralizing modernization strategies has the advantage of enabling economies of scale and facilitating the establishment of standards that ensure system compatibility and provide a unified experience for citizens and businesses (Cubo et al., 2022). On the other hand, the capabilities of these technologies apply to all levels of government and, in some

cases, are even greater for local governments, which provide many services to citizens and directly manage their territories.

This chapter provides an overview of how local and regional governments in Latin America and the Caribbean (LAC) are incorporating digital solutions and data-driven practices into their management. The discussion is organized by the areas of application for these technologies. First, it examines their adoption in internal processes, focusing on cadastral systems, procurement systems, and financial administration platforms. The second section addresses the digitalization of procedures and services for citizens and businesses. Next, the chapter explores the deployment of technologies such as cameras, sensors, and radars which, when combined with machine learning algorithms and artificial intelligence, enable governments to address territorial challenges like traffic, safety, and

¹ This chapter was written by Florencia Buccari and Gustavo Fajardo, with assistance from Pilar Toyos and Mateo Fernández.

extreme natural events. Finally, it examines the structural factors that underpin the progress of digitalization agendas in subnational governments, with particular emphasis on gaps in access

to and use of information and communication technologies (ICT) across geographic regions and demographic groups.

Technology adoption in internal administration

Relying on electronic platforms to complete internal administrative processes offers the fundamental advantage of saving time and costs by streamlining procedures and ensuring they are carried out efficiently. Another benefit is the creation of an automatic record of all actions and transactions, which facilitates database updates, cross-referencing with other datasets, and reviewing processes. One example of these benefits can be seen in Nigeria, where the implementation of a pilot payroll management system in certain national public administration units resulted in cost savings by identifying duplicate payments and “ghost” workers (Gelb and Metz, 2018).

Internal digitalization also extends to administrative data, which arise from interactions and transactions

between citizens and the government. This can improve the targeting and efficiency of public programs and policies (World Bank, 2021). For instance, Muralidharan et al. (2016) demonstrated that the introduction of electronic beneficiary records, combined with biometric data, for two of India’s largest social programs reduced leakages.

At the subnational level, notable examples of digitalization include the digitalization of property cadastres, the implementation of electronic procurement systems, and financial administration platforms. While this list is not exhaustive, these areas represent fundamental functions supporting revenue and expenditure management in subnational governments.

Digitalization of property cadastres

Real estate taxes account for 42% of local government tax revenues in 11 countries in Latin America and the Caribbean (LAC). They offer clear advantages as a fiscal instrument: they are based on an immovable tax base, are transparent and progressive, and directly benefit taxpayers through services provided. However, collection rates in some LAC countries fall below their potential.² Barriers to increasing revenues include not only the elevated political costs of reforming real estate taxes but also challenges related to cadastral and tax administration systems of subnational governments, as well as institutional capacity for

land and property valuation. A unique case in the region is Chile, where the central government is solely responsible for administering this tax, including managing the tax base and rates (De Cesare et al., 2016).

Digitizing cadastres —converting property records into electronic formats—is an important first step toward improving real estate tax administration. Several subnational governments have made progress in this area (Knebelmann, 2022). In Mexico, for instance, 61% of local governments had digitized their cadastral records by 2020, while in

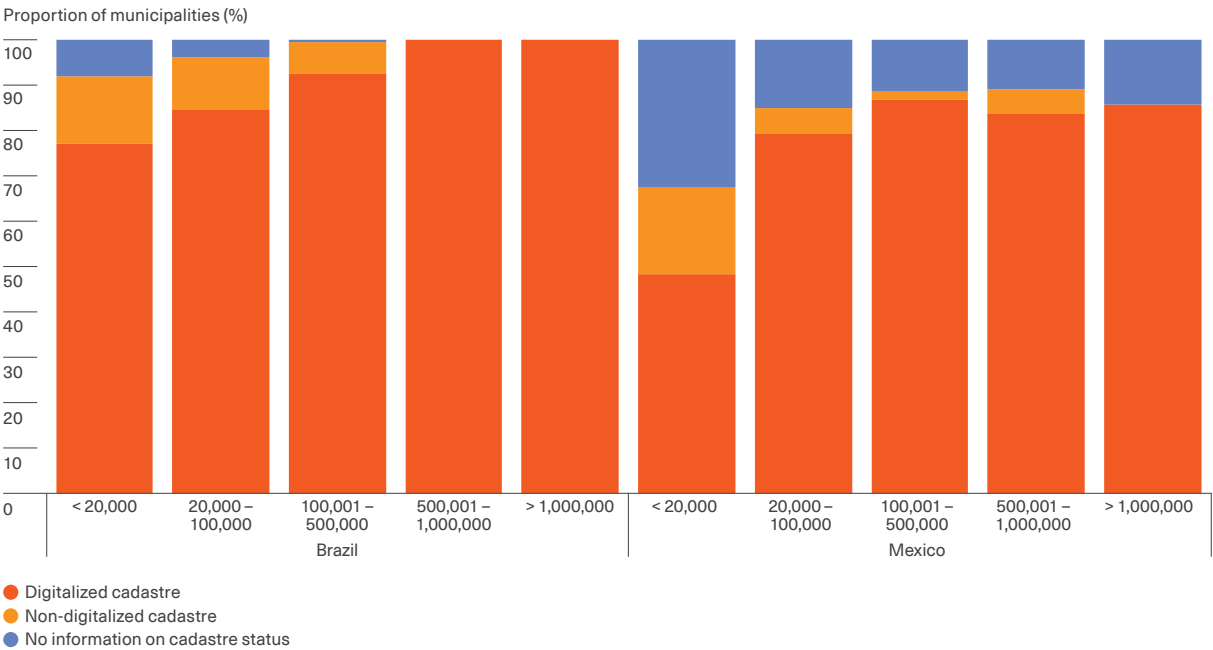
² For more information, see Chapter 5.

Brazil, this figure was 80% in 2019, with 21% also georeferenced (IBGE, 2019; INEGI, 2021). In both countries, the likelihood of having digitized records increases with municipal population size (Graph 8.1).

The digitalization of cadastre systems facilitates the completeness and timely updating of property information. Data from Mexico supports this hypothesis: 67% of municipalities with digital records updated their cadastres in the previous year, compared to only 17% of those without digital systems (INEGI, 2021). In Brazil, although there is no clear difference in the frequency of cadastral updates, there is a significant gap in the update rates of the Generic Value Table, which establishes basic unit values for land and buildings. Among local governments with digitized cadastres, 65% updated the plan in the past ten years, compared to only 43% of those without digital records.

Regular cadastral updates are associated with better tax collection performance. Evidence from Martínez (2023) for Colombia supports this point. Until 2016, municipal cadastres in Colombia were centralized under the Agustín Codazzi Geographic Institute (IGAC), except for Bogotá, Cali, Medellín, and the Antioquia Department. IGAC handled cadastral updates, including property revaluations and the inclusion of unregistered properties. While updates were mandated every five years, delays were common. Martínez (2023) estimates that cadastral updates resulted in a 12% increase in per capita real estate tax revenue. Similarly, in Mexico, the adoption of cadastral modernization programs by local governments led to a 10% increase in revenue within the first five years (Montoya-Aguirre et al., 2024).

Graph 8.1
Proportion of local governments in Mexico and Brazil with digitalized cadastres, by population size



Note: The graph shows the digitalization of cadastral records in Mexican municipalities in 2020 and property cadastres in Brazilian municipalities in 2019. Definitions can be found in the appendix available in the online edition of the RED report.

Source: Authors based on IBGE (2019), INEGI (2021), and CAF (2025).



Subnational governments in LAC have made progress in digitizing cadastres: over 60% of municipalities in Mexico and more than 80% in Brazil have already taken this step

Georeferencing cadastral information represents a step beyond digitization, as it enables integration with data from other sources. A clear example of this integration is the work carried out by real estate market observatories, which collect data from various sources—such as cadastral records, property transaction records, real estate service companies, and chambers of commerce and industry—to monitor trends in the sector. In some cases, these observatories also apply predictive models to estimate land and property values, facilitating more frequent updates of the valuations used as the basis for real estate and transaction taxes (Eguino et al., 2020).

In recent years, georeferenced cadastral data has been combined with other spatial datasets, including road infrastructure maps, public transport routes, and the locations of economic activity hubs, schools, and health facilities. However, compiling these datasets requires standardization and interoperability, meaning they must comply with specific norms, specifications, and standards. This necessity has driven the creation of Spatial Data Infrastructures (SDIs), information systems comprising technological resources—such as servers, applications, and websites—dedicated to managing geographic data. These systems

adhere to a set of standards to ensure accessibility and interoperability across multiple stakeholders (Eguino et al., 2020; MITECO, 2024). In Argentina, for example, 19 of the country's 23 intermediate-level governments have established their own SDIs, with some enabling local governments to join and create their own geoportals.

Subnational governments can leverage georeferenced cadastral systems to plan and define policies, such as those related to urban development, land-use management, and public safety programs. However, such applications remain limited. According to calculations based on data from Mexico's National Institute of Statistics and Geography (INEGI, 2021), only 35% of local governments in Mexico used cadastral information for urban development or land-use planning. This ratio varied depending on the digitization of the registry: 52% of municipalities with a digitized registry used it for urban planning purposes, compared to just 15% of those without one.

An illustrative example of the benefits of alternative applications for georeferenced cadastral data comes from the modernization of the cadastre in Fortaleza, Brazil. This modernization enabled the Municipal Secretariat of Urbanism and the Environment to access and use the cadastral data, enabling the streamlining of economic and construction feasibility consultations. When the system was first implemented, response times for these requests decreased from 120 days to near-instantaneous responses, while the number of consultations processed increased from 80 per semester to 265 per day (Eguino et al., 2020).

Electronic procurement systems

Studies show that the implementation of electronic procurement systems by subnational governments can yield numerous benefits. Lewis-Faupel et al. (2016) examined the adoption of e-procurement systems for infrastructure projects in regions and provinces in India and Indonesia. They found improvements in project quality (measured by on-time completion rates) and an increase in the number of winning contractors, which suggests

greater openness and competition. Positive evidence also exists for the implementation of e-procurement platforms in Latin America and the Caribbean, but primarily at the national government level (De Michele and Pierri, 2020; Singer et al., 2009).

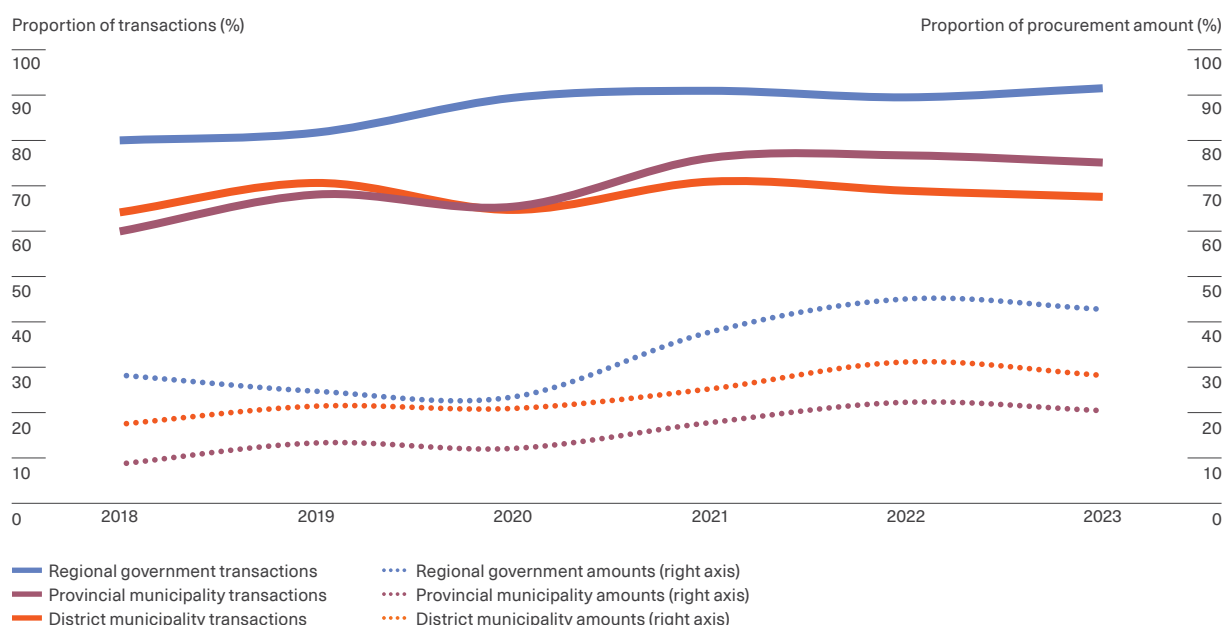
Electronic procurement systems offer the added advantage of automatically generating transaction records, which leads to the creation of large databases of past operations. These databases are invaluable for analyzing the efficiency of public procurement processes or identifying irregularities.

The adoption of these systems by regional and local governments is quantitatively significant given the large share of total public procurement they account for—ranging from 10% in Paraguay to 85% in Brazil (OECD, 2024b). A common first step

in promoting the use of these platforms among subnational governments is their adoption at the central government level. In the region, 25 out of 30 countries with subnational governments had an active national e-procurement portal as of 2022 (World Bank, 2022b). Of the 10 South American countries with such systems, eight extend the scope of their national public procurement legislation to include subnational governments. All of these countries use electronic portals to systematize the procurement of homogeneous goods and acquisitions for infrastructure projects.

Graph 8.2

Use of electronic catalogs for public procurement by subnational governments in Peru, measured in terms of transactions and spending



Note: The left axis shows the proportion of transactions conducted through electronic catalogs relative to the total operations possible under framework agreements (i.e., those eligible for electronic catalog use). The right axis provides a similar analysis but in terms of procurement amounts. The data is disaggregated by levels of government: regional and local (provincial and district). Procurement data for transactions conducted through electronic catalogs comes from Perú Compras, while data for transactions conducted outside this mechanism is sourced from the State Procurement Supervisory Agency (OSCE). The figures reported represent averages for all subnational governments using both mechanisms in each year. Hospitals, universities, and schools are excluded.

Source: Author based on Open Contracting Partnership (2023a, 2023b).

Having an electronic platform, however, does not guarantee widespread use for public procurement operations, as purchasing units—both national and subnational—may find exceptions to avoid its adoption. Perú Compras illustrates this dynamic. Graph 8.2 shows the percentage of regional and local government purchases in Peru that could be conducted through electronic catalogs and were actually executed using this method. While the proportion of transactions conducted electronically is high, it is much lower in terms of total spending amounts. A similar analysis for central government agencies reveals comparable findings: in 2023, 88% of transactions eligible for electronic catalog use were completed through this mechanism, but electronically executed purchases accounted for only 17% of total spending (Open Contracting Partnership, 2023a, 2023b).

Three hypotheses may explain the limited use of electronic catalogs for high-value purchases, even though this mechanism is mandatory for products covered under framework agreements. First, a comparison of public procurement for similar goods reveals that items purchased outside the electronic catalog have higher prices—on average, 30% more expensive (Cusato Novelli, 2022). The second hypothesis suggests that officials include additional specifications for goods to bypass the use of electronic catalogs (Inostroza and Centa, 2020). Finally, Chile's experience seems to suggest that audits of purchases made through electronic platforms could disincentivize their use (Gerardino et al., 2024).

Administrative and financial management systems

Financial Management Information Systems (FMIS) are programs that support the budgetary, financial, and accounting management of the public sector. These systems enable the creation of a unified and timely record of revenues and expenditures and allow for the automatic generation of financial statements. Recent advancements have also enabled the operation of a Treasury Single Account, which provides a consolidated financial position and facilitates centralized balance management. In their current design, FMISs are composed of various modules beyond budget tracking, including public debt, procurement, and human resources management (Pimenta and Seco, 2021).

Implementing an FMIS benefits both subnational governments, providing them with organized and up-to-date financial and administrative information, and national entities, centralizing and standardizing data on budgets and finances across levels of government. As of 2022, all central governments in the region had implemented financial management systems, except for Trinidad and Tobago, where implementation was underway (World Bank, 2022b). These systems typically include features for budget

planning and monitoring. Additionally, in 19 countries in the region, central government FMISs allow subnational governments to use their functionalities (World Bank, 2022b).



While almost all central governments in LAC have an FMIS, only 19 allow subnational governments to access its functionalities

The development and adoption of these tools require careful management. Pimenta and Seco (2021) reviewed successful FMIS implementation cases in several Latin American and Caribbean countries and highlighted key lessons learned. First, implementing or modernizing such systems incrementally or in modular form can be favorable, since it facilitates their maintenance. Additionally, to encourage adoption, these systems must be designed with a user experience approach and accompanied by training and technical assistance for government officials. The authors note, however, that despite incorporating these principles in the region, many transactions



San Felipe, Mexico, is one of the region's newest municipalities, established in 2022.

continued to occur outside these systems after their implementation, and alternative methods proliferated. This led to issues of interoperability and task duplication.



In many cases, subnational governments use alternative systems to national FMIS for their records, leading to task duplication and interoperability issues

The case of FMIS implementation in Peru illustrates several of these recommendations and highlights the challenges associated with such strategies. The central government began rolling out the FMIS for local governments in 2003, starting with the budget management module and providing support for its adoption (MEF of Peru, 2007). The territorial deployment of this system was carried out by

offering the program free of charge and equipping municipalities with computers, modems, and printers. To assist with the software implementation, municipal officials received hands-on support from experts. Currently, the FMIS includes modules for budget management, treasury, debt, accounting, procurement, and human resources, and its use is mandatory for regional and local governments (Legislative Decree No. 1436, 2018).

Despite efforts to encourage local governments in Peru to use the FMIS, a significant proportion still operated their own budget systems alongside the national system in 2016, as shown in Graph 8.3. Starting in 2018, the Ministry of Economy and Finance introduced web-based applications for some FMIS modules (MEF of Peru, 2018), which may be related to a significant reduction of local governments that operated their own budget systems. However, the use of proprietary systems persisted in 2023, particularly in municipalities with lower per capita tax revenues (Graph 8.3).

Graph 8.3
Percentage of local governments in Peru operating their own budget systems, by per capita tax revenue quartile



Source: Authors based on INEI (2016, 2023b) and CAF (2025).

Modernizing administrative procedures and services for citizens and businesses

The most compelling argument for digitalizing public services and other administrative procedures is its potential to increase accessibility for citizens while reducing transaction costs (Gupta et al., 2017). Although it is difficult to estimate the welfare losses associated with bureaucratic procedures in the region, survey data indicates that completing such processes is often time-intensive. According to Latinobarómetro, a public opinion survey conducted across 19 countries in Latin America and the Caribbean, respondents reported spending an average of 5.4 hours on their most recent administrative procedure, with 25% requiring three or more interactions to complete (Roseth et al., 2018).

Delays and procedural burdens in administrative processes also impose significant costs on the productive sector, often being associated with lower rates of business creation (Branstetter et al., 2014; Djankov et al., 2018). Pellegrino and Zheng (2024) estimate that these inefficiencies can lead to losses of up to 4% of GDP in some European countries.

In the region, a study conducted in São Paulo estimated that digitalizing business-related processes—such as permits for transporting hazardous goods or property tax-related procedures—reduced the unit cost of applications by 67% (Pizzolato Gonçalves and Venijio Maggion, 2022). Similarly, surveys indicate that bureaucratic burdens can hinder the growth of existing businesses. In 2020, 28% of Mexican firms reported that the regulatory framework—comprising laws, processes, applications, and inspections—was an obstacle to their success (INEGI, 2020b). The primary barriers to compliance were, in order of importance, the time required, the need to provide the same information multiple times, the preparation and submission of government-mandated documents, and the associated costs.

Digitalizing public services can also reduce the costs of service provision for public administrations. In the same study conducted in São Paulo, digitalization was estimated to lower the unit cost of responding to a request by 40%, net of the costs associated with implementing digital solutions (Pizzolato Gonçalves and Venijio Maggion, 2022). These savings largely

stem from reducing personnel dedicated to direct customer service and application processing.

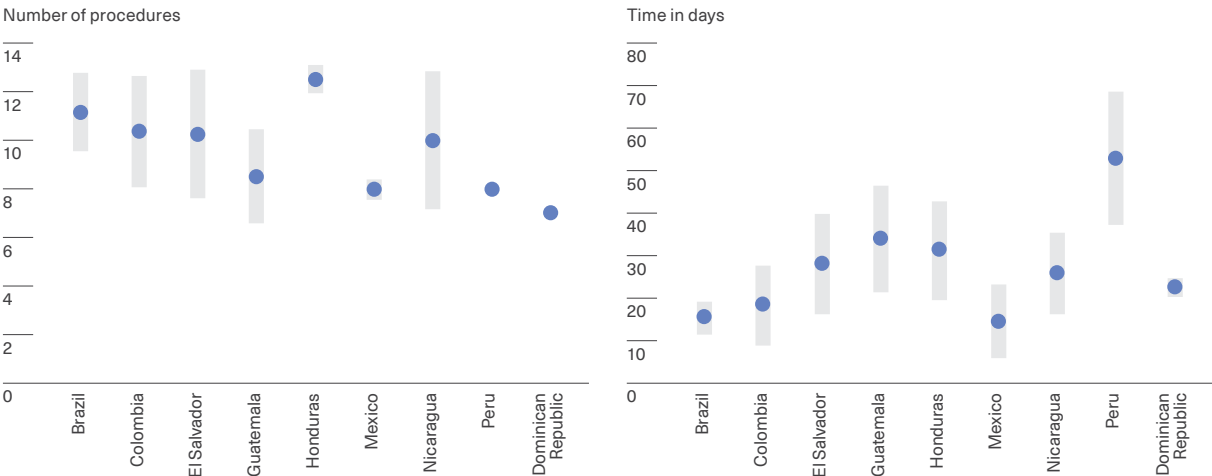
According to the World Bank's *Doing Business* report, companies in Latin America and the Caribbean wait an average of 28 days to start a business and 150 days to obtain a construction permit. Additionally, completing these processes requires between 10 and 16 separate procedures in each case (World Bank, 2022c). While this report does not provide representative data for local governments within each country, it does include surveys from various areas, and the geographic dispersion suggests a specific effect of subnational administrations (see Graph 8.4).

A basic prerequisite for offering digital services is having a government website. While this practice is widespread among subnational governments, it is not universal. For instance, according to a recent United Nations report, in six LAC countries, the largest local governments by population do not have websites (United Nations, 2022). Census data on subnational governments in the region also highlights significant disparities in website adoption: in Brazil, 96% of local governments had active websites in 2019, compared to only 55% in Peru by 2023 (IBGE, 2019; INEI, 2023b).

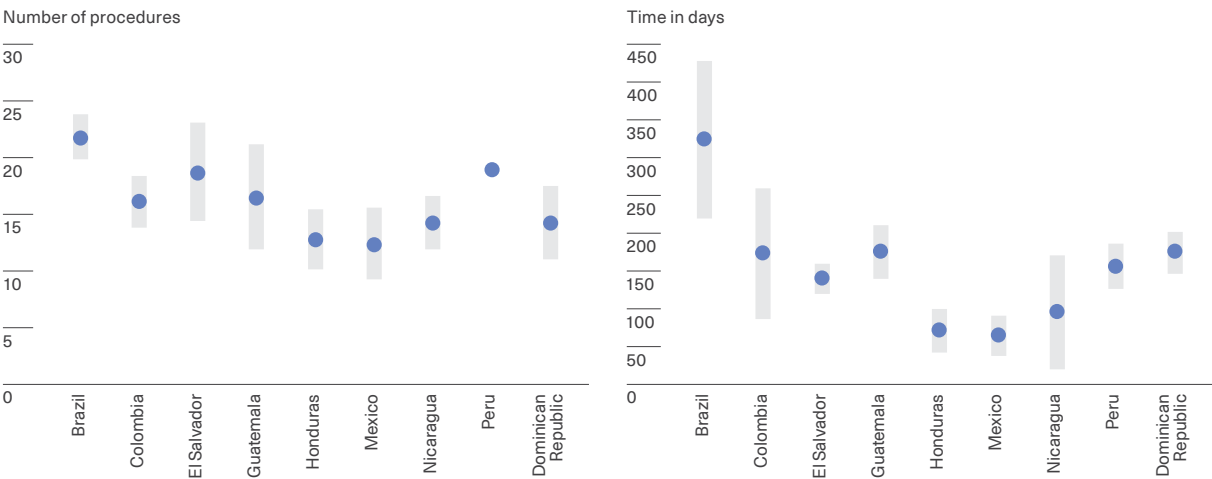
Having a website, however, is only a preliminary step, and many governments use their sites solely to provide general information about their offices. Data from Mexico's National Census of Municipal Governments and Territorial Demarcations reveals that only 10% of municipalities had any kind of procedure available on their websites in 2021 (INEGI, 2021). Of these, 53% were purely informational, 26% offered interactive features, and only 21% were transactional. These findings align with Roseth et al. (2018), who noted a nearly 15-percentage-point gap across the region between the proportion of processes that can be initiated online and those that can be fully completed online—except in Chile, where this gap is almost null. On the other hand, governments at more advanced stages of digitalizing their systems have implemented artificial intelligence to develop virtual assistants that provide additional information on online procedures and guide citizens through their completion.

Graph 8.4
 Number of procedures and waiting days for starting a business and obtaining construction permits

Panel A.
 Number of procedures and time required to start a business in Latin America and the Caribbean



Panel B.
 Number of procedures and time required to obtain construction permits in Latin America and the Caribbean



Note: The graph shows the number of procedures and days required to start a business or obtain construction permits. The dot represents the average and the bar indicates the standard deviation across selected cities included in the *Doing Business* report for each Latin American and Caribbean country. The most recent data available was used: Brazil (2021), Peru (2020), Colombia (2017), Mexico (2016), and El Salvador, Guatemala, Honduras, Nicaragua, and the Dominican Republic (2015 for the last five countries).

Source: Authors based on World Bank (2022c).

According to the same municipal census in Mexico, the most in-demand administrative procedures—after payments for drinking water services and

real estate taxes—were civil registry certificates and proof-of-residence documents. However, only 4% of municipalities offered these procedures

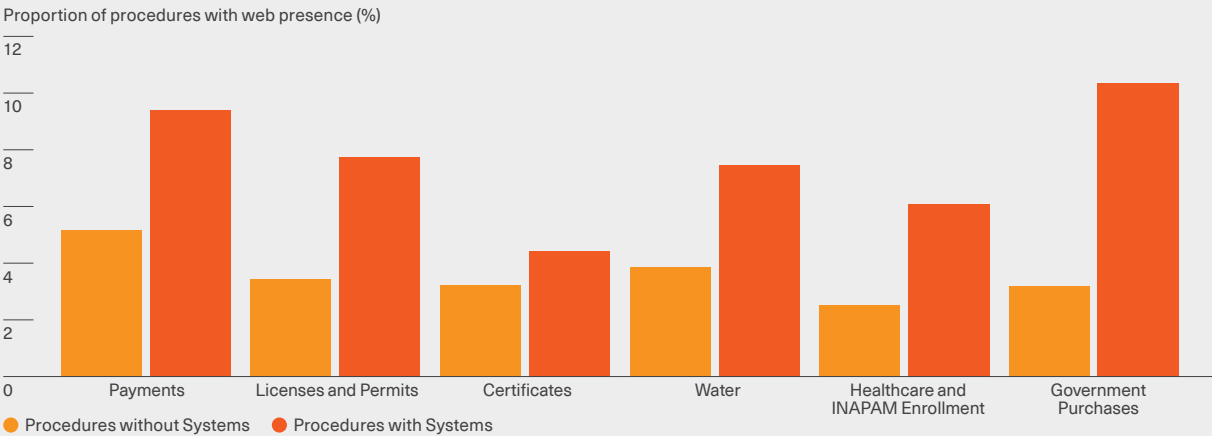
online. Similarly, while all regional governments in Brazil have websites, 30% do not provide their most in-demand public service online (CETIC, 2024). The development of online administrative processes is often linked to the implementation of internal systems within public administrations for processing or tracking applications, as explained in Box 8.1.

Digitalizing services and procedures can yield significant benefits when combined with administrative simplification measures. A classic example is the adoption of one-stop shops that integrate various services and processes into a single point of access, whether physical or digital (OECD, 2020b). Box 8.2 discusses some examples of these initiatives.

Box 8.1
The relationship between digitalizing citizen services and internal management systems

The digitalization of citizen services often depends on whether public administrations have internal IT systems to process requests. Data from the National Census of Municipal Governments and Territorial Demarcations in Mexico City (INEGI, 2021) illustrates the relationship between the internal and external components of administrative processes. The census asks two key questions regarding a wide range of procedures and services offered by municipalities: first, whether these services are accessible via the government’s website; and second, whether internal IT systems are in place to manage them. The likelihood of offering online services increases significantly for municipalities that have internal systems for processing requests. As shown in Graph 1, on average, 7.5% of services supported by internal IT systems are available online, compared to less than 4% for municipalities without such systems.

Graph 1
Proportion of services available online based on the presence or absence of internal IT systems



Note: The “Payments” category includes payments for real estate taxes, fees for drinking water supply and drainage, traffic fines, and violations of administrative or public safety regulations. The “Licenses and Permits” category includes permits for events and shows, business licenses, construction permits, and public advertisement permits. The “Certificates” category covers proof-of-residence documents and certified copies of civil registry records. The “Water” category includes water and drainage service contracts, piped water services, water leak repairs, and wastewater discharge permits. The “Medical and Elderly Services” category refers to enrollment in the National Institute for Older Adults (INAPAM), medical consultations, and psychological counseling.

Source: Authors based on INEGI (2021).

Box 8.2

Digital one-stop shops

One-stop shops (OSS) have served various purposes since their inception. Common applications include social security services, foreign trade facilitation, and business and investment registration. A study on the implementation of a digital one-stop shop for business registration in the Dominican Republic in 2013 found that it led to increased formalization, particularly among smaller businesses (Bobić et al., 2023).

There are very few documented cases of one-stop-shop implementation at the subnational level in the region. An exception is Mexico's National Commission for Regulatory Improvement (CONAMER), which certifies local governments that establish digital one-stop shops for business creation and streamlined construction processes. For business creation, there are two programs: the Rapid Business Start-Up System (Sistema de Apertura Rápida de Empresas, SARE) and the Rapid Business Start-Up Recognition and Operation Program (Programa de Reconocimiento y Operación del Sistema de Apertura Rápida de Empresas, PROSARE). These programs certify that low-risk businesses in certified municipalities can be opened within three days using a standardized application, either in person or online. For construction, the Streamlined Construction Permit System (Ventanilla de Construcción Simplificada, VECS) certification applies to municipalities that issue municipal construction permits and related processes through a single one-stop shop. These processes must be resolved within 10 days, with no more than three interactions, using a single form. All of the aforementioned certifications provided by CONAMER must be renewed every two years.

As of late 2024, 114 of 2,469 municipalities had been certified under the rapid business start-up program, and all reported having a website for the corresponding procedures. Additionally, fewer than 10 municipalities held active certifications for one-stop shops related to construction processes (CONAMER, 2024).

Horizontal services for the digitalization of procedures: The role of central governments

The digital transformation of subnational governments should leverage shared tools developed by central government entities. These are also known as horizontal services or platform services. They include, for example, digital identification and digital signatures. Leveraging the economies of scale provided by these tools leads to efficiency gains, enables the digitalization of procedures that depend on them, and accelerates their development (Cubo et al., 2022). They also improve user experience by eliminating the need to input data and configure multiple platforms while ensuring system compatibility by default.

Online digital identity refers to systems that allow individuals to securely and remotely verify their identity for online transactions (Metz et al., 2024). A

study conducted by Metz et al. (2024) examines the availability of national digital identification systems that meet the following requirements: i) guarantee a strict link between digital credentials and the physical person (e.g., through biometric data verification); ii) are operational and actively used by the population; and iii) grant access to multiple platforms or services, such as civil registries, social program beneficiary databases, tax payments, or local health services. Nearly all South American countries have implemented identification systems with these characteristics, as shown in Table 8.1, while adoption is lower in Central America and the Caribbean. By contrast, such systems are available in almost all OECD countries.

Table 8.1

Adoption of digital identity and digital signatures at the national level in Latin American and Caribbean countries

Country	National digital identity	Digital signature at the national level		
		Legislation	Infrastructure	In use
Antigua and Barbuda	No	Yes	Yes	No
Argentina	Yes	Yes	Yes	Yes
Bahamas	Yes	Yes	No	-
Belize	No	Yes	No	-
Bolivia	Yes	Yes	Yes	Yes
Brazil	Yes	Yes	Yes	Yes
Chile	Yes	Yes	Yes	Yes
Colombia	Yes	Yes	Yes	Yes
Costa Rica	No	Yes	Yes	Yes
Cuba	No	Yes	Yes	No
Dominica	No	No	No	-
Ecuador	No	Yes	Yes	Yes
El Salvador	No	Yes	Yes	No
Guatemala	No	Yes	Yes	Yes
Guyana	No	No	No	-
Haiti	No	No	No	-
Honduras	No	Yes	No	-
Jamaica	No	Yes	No	-
Mexico	No	Yes	Yes	Yes
Nicaragua	No	Yes	No	-
Panama	Yes	Yes	Yes	No
Paraguay	Yes	Yes	Yes	No
Peru	Yes	Yes	Yes	Yes
Dominican Republic	No	Yes	Yes	Yes
Saint Kitts and Nevis	No	Yes	No	-
Saint Lucia	No	Yes	No	-
Suriname	No	No	No	-
Trinidad and Tobago	Yes	Yes	No	-
Uruguay	Yes	Yes	Yes	Yes
Venezuela	No	Yes	Yes	No

Note: The table includes only LAC countries with subnational governments.

Source: Authors based on Metz et al. (2024) and World Bank (2022b).



The Autonomous Region of the South Caribbean Coast in Nicaragua has a self-governing Indigenous administration.

Digital signatures are required to carry out online procedures and services and to ensure the legal validity of resulting documents and transactions (Cubo et al., 2022). These services may be limited to public officials or extended to citizens and businesses. In the latter case, the workload for service-providing entities increases significantly, highlighting the importance of offering shared services across entities to reduce complexity. A best practice is to ensure that all public entities have access to the modules and programs that constitute these services and to make them easy to use.



Entradilla: National governments' digital identity and signature infrastructures should be leveraged by subnational governments, but many countries have yet to develop them

Given their nature, digital signatures require legal frameworks to enable their use. Table 8.1 shows that while most countries in the region have made progress in their legislation on this matter, only about one-third currently use these systems for public sector officials.

Chile provides an example of horizontal service implementation in the region. Through its State Digital Transformation Law, it offers regional and municipal governments cross-cutting platforms for digital identity (Clave Única) and digital signatures for government officials (FirmaGob). The legislation categorizes regional and local governments, establishing deadlines for the full implementation of these tools. As of June 2024, digital document signing had been implemented in 83% of regional and local governments, while digital authentication services were available in only 29% (SGD, 2024).

Use of technologies for city management

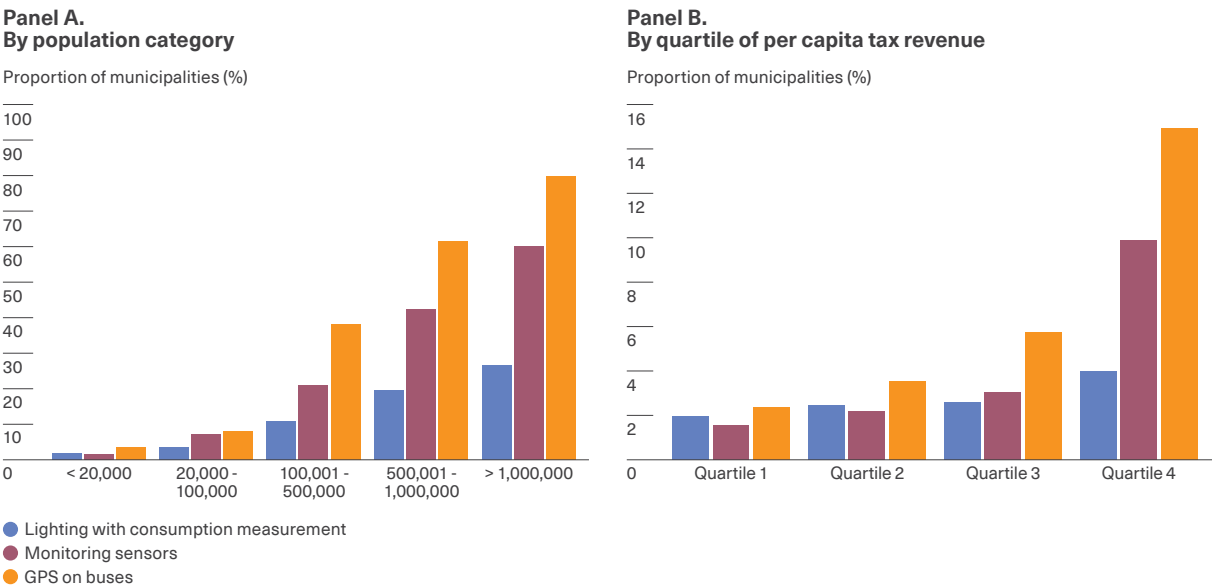
In recent decades, new technologies such as sensors, cameras, and global positioning systems (GPS) have emerged and improved, enabling high-frequency monitoring of activities within a territory. This type of information has very tangible potential applications for local governments, which manage urban affairs more directly. For example, by combining these data with machine learning and artificial intelligence models, alert and response systems have been implemented to address traffic issues, potential natural disasters, and public safety.

Local governments have begun adopting these technologies, though progress has been gradual. In 2019, 7% of local governments in Brazil had GPS systems that transmit location and speed data installed in their buses; 4% used sensors, which monitor areas at risk of natural disasters; and fewer than 3% employed lighting systems that measure real-time energy consumption (IBGE, 2019). The use of these tools increases with municipal population size and income (Graph 8.5). Larger municipalities are better positioned to afford the high installation

costs of such devices. Additionally, data processing requires significant computational capacity, often necessitating cloud services. By 2022, 11 countries in the region were already using these services, and eight national governments had launched initiatives to begin using cloud computing. Among these 19 countries, eight had developed strategies to centralize central government services with local governments (World Bank, 2022b).

One example of these tools' adoption is the Welcoming, Global, and Smart City Program (Ribeirão Ágil – Ciudad acogedora, Global e Inteligente) Program in Ribeirão Preto, Brazil. Funded by CAF — Development Bank of Latin America and the Caribbean —, the project aims to modernize municipal management and improve the quality of public services. It includes the installation of new video surveillance cameras and the modernization of the Municipal Integrated Video Surveillance Center.

Graph 8.5
Proportion of local governments in Brazil using real-time monitoring tools in 2019



Source: Authors based on IBGE (2019), CAF (2025), and STN (2023d).

To aggregate and process the high-frequency information collected by sensors and cameras—often combined with external data sources—monitoring centers have been implemented (Cabello, 2022). These units use the data to monitor, prevent, and respond quickly to local issues such as traffic or security problems. An interesting case is Medellín’s Intelligent Mobility System, which collects data from monitoring cameras and traffic lights equipped with vehicle detection sensors capable of capturing traffic information. The data is integrated into the Mobility Control Center, which transmits alerts to citizens via social media and city-installed panels.

The monitoring center model is beginning to expand among local governments in Brazil: 11% of municipalities had operational control centers in 2019 (IBGE, 2019), covering over half of municipalities with populations between 100,000 and 1 million inhabitants. A notable example is the Rio de Janeiro Operations Center (COR), inaugurated in 2010. It combines its own traffic and transportation data with private applications

such as Waze and Moovit, public safety data, and information on potential extreme weather events (e.g., heat waves and floods). Its goal is to identify and manage crises (Municipal Government of Rio de Janeiro, 2024). Box 8.3 provides details on other cases of cooperation with the private sector for data collection.

One factor that explains the still limited adoption of monitoring centers and related technologies is the high cost of installation and operation. For example, the Regional Government of Santiago de Chile estimated the cost of installing 400 cameras in 2023 at approximately USD 7,000 per unit (Metropolitan Regional Council of Santiago, 2023). Operational costs also vary widely among governments and can be significant. In the case of Rio de Janeiro, for instance, the 2023 budget allocated USD 5 million for COR’s operational expenses that year (Municipal Government of Rio de Janeiro, 2023).

Box 8.3

Cooperation with the private sector for data collection

The significant growth of the digital service economy has led to the emergence of private companies and organizations that collect vast amounts of information through their activities (social media posts, satellite images, mobility applications). This creates opportunities for new data sources that could potentially be used by the public sector. Examples of potential applications include disaster response targeting, greater geographic and temporal disaggregation in socioeconomic status estimates for households, and road accident monitoring (World Bank, 2021).

One example of a public-private agreement is the partnership between the Rio de Janeiro Operations Center (COR) and mobility applications such as Moovit and Waze, which provide city traffic data. The COR uses these applications to send notifications to citizens about construction projects that may impact mobility and receives real-time traffic updates from the applications' users (Municipal Government of Rio de Janeiro, 2024).

A general caution regarding the public sector's use of such data is that it must be handled with great care. Specifically, potential biases in data coverage and representativeness should be considered (e.g., data from a cellular services company with low penetration in certain regions or socioeconomic strata). Additionally, governments should be mindful of prior data cleaning and processing by the private sector actors providing the data (World Bank, 2021). The public sector must also ensure the confidentiality of the data obtained from private entities and clearly define the purposes for its use. To this end, governments can rely on the confidentiality frameworks already established in their statistical systems (European Commission, 2020).

To date, the implementation of such collaborations has not expanded significantly.

Capabilities and enabling factors for modernization

Despite the arguments presented in this chapter in favor of investing in data use and information technologies, progress among subnational governments remains incipient. Several factors contribute to this. First, these investments are costly. Evidence that costs are a significant factor can be seen in the higher penetration of technological solutions in more populated and wealthier jurisdictions, where budgetary constraints are less restrictive, as shown throughout this chapter. National government initiative is essential to addressing this issue. By leveraging economies of scale, they can offer standardized models and platforms for subnational governments to adopt. This approach can address at least some of the

costs associated with developing and adopting software. However, other costs, such as purchasing equipment, hiring personnel, and making organizational adjustments, cannot be addressed through this method.

In addition to costs, there may be a perception among authorities that these investments yield low returns. While direct evidence in this regard is difficult to obtain, recent studies have explored how much government organizations value quantitative evidence when making decisions. This may reflect a broader organizational culture oriented toward data use and digital tools. Findings from these studies, which have focused on municipal governments,

suggest that organizations respond to evidence but only moderately and that institutional continuity and inertia often carry more weight in decision-making (DellaVigna et al., 2024; Hjort et al., 2019).



Costs, organizational culture, and political economy factors influence subnational governments' decisions on the use of technologies and data

Political economy factors can also hinder digitalization efforts. For example, authorities may perceive reforms as potentially detrimental, either by reducing their revenue streams or affecting their popularity. In line with this, Ferraz et al. (2024) found that Brazilian municipalities invest little in fiscal capacity (including property registries) when they receive substantial transfers from the national government, to avoid the political cost of increasing

taxes. In some cases, however, political competition can incentivize reforms. For instance, Berliner and Erlich (2015) found that state-level freedom of information laws, often closely tied to digitalization, were passed more quickly in Mexican states with higher levels of political competition because authorities in such states had more incentive to raise transparency standards when the likelihood of political alternation was high.

The paragraphs above highlight factors closely tied to the incentive and cost calculations faced by subnational authorities when deciding whether to pursue digitalization initiatives. On the other hand, some more structural factors, which are beyond the immediate decisions of authorities, play a significant role in determining the viability of such initiatives. Next, four of these structural factors are described: the quality of infrastructure and citizens' skills, the capacities of subnational bureaucracies, the digitalization strategies of national governments, and collaboration with the private sector.

Digital gaps: Infrastructure and citizen skills

The value of digital services offered by subnational governments depends on demand, which in turn relies on the population's access to and ability to use ICTs. In LAC, there are significant digital gaps, with substantial inequalities in access and usage, making it essential to explore the sources of these differences.

The first source of the digital gaps is internet quality, which is directly linked to digital infrastructure. Figure 8.1 illustrates fixed internet download speeds at the subnational level throughout the region. With exceptions like Chile and Uruguay, where speeds are uniform and high, most countries show significant geographic disparities. Twenty-two percent of jurisdictions have download speeds below 25 megabits per second (Mbps), making simple tasks like file downloads, email, or online conferencing across multiple devices difficult. Fixed internet

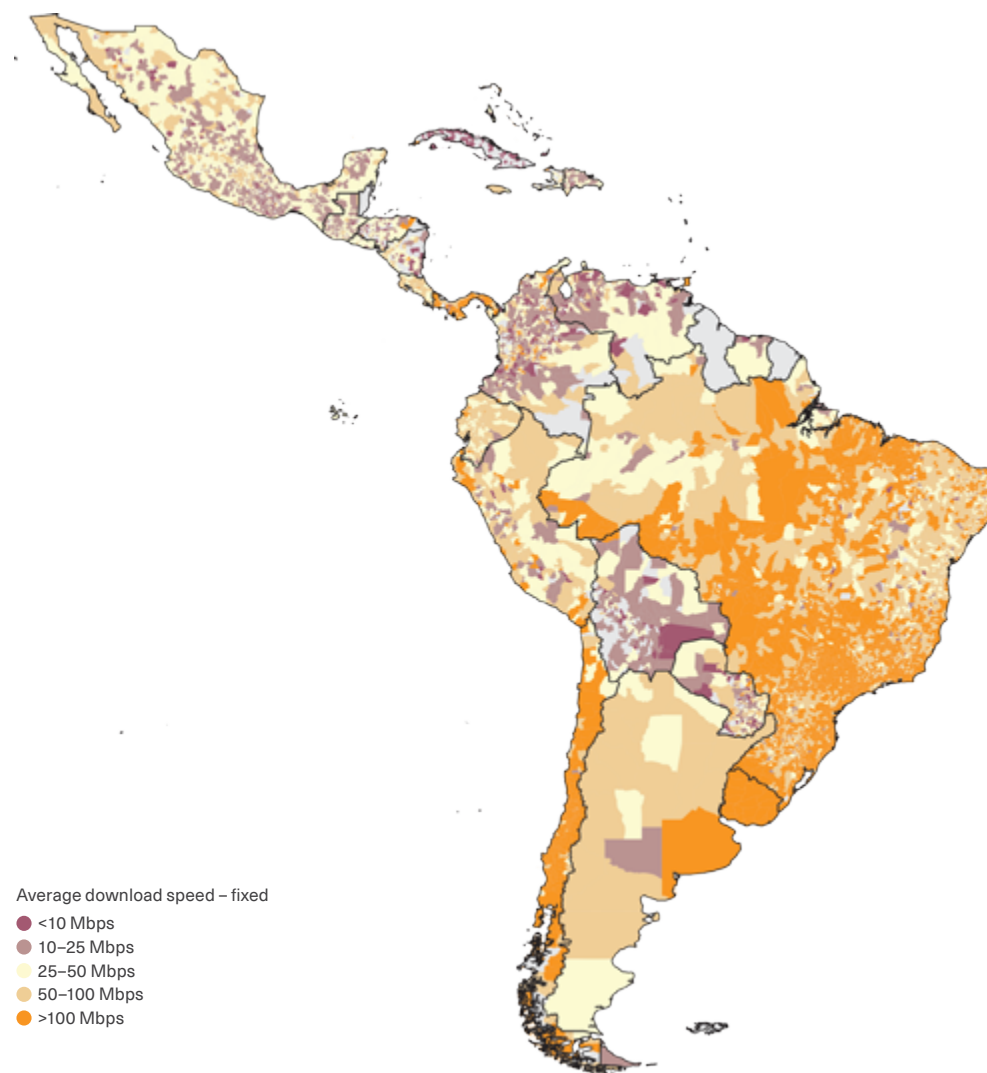
speeds often reflect the connection quality available to subnational government offices. However, from the user's perspective, mobile connectivity is more relevant and tends to be worse. In the average jurisdiction, mobile download speeds are 50% lower than fixed speeds, and 37% of jurisdictions have mobile speeds below 25 Mbps (Figure A.8.1).³

Ownership or access to devices is another determinant of ICT use. While computer ownership is low in the region, mobile phone penetration is exceptionally high, with over 90% of individuals in countries with household survey data (e.g., Bolivia, Brazil, Colombia, and Mexico) reporting ownership. This disparity highlights the importance of mobile internet for users. On the other hand, age stands out as a notable source of heterogeneity. Mobile phone ownership drops to between 60% and 75% among individuals aged 65 and older.

³ The affordability of internet services can also be a barrier, as shown in the Ideal 2021 report (Cont et al., 2021).

Figure 8.1

Average download speeds of fixed connectivity in 2023 for local and regional governments in Latin America and the Caribbean



Note: The map presents average download speeds in 2023, measured in megabits per second (Mbps). Data comes from OOKLA (2023), which collects speed test results from users with GPS-enabled devices connected via Wi-Fi and Ethernet.

Source: Authors based on OOKLA (2023) and CAF (2025).

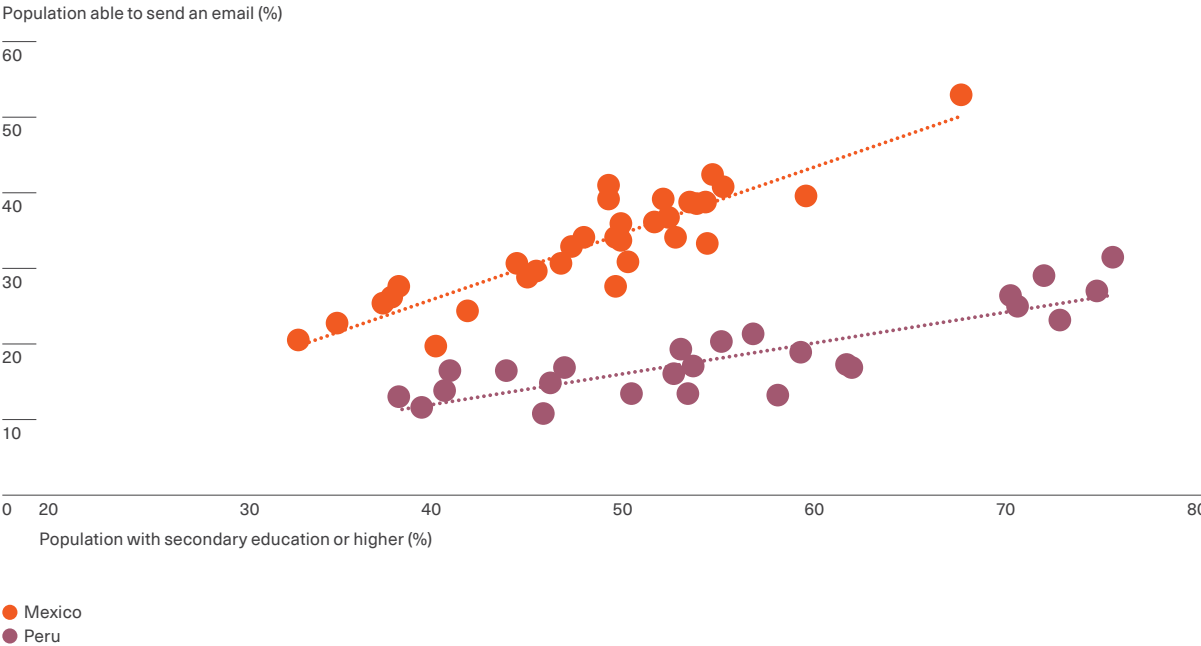
Finally, the ability to use online services and procedures depends on citizens' basic digital skills, an area where the region lags behind developed countries. Measurements of basic skills (e.g., copying or moving files or sending emails with attachments) show that only 28% of the population in LAC possess these skills, compared to 64% in OECD countries (Dalio et al., 2023). These skills also vary geographically and correlate with educational attainment. Graph 8.6 presents data from Mexico and Peru, illustrating the positive relationship between the percentage of individuals with secondary or higher education in a jurisdiction and the percentage able to send an email with attachments.

To address gaps in internet quality, device access, and skills, subnational governments in the region implement digital inclusion policies and programs.

The 2019 Municipal Basic Information Survey (MUNIC) in Brazil collected data on four such initiatives implemented by municipalities. Fifty-five percent of municipalities reported some type of action, with the most common being the installation of computers in public schools, and the least common being computer courses for the general population (Graph 8.7).

Other examples include the Santa Fe + Connected program (Santa Fe + Conectada), implemented by the provincial government of Santa Fe (Argentina) with CAF funding. Its objectives include extending the provincial internet network through fiber optic deployment, providing wireless (Wi-Fi) connections to low-income neighborhoods in the cities of Rosario and Santa Fe, and developing tools and training to improve the digital skills of teachers and students.

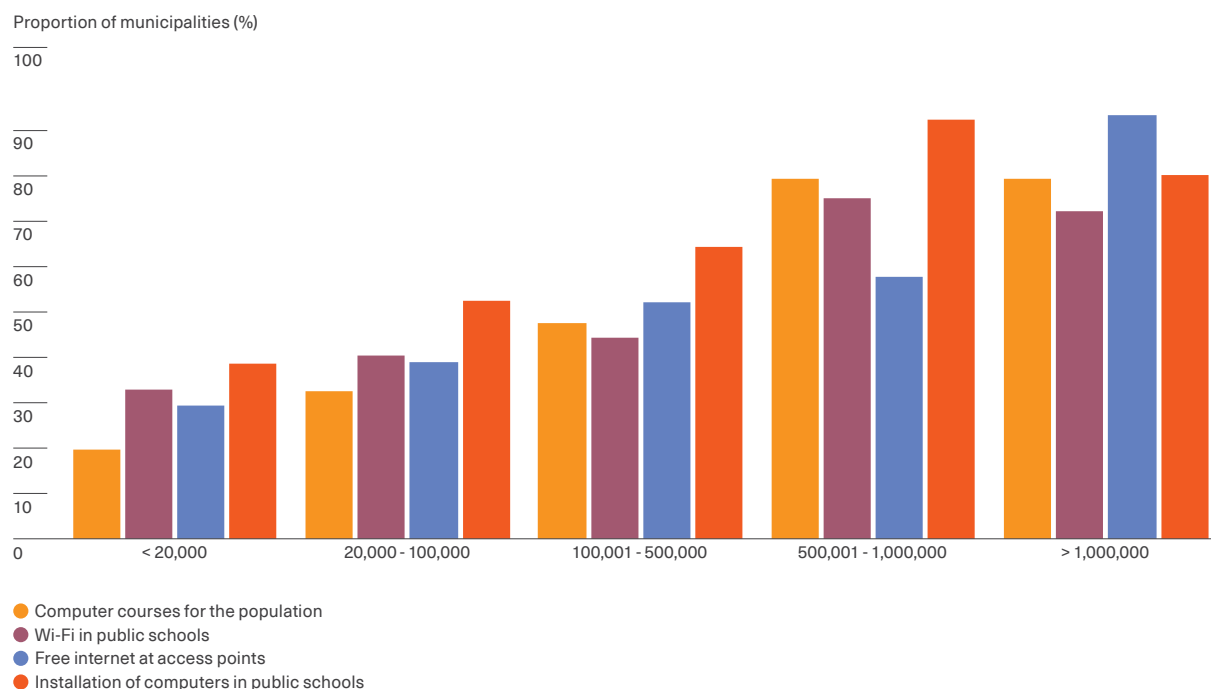
Graph 8.6
Relationship between educational level and basic digital skills in jurisdictions of Mexico and Peru



Note: The graph shows the percentage of individuals aged 18 and over in Mexico and Peru who can send an email using a computer, compared to the percentage of individuals with at least a secondary education.
Source: Authors based on INEGI (2023b) and INEI (2023a).

Graph 8.7

Digital inclusion actions in local governments of Brazil in 2019 by population category



Source: Authors based on IBGE (2019) and CAF (2025).

In addition to these digital inclusion initiatives, the observed patterns of access and usage highlight several policy implications for subnational governments' digitalization strategies. One implication is that websites and digital service platforms must be accessible from smartphones, a feature that is often overlooked. As of 2019, data from Brazil indicated that only 25% of municipalities had designed a mobile-friendly website or one adaptable to mobile devices (IBGE, 2019).

Another more critical implication is that electronic services and procedures must always retain traditional (non-digital) channels of access. This principle, known as omnichannel, is essential to avoid excluding population groups with limited or no access to ICTs. Moreover, as mentioned earlier, user experience and service quality across different access channels must remain consistent (OECD and CAF, 2023).

Bureaucratic capacities for digitalization

Digitalization requires skilled personnel. Even for the most basic levels of digitalization, there is a need for staff specializing in IT, security, and information systems to handle technical support

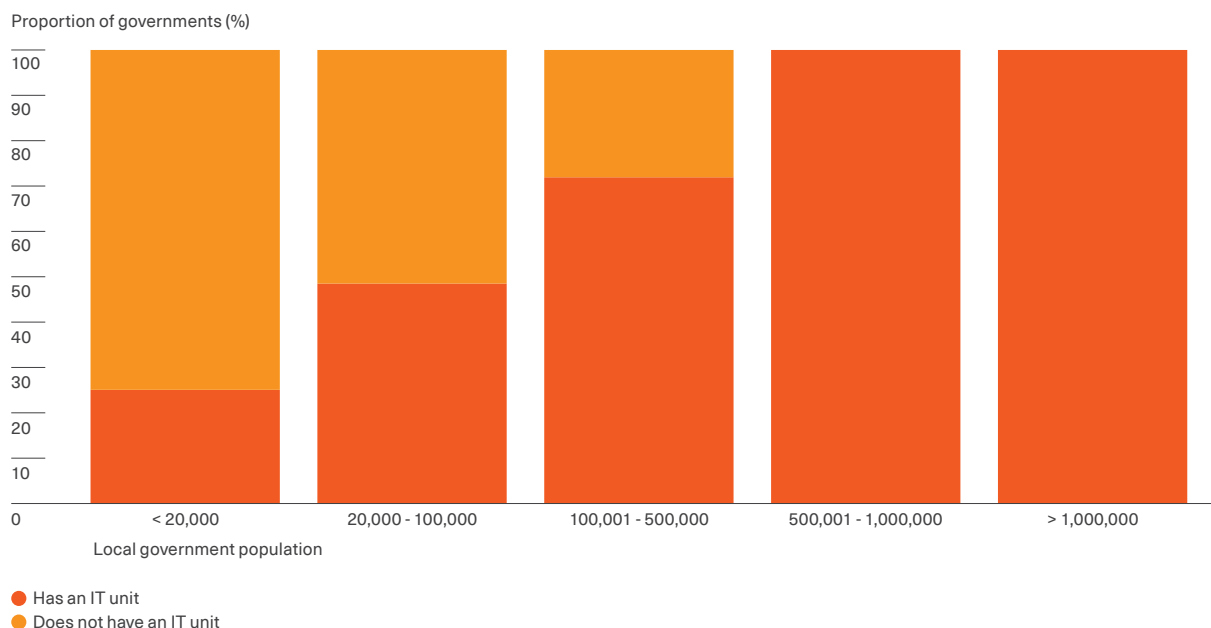
tasks. However, not all subnational governments have units dedicated to these functions. Payroll data from Ecuador's cantons show that only 42% of cantons had such units between 2018 and 2023.

Unsurprisingly, this percentage increases with the size of the local government. In Brazil, just over half

(58%) of municipalities had a technology and IT unit in 2019 (IBGE, 2019).

Graph 8.8

Proportion of local governments in Ecuador with ICT units, 2018–2023



Source: Authors based on Ecuadorian cantons' transparency webpages.

The lack of such units in smaller municipalities reflects their limited use of computers and software applications, which may not justify a dedicated support position. This highlights an important principle: digitalization strategies should not be uniform across subnational governments but should adapt to the specific needs and resources of each jurisdiction. Some of the more complex solutions discussed in this chapter can only be implemented in jurisdictions of a certain size.

For jurisdictions with sufficient scale, the value of digitalization increases when complementarities within the organization are exploited. For instance, the value of an electronic procurement system grows if, beyond facilitating transactions, its records are used to build management indicators or audit processes. Two important actions can foster such complementarities: first, enhancing the skills of staff across the organization; and second, creating units that promote the use of data in management. These units generate internal demand for the systematic use of digital tools, which are themselves sources of data.



The Bolívar state in Venezuela is home to Canaima National Park, one of the largest protected areas in Latin America and the Caribbean.

To enhance staff skills, subnational administrations can adjust hiring requirements and provide training for current employees. Economies of scale can be leveraged by including subnational governments in training programs already offered by central governments. According to a survey by OECD and CAF (2023), nine out of 13 national governments

in the region include subnational governments in their capacity-building strategies. Topics covered in these courses include digital transformation, innovation, and change management. In some cases (e.g., Argentina, Brazil, Chile, and Uruguay), these programs have been specifically designed for local and regional governments.

Box 8.4

Traditional data collection

Understanding socioeconomic variables such as education, employment, income, and housing conditions, among many others, is essential for governments. These variables provide insights into the population's quality of life and well-being and allow for the monitoring of public policy impacts. This information is primarily collected through national statistical offices. In addition to censuses, these offices develop various data collection tools, with the most common being household or living conditions surveys and labor market surveys.

A limitation of national surveys for subnational governments is that they often do not cover the entire national territory and may not provide representative results at regional and local levels. In LAC, nine out of 23 countries with household or labor market surveys do not provide data representative of any subnational government level. Regarding regional governments, eight countries have surveys representative for all their jurisdictions, and one more has representation for some. For local governments, only Antigua and Barbuda has surveys that are representative for all municipalities, while eight countries have surveys representative for some.

Given the limitations of national statistics in providing representative results for subnational governments, these entities may choose to collect data themselves. Typically, this has been done through their own statistical institutions or units, using traditional methods such as surveys. However, due to the high costs of establishing such units and conducting primary data collection, these activities are mainly carried out by jurisdictions with more resources, such as high-income cities and regional governments in federal countries. For example, in Argentina, each provincial government has its own statistical unit that coordinates with the National Institute of Statistics and Censuses (INDEC) on annual statistical activities. In Mexico, according to the National Census of State Governments, all 32 federal entities engaged in statistical and geographic data generation and processing activities in 2022.

At the local government level, the most basic arrangement involves having a unit responsible for working with data (public or private) to produce multipurpose indicators. However, not all subnational governments have statistical teams, let alone a dedicated area. It is difficult to obtain specific data, but the National Census of Municipal Governments and Territorial Demarcations of Mexico City (INEGI, 2021) offers some insights. In 2020, 20% of municipalities reported performing some type of statistical and geographic information processing, with this proportion increasing alongside the population size and wealth of the local government (approximated by per capita tax revenue).

Regarding units that promote data use, a notable example is government delivery units. These units are responsible for setting quantitative goals or indicators related to priority management objectives and monitoring their progress (Barber et al., 2011). Through these functions, they have encouraged the use of statistics in policymaking and monitoring. When deficiencies in the necessary information are identified, these units play a key role in generating data. In this sense, these units demand various types of data. On the one hand, they promote the use of digital records of government processes, which provide information on aspects such as the financial and operational execution of government programs. On the other hand, they rely on demographic and socioeconomic variables derived from more traditional data sources, such as surveys conducted by national or subnational statistical offices (Box 8.4).



Several countries in the region include subnational governments in their national skills upgrading strategies, which is crucial for capacity building

Subnational governments in LAC have begun implementing delivery units over the past two decades at local and regional levels (Alessandro, 2020). According to examples documented by Alessandro and by Lafuente and González (2018), the objectives of these units have covered areas such as public safety, health, education, and infrastructure. The number of objectives monitored varies significantly, with up to 290 strategic projects tracked simultaneously in some cases.

Impact evaluation units are another type of unit that uses data intensively. These focus on measuring the impact of programs and policies, such as the effect of hotspot policing schemes on crime rates. Conducting such evaluations is costly and logistically complex, so it is generally reserved for sufficiently large organizations. However, these evaluations provide value to administrative records and other data sources. Developing such units only makes sense if the evidence is used to inform decision-making. In Mexico, the National Council for the Evaluation of Social Development Policy (CONEVAL) oversees the adoption of monitoring and evaluation functions by regional governments. Its 2023 report highlights that 31 out of 32 regional governments have made evaluations mandatory for their social development policies, although only 12 have established an institution with technical and managerial autonomy.

Interaction with national governments

Central governments in the region have made progress in recent years in creating national digital government strategies (NDGS) or programs, which serve as instruments to define the main pillars and objectives of digital transformation in government, along with the actors involved.⁴ The NDGS can be laid out in documents specifically addressing the digital transformation of government or included within broader digitalization strategies (OECD

and CAF, 2023). All South American states and the majority in Central America—22 countries in total—have NDGS. Some of these countries have also adopted sector-specific digitalization strategies or a strategy for incorporating artificial intelligence and other technologies into government operations (World Bank, 2022b).

4 CAF has supported the development of these digital transformation strategies in the region. Examples include a support program for Panama's digital strategy (Programa de Apoyo a la Estrategia de Transformación e Inclusión Digital de Panamá), a program to support digital transformation of the Colombian State (Programa de Apoyo para la Transformación Digital del Estado para la Reactivación en Colombia), and a sector-wide program in Trinidad and Tobago to implement its digital strategy (Programa Sectorial de Enfoque Amplio de Apoyo a la Implementación de la Estrategia de Transformación e Inclusión Digital de Trinidad y Tobago).

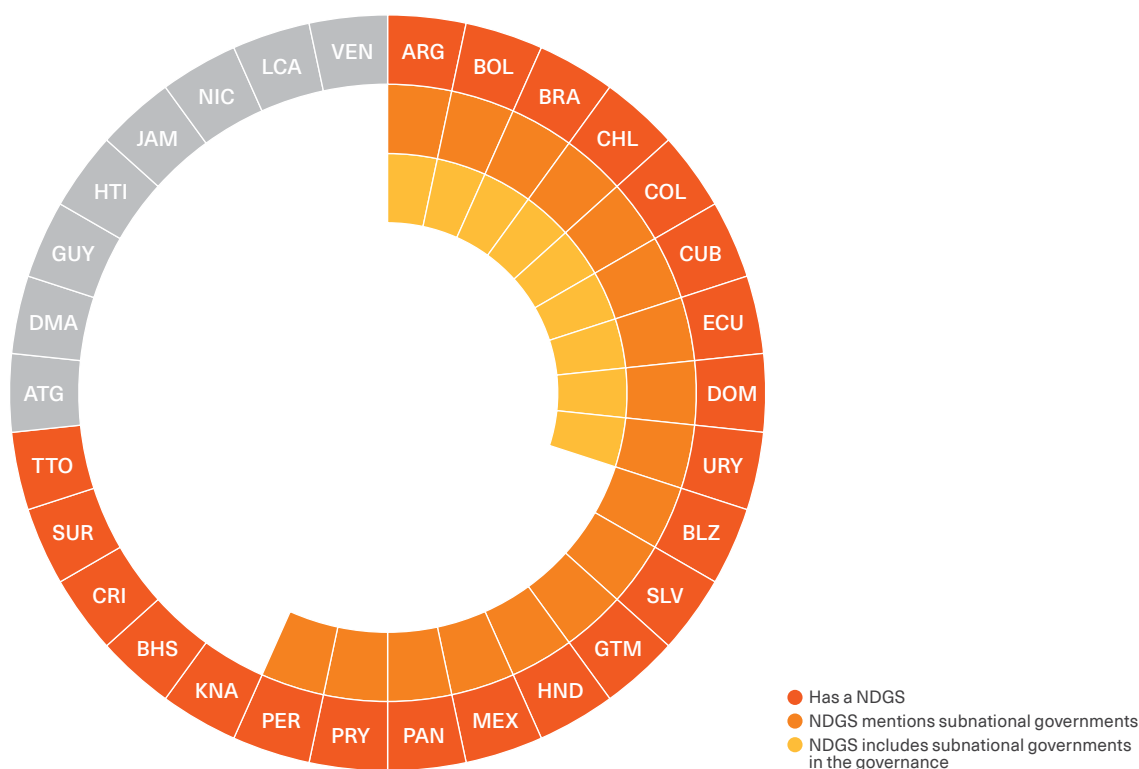
While subnational governments are mentioned in the NDGS of 18 of the 22 countries, only nine include provisions for coordinating with subnational governments during implementation or integrating them into the governance framework.

A noteworthy example of coordination and inclusion is Uruguay, which developed a digital

strategy plan for subnational governments (Plan Estratégico de Gobierno Digital para Gobiernos Subnacionales). This plan sets specific objectives that the Electronic Government and Information Society and Knowledge Agency (AGESIC) aims to achieve in cooperation with the Congress of Mayors, a coordination body for regional government authorities (AGESIC, 2021).

Graph 8.9

Inclusion of regional and local governments in national digital government strategies (NDGS)



Source: Authors based on national documents related to national digital government strategies (refer to the appendix, available in the online edition of RED, for each country's source).

Some national strategies include specific programs for implementation at the regional and local government levels. A previously mentioned example is Chile's deployment of cross-cutting platforms for digital identity and electronic signatures. Another example is a program implemented by Colombia's

Ministry of Information and Communications Technology since 2018 called Mi Colombia Digital. This program provides regional and local governments (as well as schools, state-owned enterprises, and other territorial entities) with free templates for creating websites and email accounts

(Facchina and López Barrera, 2024). These model templates integrate easily with the proprietary systems of territorial entities (Cruz, 2020), meet accessibility and security standards, and allow entities to customize them (Mi Colombia Digital, 2024). By the end of 2023, 879 local governments in Colombia (out of 1,105) had implemented an electronic headquarters using the Mi Colombia Digital model (Mi Colombia Digital, 2023; CAF, 2025).

Another relevant case is Brazil's National Digital Government Network, led by the Ministry of Public

Service Management and Innovation. In addition to providing website templates, this program offers tools for digital identification and signatures for citizens (Ministry of Management and Innovation in Public Services, 2024b). The first to join the network were regional governments and local governments representing capital cities. An encouraging development is the significant increase in local governments that joined the network and began using its services in 2023 and 2024 (Ministério da Gestão e da Inovação em Serviços Públicos, 2024a).

Innovations in partnership with the private sector

Collaboration with private companies that use digital technologies and innovative methodologies to address public challenges is a key enabler of modernization in the public sector. This type of cooperation, and the ecosystem in which it occurs, is known as GovTech (Zapata, 2020). In recent years, programs have emerged to accelerate companies offering innovative digital solutions, such as InovAtiva in Brazil, the Ingenio incubator in Uruguay, and MiLAB/Innpulsa in Colombia, implemented with support from CAF. Strategies have also been adopted to build networks among various actors in the ecosystem, such as Peru's National Network of Digital Innovators (OECD and CAF, 2023).

Another way to foster this ecosystem is through financial support. This can take the form of state procurement of services, the creation of state investment funds to develop pilots or prototypes, or grants for research and development (Kuziemski et al., 2022). However, according to OECD and CAF (2023), no innovation funds have been identified in countries across the region.

Subnational governments can leverage collaborations established at the national level. For example, partnerships created by Innpulsa in Colombia provide solutions for local governments to offer digital residency certificates (Innpulsa Colombia, 2024). Local governments in Argentina, Colombia, Costa Rica, Peru, and Uruguay have also been implementing innovation labs and joint initiatives with the private sector (Laguyas et al.,

2021). These labs have developed solutions for a range of challenges, including waste management and inclusive education for persons with disabilities.



Several subnational governments in LAC have implemented solutions in collaboration with the private sector for managing areas such as education and waste management

The challenges to fostering these ecosystems—faced by both central and local governments—are tied to adapting public procurement frameworks, building the capacities of public officials, and establishing spaces for testing and experimentation (OECD and CAF, 2023).

