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Accepted for publication in the Journal of Public Budgeting, Accounting and Financial Management

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<https://doi.org/10.1108/JPBAFM-12-2024-0265>



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Journal:	<i>Journal of Public Budgeting, Accounting & Financial Management</i>
Manuscript ID	JPBAFM-12-2024-0265.R2
Manuscript Type:	Research Paper
Keywords:	e-service, govtech, interoperability, financial management system

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Abstract

Purpose. To explore the configurations of central government's core and non-core financial management information systems (FMIS) interoperability and e-service delivery, highlighting the role of FMIS as a strategic backbone for broader digital transformation efforts.

Design/methodology/approach. Using cluster analysis on data from the World Bank's 2022 GovTech Maturity Index, we examine a sample of 105 countries with a high coverage of core and non-core FMIS functions. We examine the coexistence of different levels of FMIS interoperability and e-service delivery to map prevailing configurations across central governments.

Findings. Our findings point to a diverse configuration of FMIS interoperability and e-service delivery in different economies. Each configuration represents a distinct arrangement of how central governments have implemented and connected their financial management systems with digital service platforms. Four distinct configurations emerge from the analysis, reflecting combinations of interoperability and e-service development, allowing for a nuanced view of the role of FMIS towards broader digital transformation.

Originality. This is among the first empirical studies to systematically analyse the configurations of FMIS interoperability and e-service across a large global sample. It reframes FMIS not only as a back-office tool but as a strategic enabler of digital government, advancing the literature on digital transformation by applying a punctuated equilibrium perspective to highlight non-linear development trajectories.

Research limitations/implications. The study adopts a cross-sectional design, focusing on central governments only. It does not address causal mechanisms or the role of regional/local FMIS, and contextual factors influencing e-service effectiveness remain outside its scope. Future longitudinal and qualitative research is needed to trace transitions between configurations and test the conditions that trigger them.

Practical implications. The findings highlight the relevance of a proper strategy for FMIS interoperability to support a sustainable e-service program, informing international development organisations about this current Achilles' heel for digital governance.

Social implications. The findings reinforce the role of accounting-related digital transformation in enhancing the overall effectiveness of public sector governance, benefiting society as a whole.

Keywords: e-service, interoperability, financial management system, GovTech

1. Introduction

“There have been a number of unforeseen challenges during the transition [to a new Child Care Data System], which involve loading family and provider data from existing state systems into the new [system]” - and, as a result, the platform remained not fully operational even six months after launch (Spoerre and Bates, 2024)

The passage describes the service meltdown of the e-government system used to manage child-care subsidy payments in Missouri, United States of America. For more than six months, since December 2023, Missouri’s new “Child Care Data System” has failed to integrate provider and family data properly, creating a major backlog in subsidy payments. As a result, many child-care centres laid off staff, closed, or stopped serving low-income children. The system’s failures (and the resulting payment delays) were similar to prior incidents (Spoerre and Bates, 2024), underscoring how a lack of up-to-date, integrated financial data can cripple digital public services.

As digital technologies are now ubiquitous across the public sector, shaping activities from back-office processes in governments and state-owned agencies to front-end service delivery for citizens and businesses, such incidents described above may be more frequent in the future, not only in regional and local governments, but also at the central level. Front-end systems must be able to exchange and make use of data from FMIS consistently, and vice versa, to provide citizen-focused services (Azevedo et al., 2025; Gottschalk, 2009). Failures in systems integration and interoperability can undermine not only service delivery but also the broader promise of digital government (Dener et al, 2021; Margariti et al., 2022).

While prior studies have explored dimensions such as e-government maturity (Das et al., 2017), contextual influences on digitalisation (Bisogno et al., 2025; Castelnovo and Sorrentino, 2018), and strategic service delivery (Scholta et al., 2019), the role of financial management information systems (FMIS) in enabling digital transformation has remained underexplored (Bisogno et al., 2024; Azevedo et al., 2025). This is critical since FMIS produces, organises, and stores governmental data upon which e-services platforms depend.

Extant literature, however, typically frames FMIS as mere (but important) tools for core functions such as budget execution and contractor procurement (Dener et al., 2011; Dorotinsky and Watkins, 2013; Uña et al., 2019; Gourfinkel, 2021; World Bank, 2024). We aim to extend this view, looking at the configurations of FMIS interoperability and e-service delivery in central governments. Each configuration represents a distinct arrangement of how central governments have implemented and connected their financial management systems with e-service platforms, allowing for a nuanced view on the role of FMIS towards broader digital transformation. To theorise such configurations, we draw on insights from punctuated equilibrium theory and strategic technology management (Loch et al., 1999; Sabherwal et al., 2001; Lyytinen and Newman, 2008; Furr and Snow, 2024).

From a practice perspective, the importance of FMIS interoperability is already recognised. The World Bank’s “whole-of-government” approach advocates interoperable systems which shift away from the previous siloed-ICT design, i.e., “fragmented and disconnected ICT solutions with no or little focus on interoperability” (Dener et al, 2021,

p. 3). Indeed, “government interoperability standards are becoming more and more popular” in several countries (Kostenbaum and Dener, 2015, p.42). Initiatives such as the European Interoperability Framework guide governments on the initial setup of interoperable digital services (EU, 2017). By connecting core governmental systems to e-service platforms, interoperability not only facilitates access to public services but may also strengthen transparency and accountability (Hodapp and Hanelt, 2022; World Bank, 2021, 2023).

In this article, we address the gap in the academic literature by exploring the configurations of central governments’ interoperability between core and non-core financial management information systems and e-service delivery. Drawing on data from the World Bank’s 2022 GovTech Maturity Index, we conducted a cluster analysis of 105 countries with high coverage of core and non-core FMIS modules to capture the diversity of current technological setups.

These configurations are interpreted through a matrix that positions countries according to their levels of FMIS interoperability and e-service presence. This reveals transitional zones, stable groupings, and cases of apparent misalignment between back-end systems and front-end e-services. While our findings show that higher levels of interoperability are often associated with more advanced e-service delivery, they also reveal cases where FMIS coverage is high, but interoperability and e-service delivery remain limited. This suggests that more intensive e-service delivery depends on interoperability for scaling up data-sharing capabilities.

Overall, our results highlight the need for strategic FMIS implementation to support a sustainable e-service program. Beyond contributing to the academic literature, we offer insights to international development organisations and central governments seeking to overcome barriers to digital governance.

2. Literature

In this section, we first review how digital transformation differs from earlier e-government initiatives and why interoperability is central to its success. We then turn to the role of FMIS as infrastructure for digital governance before introducing punctuated equilibrium theory as our conceptual lens.

2.1 Digital transformation in government and the challenge of interoperability

Digital transformation in governments goes far beyond digitising analogue documents. It represents a holistic and profound shift, reshaping practices, processes, and related artifacts along a continuous and interconnected trajectory (Heaton and Parlikard, 2019). More comprehensive than e-government (González-Zapata and Piccinin-Barbieri, 2021), which often relies on “fragmented and disconnected ICT solutions”, digital transformation entails organisational, cultural, and societal changes driven by new forms of information and communication technology (Mergel et al., 2019) – which puts a central stress on the interoperability of platforms and systems necessary to transmit large data sets (Lam, 2005; Heaton and Parlikad, 2019; Dener et al, 2021, p. 3). As Bisogno et al. (2025) emphasise, this shift requires governments to balance institutional arrangements, accounting rules, and ICT infrastructures in ways that reshape accountability mechanisms and decision-making processes, meaning digital transformation is as much about governance redesign as it is about technology.

The potential benefits range from increased accountability facilitated by reliable information disclosure (Agostino et al, 2021; Cuadrado-Ballesteros et al., 2021), stronger citizen participation and co-production in service provision (Agostino et al., 2021; Lember et al., 2019), and improved public trust (Twizeyimana and Andersson, 2019). At the same time, Scholta et al. (2019) show that citizens increasingly expect proactive or even predictive services (“no-stop shops”) that require seamless data integration and automation, underscoring how interoperability - described below - is becoming a prerequisite for next-generation service delivery. Yet, digital transformation also faces barriers, including organisational resistance, low digital literacy, and user vulnerability (Ávila et al., 2023; Raihan et al., 2024). As Castelnovo and Sorrentino (2018) note, data fragmentation and misaligned governance structures often prevent public managers from realising the promised value of digital initiatives, particularly when interoperability across agencies is weak.

While much prior work emphasises socio-technical factors, seeing digital transformation as contingent upon broader organisational, institutional, and societal factors (Bisogno et al., 2025; Scholta et al., 2019; Castelnovo and Sorrentino, 2018), we focus on technology per se as a necessary enabler of digital transformation (Bisogno et al., 2024; Das et al., 2017). Without robust systems and standardised architectures, advanced e-service models remain aspirational (Kalogirou, Stasis, and Charalabidis, 2022; Scholta et al., 2019). In our view, technology is the infrastructure upon which socio-technical systems are built; while not determinative of outcomes, it sets the stage for what is organisationally and politically possible. Das et al. (2017), for example, demonstrate longitudinally that improvements in ICT infrastructure (not governance or human capital) were the strongest drivers of e-government maturity across 191 countries, reinforcing that technical backbones matter even when institutional contexts vary.

In the context of our study, a key technological enabler is systems interoperability, defined as the ability of two or more systems to exchange and make use of information (Gottschalk, 2009). Historically, governments relied on “spaghetti architectures” for data exchange, in which different but interdependent systems were linked through costly point-to-point connections (Gulledge, 2006; Baheer *et al.*, 2020). More recently, another architecture for data sharing, named “government service bus”, have been developed to reduce complexity and increase scalability and cost-effectiveness (Hodapp and Hanelt, 2022). The “government service bus” is a “secure and integrated platform for automating data exchange between mutually interacting software applications in a service-oriented architecture based on well-defined protocols” (Dener et al, 2021, p. 121).

Interoperability is central to achieving higher-value services (Hjort-Madsen, 2006). For example, moving from one-stop to no-stop shops require deep data integration, interoperability, and automation (Scholta et al., 2019). Nowadays, the interoperability of incoming and legacy systems remains a major challenge for digital transformation initiatives (Dener et al, 2021, Margariti et al., 2022; Irani et al., 2023; Hjort-Madsen, 2006; Lam, 2005), since digital governments imply interoperable databases and routines, across multiple interfaces and applications, according to a logic distinct from systems built on a unique and rigid architecture.

This challenge is particularly evident in public finance. Many e-services depend on data managed in public financial management (PFM) information systems and require direct access to databases recorded in FMIS. For example, to inform citizens about where to obtain medications requires an e-service application to access real-time public pharmacy inventory data from FMIS. Table 1 presents more examples of e-service

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3 initiatives that are potentially connected to the FMIS and the consequences of the lack of
4 interoperability. As Azevedo et al. (2025) argue, FMIS provide the baseline infrastructure
5 for more complex digital government functions that depend on data, such as e-service
6 initiatives. Despite such recent advancements, the link between the digital transformation
7 agenda and government FMIS remains largely underexplored in academic literature.
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9

10 2.2 FMIS as Infrastructures for Digital Governance

11
12 FMIS are integrated platforms for managing public finance functions in
13 governments (Rodin-Brown, 2008). The grey literature distinguishes between core and
14 non-core modules (Hashim and Piatti-Fünfkirchen, 2018). Core modules are the general
15 ledger that records all performed transactions according to the chart of accounts, and the
16 budget module. Non-core modules cover other administrative functions, often segregated
17 from each other - such as procurement, payroll, human resources, and tax (Diamond and
18 Khemani, 2006; Rodin-Brown, 2008). The data architecture embedded in FMIS core and
19 non-core modules will enable or constrain the implementation of citizen-oriented digital
20 services, such as open data portals or tax e-payment services (World Bank, 2023).
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23 Two central characteristics of FMIS are particularly relevant to our analysis: (i)
24 system coverage and (ii) system module interoperability. The coverage is the amplitude
25 and comprehensiveness of core and non-core FMIS modules in place, ranging from basic
26 accounting, budgeting, revenue and expenditure registration and management, debt
27 management, human resources and payroll, financial reporting and auditing (Rodin-
28 Brown, 2008). Differently, system interoperability is the ability of two or more systems
29 to exchange data and make use of it (Gottschalk, 2009) based on the standardisation of
30 (or a protocol for) data flows between systems (Hellberg and Grönlund, 2013). Such
31 interoperability would ensure that various systems operate in a complementary but
32 separate manner (loose coupling), without data and routine redundancies (Scholl and
33 Klischewski, 2007). In general, broader coverage will scale up the complexity of
34 interoperability of various FMIS modules and multiple applications. Extant literature has
35 usually considered FMIS's role in functions like budget execution and contractor
36 procurement for the various services and programs offered by governments (Dener et al.,
37 2011; Dorotinsky and Watkins, 2013; Uña et al., 2019; Gourfinkel, 2021; World Bank,
38 2024). By looking at the configurations of FMIS interoperability and e-service delivery
39 in central governments, we aim to extend such literature, linking FMIS to a broader digital
40 transformation agenda.
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44 Despite widespread calls for improving e-services and integrating government
45 activities (World Bank, 2023), the low interoperability of PFM systems remains a global
46 concern (Del Paso et al., 2023). Governments often operate multiple modules without
47 seamless data exchange, risking data inconsistency and leakage (Gourfinkel, 2021; Fritz
48 et al., 2017; Jeong and Kim, 2023). Yet, little is known about how actual configurations
49 of FMIS interoperability materialise in practice across countries. This research addresses
50 that gap by systematically examining the actual arrangements of FMIS interoperability
51 and their connection with e-service provision.
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55 2.3 Understanding FMIS and e-service configurations through punctuated equilibrium

56 To better understand the configurations of IFMIS and e-services, we draw on
57 punctuated equilibrium theory and socio-technical change models (Loch and Huberman,
58 1999; Lyytinen and Newman, 2008). Punctuated equilibrium theory originally tried to
59 explain why information systems and organisations do not evolve in a smooth, uniform
60

way, but instead move through long periods of stability (e.g., equilibria) punctuated by episodes of disruption triggered by institutional, technical, or policy shocks.

From this perspective, governments' developments in FMIS and e-service provision can be seen as moving through configurations of relative alignment or misalignment, shaped by deep structures of legacy systems, coordination capacities, and external shocks (e.g., new interoperability standards). Such deep structures are enduring arrangements of rules, routines, and technologies that generate path dependency and reproduce existing equilibria (Loch and Huberman, 1999). These configurations persist not merely due to technical limitations, but because of technological uncertainty and organizational inertia (Loch and Huberman, 1999; Furr and Snow, 2024).

When disruptions occur, governments enter a phase of reconfiguration characterised by uncertainty and experimentation, where multiple responses compete (Lyytinen and Newman, 2008). Possible strategies to respond to disruptions are to (i) adopt the new technology, (ii) extend the lifetime of the current technology in place to avoid its substitution, or (iii) bridge both technologies by mixing and recombining their elements (Furr and Snow, 2024). Over time, one configuration stabilises as the new equilibrium.

Thus, rather than viewing governments' digital transformation as a linear progression, with the widespread and somewhat automatic and deterministic adoption of state-of-art technology, this approach highlights a diversity of potential configurations reflecting a distinct interplay between FMIS infrastructure and digital service delivery platforms. Instead, it unfolds as a sequence of equilibria and transitions, in which FMIS interoperability and e-service provision are dynamically aligned or misaligned.

Interpreting our findings through this lens enables us to move beyond identifying “advanced” and “lagging” cases. By mapping countries across different configurations of FMIS interoperability and e-service delivery, we can understand these cases as temporary equilibria within a punctuated equilibrium cycle, offering an empirically grounded discussion of how governments stabilise, sustain, or struggle with their digital transformation agendas.

Table 1. Examples of e-services related to accounting practices and FMIS interoperability

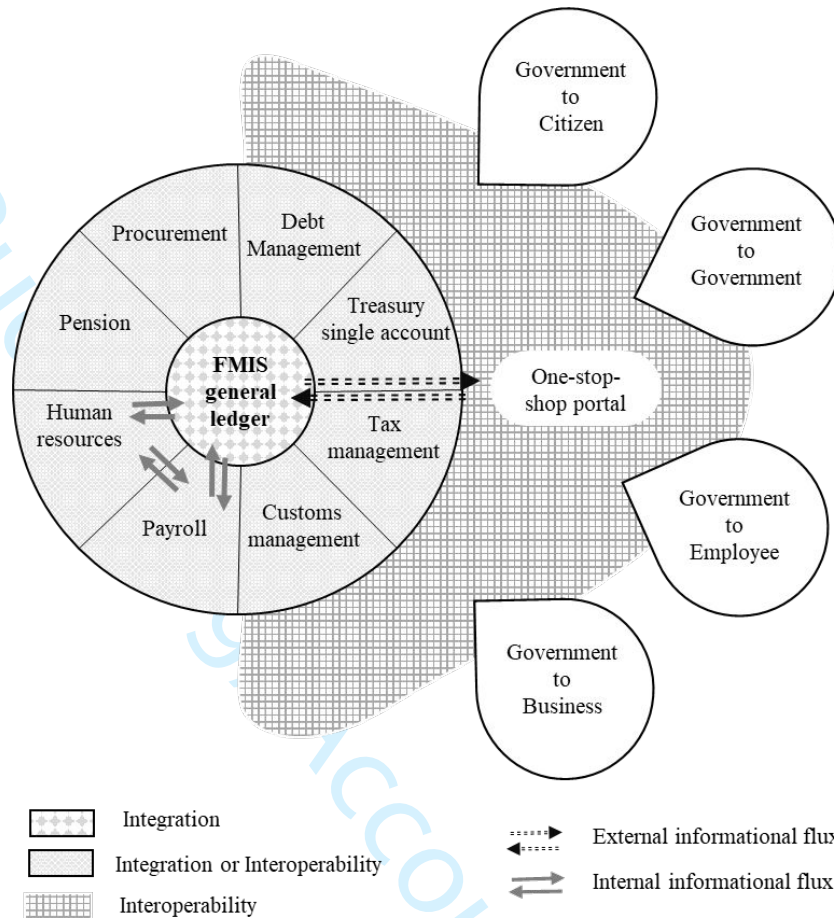
Digital Service	Example	FMIS Interoperability	Without Interoperable FMIS
Tax e-Payments	A citizen makes an online tax payment	- Record the payment in the general ledger - Reconcile with the Treasury Single Account - Provide automated receipts to taxpayers	Payments cannot be accurately registered or reconciled, causing delays or mismanagement
Payroll processing and HR systems	Payment of civil servants' salaries, including performance payment.	- HR systems feed employee performance-related information, calculating salaries into FMIS - FMIS processes payments, ensuring disbursement through the Treasury Single Account	Salaries may not be accurately tracked, leading to errors
Pension disbursements	Pensioners receive monthly payments, with eligibility adjustments	- Pension databases synchronise with FMIS for fund allocation - FMIS records pensions as liabilities in the general ledger - Real-time updates for eligibility changes (e.g., deaths, new retirees)	Risk of errors, overpayments, and fiscal inefficiencies
Procurement and suppliers' payments	Suppliers deliver services, expecting timely payments.	- Procurement systems connect with FMIS to verify budget availability - Flow of payment processes from procurement to FMIS - E-procurement platforms share data with FMIS for audit trails and financial reporting	Payment delays or duplication, reducing supplier trust and accountability.
Digital ID and e-Signatures	Citizens use a government portal for benefits requiring authentication and digital signatures	- Digital signature systems must interact with FMIS to verify eligibility - Financial approvals must automatically update FMIS records.	Inability to link citizen identities with financial records, breaking accountability and service delivery chains.
Online One-stop-shops	Citizens and businesses use unified government portals for taxes, licenses, permits, or other services.	- Transactions must reflect in FMIS for proper accounting and budget alignment - FMIS data supports portal analytics to display real-time revenue metrics	The portal functions as a disconnected front-end interface, lacking back-end financial management capabilities.

Source. Authors, based on Hashin et al, (2020), Uña et al (2023), and World Bank (2023)

3. *FMIS, Interoperability, and the Evolution of GovTech Institutions*

FMIS core and non-core modules are potentially the backbone for e-services initiatives. Figure 1 represents a simplified version of the modules of a typical FMIS, centred on the accounting general ledger and core financial modules, such as budgeting, while also linking to non-core modules (e.g., debt management, procurement, pension, human resources management, and payroll). These modules connect to e-service delivery systems - dedicated to providing public services in a digital platform to citizens, employees (civil or military servants), or businesses. Despite FMIS being a focus of digital transformation efforts, it does not automatically enhance e-service delivery. The FMIS can be considered a backbone for many digital service applications when (i) it manages relevant data to the provision of a specific e-service, or (ii) when the e-service process depends on the FMIS approval or procedure to be completed.

Figure 1. FMIS as a backbone for digital services



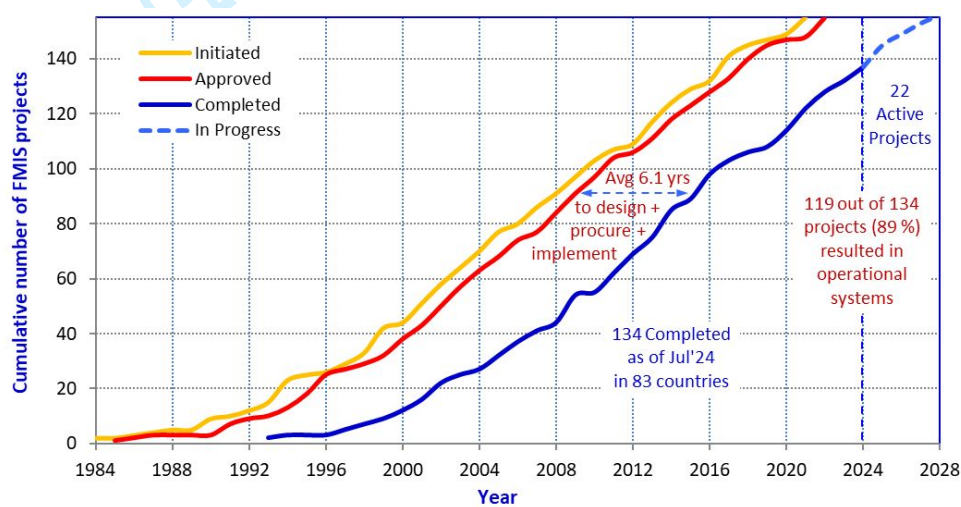
Source. Authors

Why would FMIS be relevant to e-service delivery? According to the World Bank, the new frontier of interoperability depends on an emerging data-driven culture, based on the concept of whole-of-government and data governance, rather than traditional siloed-based e-service delivery. Governments are expected to build data management layers and protocols that connect systems producing and processing data with those interacting with citizens, suppliers, or public sector employees. This architecture is based on principles such as once-only data collection, right to information, data source abstraction, non-invasive systems interconnection, system portability, event-based data exchange, and scalability (World Bank, 2022, 2023). The recent GovTech frameworks (World Bank, 2022, 2023), their related Maturity Index, and working groups and technical standards aim to operationalise these principles.

In practice, both the core FMIS (accounting and budget) and non-core modules (treasury, procurement, pension, or tax) produce and process large volumes of data. These are curated and stored in 'data warehouses' and 'lakes', accessed via APIs or query engines, and increasingly delivered through one-stop portals. Such data is safeguarded by robust processes that ensure metadata management, quality and integrity assurance, and security. The interoperability between FMIS modules, sectoral systems (e.g., digital health, justice, electoral system, etc.), and enabling technologies (e.g., digital signature, cloud services, mobile platforms) ultimately allows governments to provide integrated e-services (World Bank, 2022, 2023).

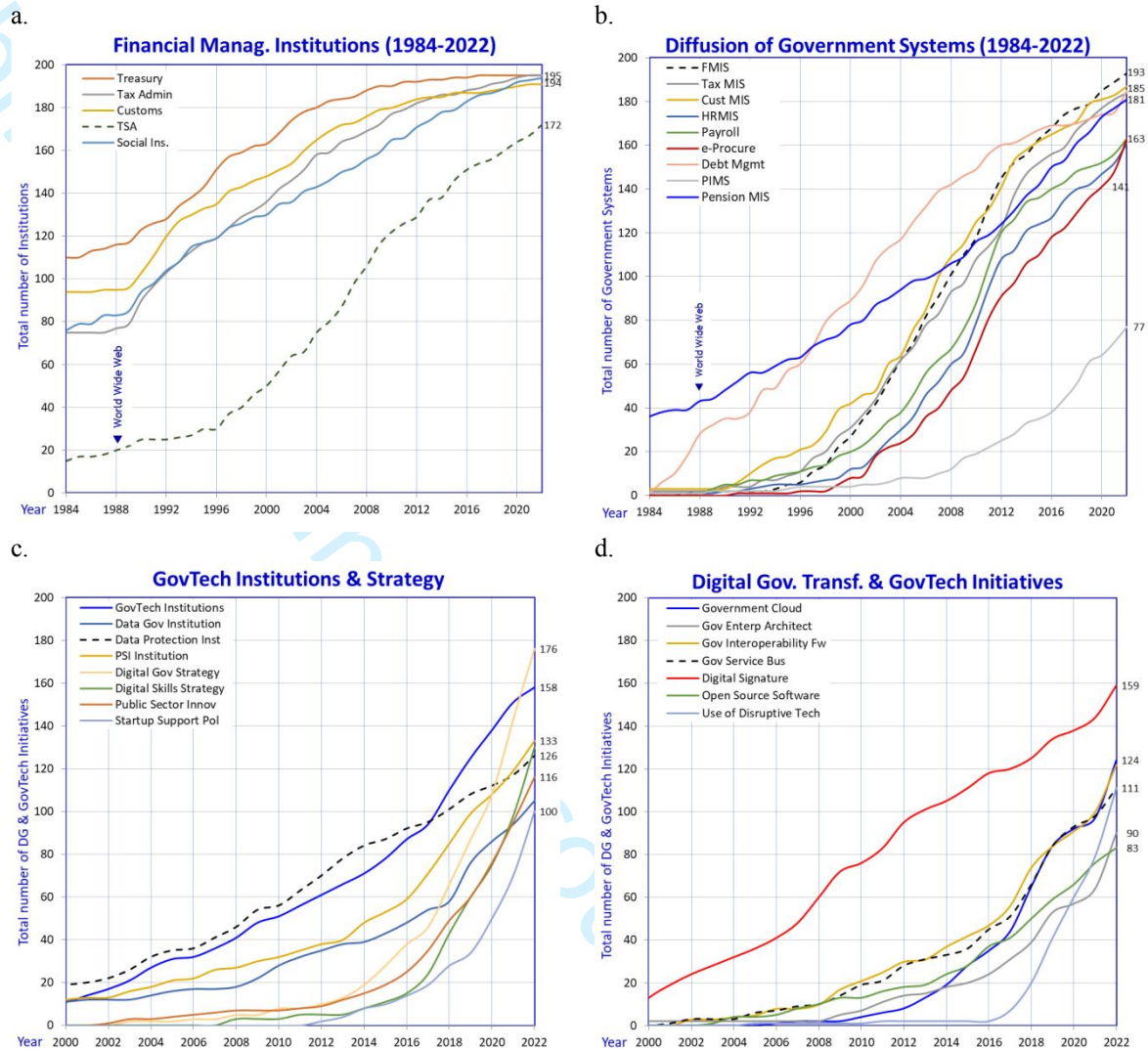
The trajectory to achieve such interoperability, however, is uneven. Building PFM institutions (e.g., treasury single account, unified chart of accounts, budgetary transparency) have proven to be a decades-long effort. As shown in Figure 2, the World Bank has supported FMIS reform since the early 1980s, funding projects in 82 countries, with 22 projects still active in 2024. While some governments have relied heavily on such support, many have pursued their own strategies, reflecting unique institutional, political, and technological contexts. As mentioned in the previous literature (e.g., Bisogno et al., 2025, Castelnovo and Sorrentino, 2018), any comparison using contemporary data must be context-specific and consider that countries are dealing with their own challenges to implement and consolidate systems.

Figure 2: FMIS projects funded by the World Bank for FMIS development in the last four decades (1984-2024)



Source: FMIS Projects Database (July 2024). <https://datacatalog.worldbank.org/search/dataset/0037882/Financial-Management-Information-Systems-Database>

These differences are also visible in long-term diffusion trends of government systems, digital initiatives, and GovTech institutions. Figure 3 presents a global overview from 1984 to the present. To explore the detailed trajectories adopted by each country, their motivations and causal elements related to each choice, is beyond the objective of our analysis. However, from an aggregate level, we contextualise three aspects to better understand the last 40 years of government digital transformation.

Figure 3: Longitudinal perspective for financial management and GovTech by the World Bank

Source: GovTech Maturity Index 2022

First, core financial institutions diffused at different moments in time. The graphics (a, b) show ‘the backbone’ of governments’ digital strategy evolving since 1984. Treasury functions spread widely from the 1980’s while tax administration, customs, social insurance, and the treasury single account achieved a broad adoption much more recently. FMIS adoption increased around 1996, but debt management and pension systems were already in place for many economies. By contrast, e-procurement, human resources system and payroll remain not adopted by some economies. Second, GovTech institutions are a more recent development. The graphics (c, d) illustrate the rise of GovTech initiatives after 2000 – around 16 years later than core financial systems. Finally, GovTech key enabling technologies (e.g., digital signature, cloud, service bus, and enterprise architecture) as central features to interoperability with e-services were adopted recently by just part of the economies. A recent trend in disruptive tech indicates new possibilities and challenges for the future.

This contextual overview indicates that different countries will achieve maturity for financial management institutions and systems in different moments in time. It means that, in any analysis for a specific period of time, they will present distinct configurations of systems in place. Comparative analysis may not fully capture the complexity related to the interoperability of multiple systems, and how it faces the maturity of financial

institutions and systems, given the diversity of multiple economies’ institutional factors and political decisions guiding such investments. A cross-sectional analysis of configurations allows to capture the diversity of institutional and technological setups that currently underpin digital transformation in central governments. Rather than examining how systems evolve over time, this approach focuses on identifying typical configurations of FMIS interoperability and e-service availability. Yet, despite the centrality of FMIS in enabling data exchange and supporting digital services, little is known about how these configurations actually materialise across countries. This study addresses that gap by systematically examining the interplay between FMIS interoperability and e-service provision, thereby linking financial management infrastructures to the broader digital transformation agenda.

4. Data and Methods

Our analysis explores the configurations of central government’s core and non-core financial management information systems (FMIS) interoperability and e-service delivery provision. Our exploratory analysis is based on a cluster analysis of the interoperability of FMIS and e-service systems/platforms. This is followed by positioning different countries in a matrix that captures their current configuration across both dimensions.

4.1. Data sources and sample

Our analysis is based on the data provided by 2022 GovTech Maturity Index (updated in March 2023), and the entire set of recommendations and reports developed by the World Bank. GovTech measures critical aspects of digital governance across 198 economies, including North, Central and South America, Asia, Oceania, Europe and Africa, different levels of democracy, economic development and organisation of political and administrative systems. The data is collected by a comprehensive central government online survey. In 2022, 135 economies responded to the online survey tool, while data for the remaining 63 economies in the database was remotely collected by the World Bank from each government website. The exercise included about 850 officials from those countries, that also confirmed and updated the survey after validation from World Bank. The GovTech Maturity Index initiative currently collects about 48 indicators, to compose the Core Government Systems Index (CGSI - 17 indicators) capturing the key aspects of a whole-of-government approach, the Public Service Delivery Index (PSDI - 9 indicators) covering the state of online portals, e-filing services and e-payment capabilities, the Digital Citizen Engagement Index (DCEI - 6 indicators) for public participation platforms, citizen feedback, and open gov/data portals, and finally GovTech Enablers Index (GTEI - 16 indicators) to capture strategy, institutions, regulations, and digital skills and innovation programs in place.

For our analysis, we mainly focused on items about *Core Government Systems* and *Public Service Delivery*. Such dimensions provide a detailed examination of key functionalities and systems underpinning public financial management and service delivery. The list of economies covered by the GovTech survey is broad with a large variation on the maturity index, from countries that do not have a Treasury Single Account or are still implementing their first FMIS. To increase the comparability of the data, we focused our analysis on a selected group of central governments in which FMIS is already operative, and at least five non-core administrative systems were in place (Tax,

Customs, Human Resources, Pension and e-procurement). We have excluded from the analysis economies that are not considered countries by the United Nations. Finally, we also selected only the countries in which the central government officials responded to the survey (excluding cases collected from by the World Bank on their websites). This resulted in a final dataset composed of 105 countries (from the 198 in total). Table 2 shows the descriptive statistics for our sample of 105 central governments.

Table 2. Descriptive statistics of the sample

	Max [Min]	Total mean (med.)	AFR mean (med.)	EAP mean (med.)	ECA mean (med.)	LCR mean (med.)	MNA mean (med.)	SAR mean (med.)
<i>FMIS Interoperability</i> ¹								
Core FMIS (Treasury + Budget)	2[0]	1.12 (1)	1.18 (1)	0.79 (1)	1.26 (1)	0.90 (1)	1.15 (1)	1.80 (2)
Tax MIS	2[0]	1.19 (1)	1.18 (1)	1.07 (1)	1.35 (1)	0.90 (1)	1.54 (2)	0.80 (1)
Customs MIS	2[0]	1.13 (1)	1.09 (1)	1.14 (1)	1.13 (1)	1.00 (1)	1.46 (2)	1.00 (1)
Human Resource MIS	2[0]	1.14 (1)	1.05 (1)	1.07 (1)	1.42 (1)	0.80 (1)	1.31 (1)	1.00 (1)
Pension MIS	2[0]	1.10 (1)	0.68 (1)	0.93 (1)	1.42 (1)	0.95 (1)	1.62 (2)	0.80 (1)
Procurement MIS	2[0]	1.10 (1)	1.00 (1)	1.14 (1)	1.23 (1)	0.90 (1)	1.08 (1)	1.40 (2)
<i>Service Provision</i>								
e-Procurement portal capabilities ²	3[0]	2.10 (2)	1.50 (1)	2.21 (2)	2.30 (2)	2.15 (2)	2.47 (3)	2.20 (3)
Pre-populated returns for tax ³	1[0]	0.62 (1)	0.45 (0)	0.57 (1)	0.68 (1)	0.75 (1)	0.77 (1)	0.20 (0)
e-Payment services ⁴	2[0]	0.88 (1)	0.78 (1)	0.86 (1)	1.00 (1)	0.70 (1)	1.00 (1)	1.00 (1)
Intra-government e-Payment ⁵	1[0]	0.84 (1)	0.69 (1)	0.79 (1)	0.94 (1)	0.85 (1)	0.85 (1)	1.00 (1)
Pension online service portal? ⁶	2[0]	1.63 (2)	1.45 (2)	1.29 (2)	1.87 (2)	1.5 (2)	1.77 (2)	2.00 (2)
Open Data portal ⁷	3[0]	1.84 (2)	1.14 (1)	2.07 (3)	2.35 (3)	1.65 (1.5)	2.00 (3)	1.40 (2)
Digital signature ⁸	3[0]	2.19 (3)	1.5 (1)	2.00 (3)	2.97 (3)	2.00 (3)	2.15 (3)	1.80 (3)

Note: Based on the original data (i.e., non-transformed). AFR = Africa Region (22 economies); EAP = East Asia and Pacific Region (14 economies); ECA = Europe and Central Asia Region (31 economies); LCR = Latin America and the Caribbean Region (20 economies); MNA = Middle East and North Africa Region (13 economies); SAR = South Asia Region (5 economies); (1) All items are captured through the question “Does [the system] exchange data with other systems? [0] No [1] Yes (via separate interfaces) [2] Yes (via Government Service Bus)”; (2) “e-Procurement Portal capabilities” [0] Unknown, [1] Tender notices + Contracts, [2] Online Tendering + Contracts, [3] OT + C + Interfaces with other systems; (3) “Available pre-populated returns?” [0] No, [1] Yes; (4) “Are e-Payment services available?” [0] No, [1] Implementation in progress, [2] Yes (in use); (5) “e-Payment service for government/treasury payments?” [0] No, [1] Yes; (6) “Is there a Social Insurance/Pension online service portal?” [0] No [1] Implementation in progress, [2] Yes (in use); (7) “Update frequency of Open Data portal” [0] Unknown, [1] Annually, [2] Quarterly / Monthly, [3] Weekly / Daily; (8) “Use of Digital Signature in public sector?” [0] Unknown, [1] Back-office transactions, [2] Front-office service delivery, [3] Both back- and front-office transactions.

4.2. Data analysis

We observe, as of 2022, the different configurations of FMIS interoperability and e-services in place for our sample (central governments of 105 countries). We positioned each case in a matrix (4x4) of FMIS interoperability and e-service provision. To generate the categories for both dimensions (interoperability of FMIS and the presence of e-service applications), we conducted a cluster analysis (Hair et al. 1998; Alzamil et al., 2021).

We preliminary prepared the dataset, removing ambiguity, such as replacing categories as “implementation in progress” by ‘non-existent’ (e.g., dummy variable values 1 for system operating and 0 otherwise). Data was also standardised by z-score when necessary (Makles, 2012). For each dimension of interoperability, we ran a K-means clustering (Alzamil et al., 2021) and obtained the optimum solution with four groups for both dimensions. We started by testing solutions with 20 clusters with random starting points, judging the solution based on the “elbow method” (Makles, 2012; Kassambra, 2017), in which the optimal solution is determined by examining the point at which incremental reductions in within-cluster variance become marginal, indicating diminishing returns from adding more clusters (Hair et al., 2019). In both cases, the optimal solution with four clusters balanced better the trade-off between cluster compactness and parsimony. For the dimension systems’ ‘interoperability’ we used 6 items of the survey (see Table 2) plus the year of FMIS implementation as a control – since, for instance, some countries implemented their FMIS in 90’s (with technology constraints of that time, later facing strategic choices to use technologies as ‘service bus’ to achieve greater and scalable interoperability), while other countries have first debated a framework of interoperability before launching their new version of FMIS. Similarly, we used the same approach to run another cluster analysis to categorise the same sample according to their e-service provision, using 6 items from the survey (as mentioned in Table 2).

5. Current configurations of FMIS interoperability and e-services in central governments

We grouped the 105 cases into categories according to the adopted solutions to achieve FMIS interoperability and the e-service applications in place. Tables 3 and 4 present the means and frequencies for each cluster according to the observed interoperability of the FMIS core and five non-core modules. On average, the cases classified in cluster 1 do not sustain the minimal interoperability for all modules (except customs). Cluster 2 presents minimal interoperability but is based on a consolidated use of separate interfaces (also known as ‘spaghetti-like’ interface), and cluster 3 with a large (but not complete) use of government service bus technology. The countries classified in cluster 4 are the cases with extensive use of government service bus technology, the highest level of interoperability for all (non-)core systems.

Table 3. Clusters by FMIS interoperability and year of implementation (mean scores)

Clusters >	min	max	1	2	3	4
<i>Interoperability level for FMIS</i>						
FMIS core-modules	0	2	<u>0.82</u>	0.89	1.70	1.60
Tax MIS	0	2	<u>0.91</u>	0.89	1.70	1.80
Human Resources MIS	0	2	<u>0.61</u>	0.93	1.60	1.84
Procurement MIS	0	2	<u>0.00</u>	1.14	1.60	1.80
Pension MIS	0	2	<u>0.70</u>	0.95	0.70	1.92
Customs MIS	0	2	1.00	<u>0.85</u>	1.30	1.72
<i>Implementation Year current FMIS</i>	1987	2021	2006	2007	2010	2009
Number of observations		105	23	47	10	25
Percentage of observations			22%	45%	10%	24%

Note: Bold numbers are the highest interoperability for each Management Information System (MIS), and underlined numbers are the lowest interoperability.

Across all clusters, a large majority of FMIS are either interoperable via separate interfaces (level 1) or through a government service bus, recognised as a better architecture for data exchange and interoperability (level 2). Systems not adopting even a rudimentary 'spaghetti-like' interface are non-interoperable (level 0), but they are relatively rare in our sample. Specifically, Cluster 1 has a higher prevalence of non-interoperable systems, with a significant portion already using a minimum interoperability, transitioning away from isolated systems. It appears that non-interoperable systems (level 0) are becoming less common, indicating a broad trend toward enhanced digital integration in financial management at least in the countries that have higher core and non-core FMIS modules coverage in place and show some degree of awareness to the topic, as they answered to the World Bank survey.

Table 4. Clusters by FMIS interoperability and year of implementation (frequencies)

Clusters >	1	2	3	4
Financial MIS core-modules	8 / 11 / 4	9 / 34 / 4	0 / 3 / 7	1 / 8 / 16
Procurement MIS	0 / 23 / 0	0 / 40 / 7	0 / 4 / 6	0 / 5 / 20
Tax MIS	2 / 17 / 4	7 / 38 / 2	0 / 3 / 7	0 / 5 / 20
Human Resources MIS	0 / 9 / 14	7 / 36 / 4	1 / 2 / 7	0 / 4 / 21
Pension MIS	10 / 10 / 3	9 / 31 / 7	3 / 7 / 0	0 / 5 / 23
Customs MIS	3 / 17 / 2	9 / 36 / 2	0 / 7 / 3	0 / 7 / 18
<i>Implementation Year current FMIS</i>	1995-2020	1987-2020	1998-2021	1988-2020

Note: Numbers are frequency for values 0 / 1 / 2 in the cluster, where 0 indicates no interoperability, 1 interoperability based on specific interfaces for data sharing, 2 indicates interoperability based on data sharing platforms, named 'service bus technology'. The implementation years for the current FMIS show the oldest and newest FMIS implemented in the cluster. Bold numbers are the frequency of the interoperability (higher or lower) for each system that clearly define the group.

Tables 5 and 6 presents the means and frequencies for each cluster according to e-service provided by the central government. Cluster A group the cases we named as 'constrained e-service providers', in which e-services are underdeveloped or in the early stages of implementation. For instance, most respondents (33%) declared that 'they don't

know' to inform the open data update frequency, while 50% declared the open data portal is updated annually, quarterly or monthly. Conversely, cases in cluster D presents advanced e-service providers, excelling in all categories. It dominates the dataset, showing that a majority of governments have implemented advanced e-services. For instance, most of the cases under this cluster update the open data portal weekly or daily (63%). The e-procurement portal and digital signature usage has more advanced capabilities in comparison to any other cluster, while all other services exist (minimum 80% for pre-populated tax returns).

Table 5. Clusters by e-service provision (means, min and max)

Clusters >	min	max	A	B	C	D
<i>Level of e-services</i>						
e-Procurement portal capabilities	0	3	<u>1.42</u>	1.90	<u>1.42</u>	2.47
Pre-populated returns for tax	0	1	<u>0.08</u>	0.60	0.37	0.80
e-Payment services	0	2	<u>0.17</u>	0.70	1.00	1.00
Intra-government e-Payment	0	1	<u>0.00</u>	1.00	0.89	0.95
Pension online service portal	0	2	0.58	<u>0.40</u>	1.89	1.94
Open Data portal	0	3	1.25	0.80	<u>0.58</u>	2.48
Digital signature	0	3	1.42	<u>0.70</u>	1.42	2.80
Number of observations		105	12	10	19	64
Percentage of observations			11%	10%	18%	61%

Note: Bold numbers are the highest level of e-service.

The cases classified in Cluster B are the emerging e-service providers with moderate progress in some advanced services, such as e-payments (outside and inside government) and e-procurement. Regarding open data frequency of update, most of the respondents don't know (50%) the frequency, while other 30% indicates an annual frequency. Finally, cases in cluster C are also intermediate e-service providers, particularly in e-payments and pensions. However, it lacks strength in e-procurement, pre-populated returns and open data frequency, which signals that they are focusing on government-to-government operations.

Table 6. Clusters by e-service provision (frequencies)

Clusters >	A	B	C	D
e-Procurement portal capabilities	1 / 6 / 4 / 1	0 / 4 / 26 / 34	0 / 2 / 7 / 1	2 / 10 / 4 / 3
Pre-populated returns for tax	11 / 1	13 / 51	4 / 6	12 / 7
e-Payment services	10 / 2	0 / 64	3 / 7	0 / 19
Intra-government e-Payment	12 / 0	3 / 61	0 / 10	2 / 17
Pension online service portal	8 / 1 / 3	1 / 2 / 61	7 / 2 / 1	0 / 2 / 17
Open Data portal	4 / 3 / 3 / 2	1 / 7 / 16 / 40	5 / 3 / 1 / 1	9 / 9 / 1 / 0
Digital signature	5 / 2 / 0 / 5	2 / 2 / 3 / 57	7 / 1 / 0 / 2	5 / 7 / 1 / 6

Note: Numbers are frequency for values 0 / 1 / 2 / 3 / 4 in the cluster, where 0 indicates no service or the respondent is uninformed about it, progressing towards 4 in which the e-service is provided and usually with higher functionalities. For instance, the Open Data portal scale indicates the frequency, as unknown, annually, quarterly/monthly, weekly/daily. The Digital Signature scale shows the use in the public sector,

as unknown, back-office transactions, front-office service delivery, both back- and front-office transactions. Bold numbers are the frequency of the level of e-service (higher or lower) that clearly define the group.

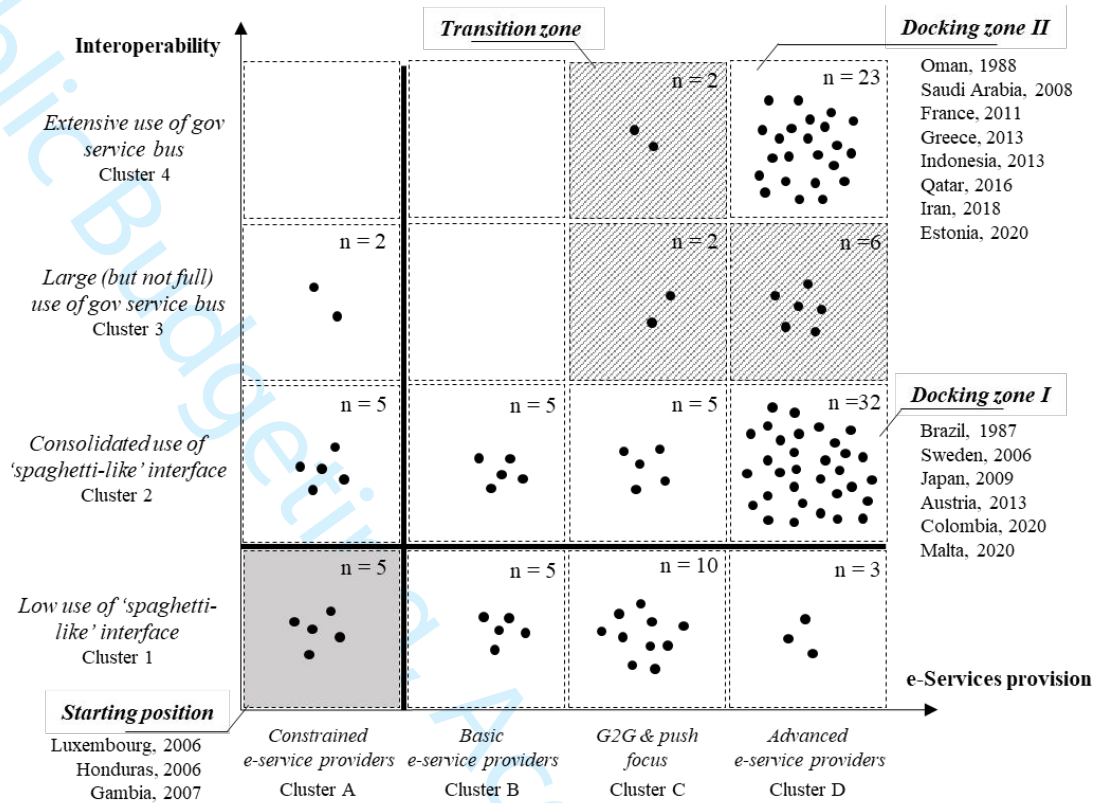
Similar to the interoperability cluster, in the case of e-service delivery, the majority of our sample presents an advanced presence. This, of course, means the availability of e-services to citizens, business and intra-governmental operations – but the data does not allow us to make any inference about the actual usage and the limitations of such systems in practice.

6. Digital transformation trajectories and transition zones

As already mentioned, digital transformation is a long and non-linear journey. Throughout their trajectories, governments encounter (and often add new ones of their own) barriers, including legacy systems obsolescence, uncertainty about new technologies, compliance with emerging financial institutions, and cybersecurity threats. Based on the identified clusters, and focusing on technology as an enabling infrastructure, we map where countries currently stand in this journey - not to establish a maturity model of FMIS (usually a choice by accounting scholars) or of e-service provision (usually a choice by public administration scholars), but to consider the configurations at the intersection of both domains.

To do so, we propose the following 4x4 matrix mapping FMIS interoperability and e-service delivery levels (Figure 4). The resulting configurations appear not to follow sequential steps toward an ideal end-state. Rather, echoing the punctuated equilibrium perspective, they represent temporary equilibria in which long periods of relative stability – i.e., “docking zones” – are occasionally disrupted, for example, by technological advancements or donor-driven initiatives, often resulting in a new equilibrium after a transition period of technological uncertainty (see Sabherwal et al. 2001; Furr and Snow, 2024). Below, we describe specific examples to illustrate key trends and findings, but the full list of countries and their positions can be found in the Appendix.

Figure 4. Countries position based on FMIS interoperability and e-service delivery



Source: Developed by the authors.

Docking zones. We use the term docking zones to describe relatively stable technological equilibria in which governments “settle” around a given interoperability architecture. Crucially, these zones are not necessarily steps in a linear maturity path but temporary alignments of systems, institutions, and practices. Governments may remain in a docking zone for long periods because their existing arrangements are sufficient to sustain e-service delivery at any particular required level. Two relatively stable configurations emerge.

‘Docking zone I’, groups countries that design their interoperability based on a point-to-point ‘spaghetti-like’ interfaces where each system communicates with others individually, creating a complex web of dependencies (2D). This might be related to the usage of legacy systems - when interoperability is added as an afterthought – representing an extension response to technological changes (Furr and Snow, 2024), i.e., when interoperability is designed to maintain e-service delivery capacity without reconfiguring core technological infrastructures. Indeed, just a handful of FMIS in the 32 cases in this quadrant were developed and implemented in the last decade (from 2015 onwards), while 44% of them date from before the mid-2000s. For example, Brazil’s FMIS, implemented in 1987, has been repeatedly updated and supported by extensive World Bank financing (49 projects in total, three directly related to FMIS) but remains in a spaghetti-architecture equilibrium. Although such spaghetti-like interfaces are costly and rigid, they can nonetheless support extensive e-service provision. For this reason, governments may have little immediate incentive to overhaul their systems.

‘Docking zone II’, by contrast, reflects more recent investment in modern data architectures. This group adopted the service bus technology, considered superior for data

exchange and interoperability (4D). The 23 cases present a high level of FMIS interoperability, as systems are all connected to a centralised middleware (the service bus) that manages communication, data transformation, and integration across systems. The service bus reflects modern IT architectures, especially large-scale systems – as the whole-of-government approach for a broader digital transformation – that require reliable and scalable interoperability. In this quadrant, 74% of the FMIS were developed in the last two decades, being 25% of the total developed after 2016. Some countries, like Indonesia and Serbia, accessed funding for more than one project to improve their FMIS in the last decade, which might be related to the modern architecture in place. Docking Zone II is a more advanced equilibrium, but still a docking zone: governments may remain here until new disruptive technologies or institutional demands necessitate further reconfiguration.

Docking zones represent stable equilibria where governments remain because current configurations deliver sufficient functionality for e-service provision. Yet, in line with punctuated equilibrium theory, these equilibria are not permanent. Over time, mounting pressures expose their limitations and create conditions for transition. In Docking Zone I, for example, governments relying on spaghetti-like architectures may deliver extensive e-services today, but they face growing challenges as technology advances and the demand for open, scalable, and collaborative systems increases (World Bank, 2023). Point-to-point connections are rigid and complex, creating bottlenecks for innovation, limiting scalability, and weakening data security and standardisation. These limitations are already being tested by the arrival of fourth industrial revolution technologies such as AI, IoT, and quantum computing, which require seamless integration with existing ecosystems.

In this context, adopting service bus architectures offers a bridging or adoption strategy that enables governments to build adaptable, open-access systems, ready to interoperate with private-sector innovations (Hodapp and Hanelt, 2022) and emerging technologies such as blockchain smart contracts (World Bank, 2023). Nevertheless, no docking zone is permanent: even service bus arrangements will eventually confront new challenges. Thus, movement between zones typically occurs when external shocks or rising demands alter the balance between costs and benefits (Furr and Snow, 2024), reinforcing the idea that digital transformation advances through punctuated, rather than linear, trajectories.

Starting configuration. The bottom-left grey quadrant illustrates a starting position, where both FMIS interoperability and e-service provision are minimal. The five countries in this position (1A) lack foundational digital infrastructure (e.g., cloud, except for Luxembourg) and even basic interoperability. They are also constrained e-service providers. Countries in this configuration underscore the critical role of FMIS towards e-service provision. Without robust accounting systems that communicate seamlessly across modules (e.g., budget, procurement, payroll), i.e., are interoperable, governments may struggle to deliver digital services that rely on accurate financial data, further hindering their modernisation efforts. For example, Honduras, despite receiving significant World Bank support (26 projects, including 4 FMIS related since 2006), remains locked in this low-performance configuration. This case highlights that external funding alone does not guarantee a transition to further docking zones, reinforcing the socio-technical and punctuated equilibrium view that change requires more than inputs, and also consistent with Andrews et al (2014) that change must be aligned to the recipient country's institutional setting (see Andrews et al., 2014).

Dysfunctional configurations. Two dysfunctional patterns appear. First, on the left side of the bold vertical line in Figure 4 (2A and 3A), systems achieve interoperability but fail to provide corresponding e-services. Obviously, e-service provision depends on political decisions and other elements beyond the technological development of a country. However, this creates a scenario of underutilised potential, where technical investments in integration are not leveraged to deliver tangible services to citizens or businesses, undermining the value of digital transformation efforts. Second, some governments deliver e-services without FMIS interoperability (From 1B to 1D). However, in such cases, potential issues may arise - for example, poor data quality, lack of reliability, errors, and delays in data availability (Azevedo et al., 2025). Such dysfunctionality reveals a potential lack of strategic alignment in digital government efforts. To this end, some governments (at least 25 cases) appear to be failing to adopt a whole-of-government approach, which emphasises both the technical underpinnings (like governmental service buses for seamless interoperability) and the citizen-centric outcomes (such as universally accessible e-services). Without this alignment, digital systems risk exacerbating silos and inefficiencies, rather than fostering integration and transparency.

Transition zone. The grey-dashed cells, close to the upper right corner of the matrix, represent intermediate or evolving stages. In contrast to docking zones, the incumbent administration does not allocate sufficient resources or priority to move forward with interoperability initiatives. Therefore, governments are potentially extending legacy systems or experimenting with hybrid solutions, reflecting organisational inertia and uncertainty (Furr and Snow, 2024). In the context of public financial management systems, these transitional zones highlight a critical gap. When FMIS systems lack integration or are not interoperable with other modules (e.g., procurement, tax, or customs), governments struggle to ensure the reliability and efficiency of e-services. For example, incomplete or fragmented financial data can lead to disjointed service delivery, undermining efforts to modernise and digitise public sector operations. Strategic coordination and investment in FMIS interoperability and alignment with e-service delivery are essential to address these gaps. By achieving cohesion between FMIS and broader e-governance systems, governments can transition from fragmented processes to holistic, high-performing ecosystems, enabling seamless service provision and enhancing public accountability (World Bank, 2023).

Overall, the observed cases reveals that governments worldwide converge around two main docking zones, each defined by the interoperability of their FMIS: (i) spaghetti-like interfaces (Docking Zone I) and (ii) service bus architectures (Docking Zone II). Despite their differences in efficiency, scalability, and readiness for future technologies, both configurations allow governments to sustain advanced e-service delivery. This underscores our central claim: FMIS interoperability constitutes the backbone of digital service provision, shaping how data flows across core and non-core financial modules and enabling services that depend on reliable financial information. Surrounding these docking zones are starting, dysfunctional, and transitional configurations, which are less stable and often characterised by institutional misalignment or fragmented infrastructures. These cases highlight the risks when FMIS do not provide a coherent backbone - leading to weak or underutilised e-service ecosystems.

7. Discussion and conclusion

This study explored the configurations of central government’s core and non-core financial management information systems’ interoperability and e-service delivery.

Using the World Bank's GovTech Maturity Index data across 105 countries, we identified distinct configurations that reveal the interplay between FMIS interoperability and e-service delivery.

We started by building on the idea that FMIS are not merely back-office tools for accounting and budgeting; rather, they can function as strategic enablers of digital governance, serving as the backbone of advanced e-service provision. Countries with higher FMIS interoperability are predominantly positioned in advanced e-service quadrants (docking zones I and II), underscoring the critical role of integrated systems in enabling digital transformation. However, many did not move into docking zone II, and some of them remained in the transition zone.

The punctuated equilibrium perspective helps to understand these equilibria as stabilisation points where the FMIS backbone is adequate for current demands. For some countries, the central administration benefits from periods in which systems operate at a sufficient service level, without moving toward a state-of-the-art technology, but instead keeping the entire system within an operational safe zone (e.g., remaining at docking zone I).

Conversely, being outside of the docking zones appears to be an unstable positioning, as such misaligned configurations reveal potential functional disconnections. For instance, governments with strong FMIS interoperability but weak service delivery underutilise their potential, while those with advanced services but weak FMIS create fragmented, risky data ecosystems (Azevedo et al., 2025). Such instability and functional disconnection should require central governments to reach a new equilibrium, by improving either interoperability or e-service provision.

We did not examine the specific path countries followed to reach docking zone II. However, one might suggest that first improving FMIS interoperability, followed by e-service provision can be used to enable successful digital government strategies avoiding service failures. Similarly, introducing new e-service provision based on legacy systems and siloed implementation will challenge the digital strategy progress (Dener et al., 2021).

This study contributes to the literature in different ways. First, existing literature has treated FMIS primarily as back-office tools focused on budget execution, procurement, or audit compliance (Rodin-Brown, 2008; Uña et al., 2019; Dener et al., 2021). Our study significantly advances this line of research by repositioning FMIS as a strategic enabler of digital transformation, especially when designed with interoperability in mind. By empirically demonstrating that advanced e-service delivery links strongly with FMIS systems built on interoperable architectures (i.e., spaghetti or service bus), our findings suggest that FMIS should no longer be seen as passive infrastructure, but rather as foundational platforms for digital government ecosystems. This reframing expands the role of FMIS in the digital governance literature (e.g., González-Zapata and Piccinin-Barbieri, 2021; Grossi and Argento, 2022), establishing a clearer conceptual link between public finance infrastructure and citizen-facing digital services.

Second, while the punctuated equilibrium theory (Sabherwal et al., 2001; Furr and Snow, 2024) has been conceptually applied in digital transformation studies, few have systematically applied it to classify real-world public sector configurations. By building a 4x4 matrix of FMIS interoperability and e-service delivery and identifying "docking zones" that represent temporary, stable configurations, our study offers robust empirical support for the idea that governments do not evolve digitally through linear stages, but through episodic, path-dependent shifts, shaped by both technological architectures and institutional readiness. This contributes to recent works on digital transformation inertia

(Lyytinen and Newman, 2008; Irani et al., 2023), and methodologically offers a replicable model for mapping digital evolution across administrative contexts.

Finally, by revealing two forms of strategic misalignment in digital governance (i.e., countries with high FMIS interoperability but limited e-service delivery - reflecting underutilised technical investments and weak policy coordination; and countries with advanced e-services but low FMIS interoperability - revealing fragmented data ecosystems, inefficiencies, and risks to data accuracy and reliability) our study exposes a functional disconnect between back-end financial systems and front-end service provision - an issue often overlooked in dominant e-government frameworks (e.g., Scholta et al., 2019; Twizeyimana and Andersson, 2019). By identifying these dysfunctions, the paper advances the whole-of-government digital transformation agenda (Dener et al., 2021; World Bank, 2023), offering critical insights into why some digitally advanced governments still struggle with integration, data consistency, or scalability.

This has practical consequences for reform agendas and development aid strategies. For instance, for policymakers, the results suggest that investments in FMIS should not only focus on coverage but also emphasise system interoperability to maximise their impact on e-service delivery. The lack of interoperability directly undermines data reliability within FMIS, weakening accounting and financial reporting, while simultaneously acting as a barrier to e-service provision. Second, the evolving role of FMIS implies that accountants, auditors, and ICT consultants in supplier firms will become increasingly engaged in system integration and e-service projects, moving beyond their traditional focus on accounting functions to a broader concern with digital service delivery. Finally, acknowledging the challenges related to interoperability development (Sloot et al., 2024), it is suggested that governments in the early stages of digital transformation should prioritise building core FMIS capabilities, while those with existing systems should focus on enhancing interoperability to unlock their full potential.

This study adopts an exploratory approach, mapping and comparing existing configurations of FMIS interoperability and e-service delivery across central governments. As such, our analysis is limited in important ways. First, the focus on central governments means that regional or local FMIS, which would potentially present different features, are not captured. A different focus can be relevant for countries in which regional and local governments have a relevant mandate for service provision. Second, rather than seeking to explain the motivations or causal factors behind these configurations, our objective is to provide an overview of how different arrangements currently coexist worldwide. This focus allows us to identify typical patterns and transitional zones without making assumptions about the drivers behind such configurations. While the identification of underlying explanatory factors is indeed important, it falls outside the scope of this study and is suggested below as a potential avenue for future research. It should be noticed that our approach does not suggest causality, at all, leaving room for alternative analysis and explanations.

This study provides important insights, and new questions for future research are raised. For instance, certain contextual factors, such as political will, organisational culture, or resource availability, may influence the effectiveness of e-service delivery and may be explored further. Additionally, while this study focuses on quantitative indicators of service delivery, qualitative research could provide a richer understanding of the challenges and opportunities associated with FMIS implementation in different governance contexts. Moreover, looking further in interoperability issues, how do failures in front-end e-government platforms affect the reliability, integrity, and functionality of

underlying FMIS? Finally, the punctuated equilibrium perspective suggests an important longitudinal question: under what conditions do governments move from one docking zone to another, and what types of shocks (technological, institutional, or political) trigger such transitions? Addressing this would advance our understanding of how FMIS functions as both a stabilising backbone and a potential lever of change in digital governance.

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Appendix

Table 1: Countries by groups: year of FMIS, for interoperability 1 to 2

	1A	1B	1C	1D	2A	2B	2C	2D
Honduras	2006							
Luxembourg	2006							
Samoa	2006							
Gambia	2007							
Lao PDR	2011							
Belize		1999						
Lebanon		2001						
Fiji		2005						
St. Vincent and the Grenadines		2012						
Jamaica		2015						
Bahamas			1995					
Kuwait			1997					
Bahrain			1998					
El Salvador			2001					
Angola			2004					
Zambia			2006					
Algeria			2010					
Maldives			2010					
Togo			2010					
Poland			2011					
Italy				2006				
Czech Republic				2011				
Benin				2020				
Mauritania					2006			
Chile					2007			
Costa Rica					2007			
Timor-Leste					2010			
Madagascar					2011			
Eswatini						2005		
Zimbabwe						2008		
Georgia						2011		
Antigua and Barbuda						2012		
Ethiopia						2014		
Mali							1997	
Bolivia							2003	
Seychelles							2003	
Burundi							2004	
Malaysia							2006	
Brazil								1987
Argentina								1995
Australia								1997
Paraguay								1997
Denmark								1998

1		
2		
3	New Zealand	1999
4	Peru	1999
5	Uruguay	1999
6	Tunisia	2000
7	Hungary	2002
8	Spain	2002
9	Romania	2003
10	Dominican Republic	2004
11	Thailand	2004
12	Sweden	2006
13	India	2007
14	Switzerland	2007
15	Belgium	2009
16	Japan	2009
17	Morocco	2009
18	Croatia	2011
19	Guatemala	2011
20	Austria	2013
21	Ghana	2013
22	Rwanda	2013
23	United Kingdom	2014
24	Panama	2015
25	Finland	2016
26	Sri Lanka	2017
27	Philippines	2019
28	Colombia	2020
29	Malta	2020
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Table 2: Countries by groups: year of FMIS, for interoperability 3 to 4

	3A	3C	3D	4C	4D
Cameroon	2004				
Burkina Faso	2021				
Bhutan		2008			
Türkiye		2017			
Slovenia			1998		
Portugal			2003		
Ecuador			2008		
Singapore			2012		
Uganda			2016		
Tanzania			2018		
Cabo Verde				2001	
Kenya				2011	
Oman					1988
Lithuania					2000
Mauritius					2000
Iceland					2001
North Macedonia					2001
Kazakhstan					2002
Mongolia					2005
Korea, Rep.					2007
Saudi Arabia					2008
Serbia					2008
United Arab Emirates					2008
Albania					2010
France					2011
Jordan					2011
Russian Federation					2011
Greece					2013
Indonesia					2013
Bangladesh					2016
Qatar					2016
Uzbekistan					2017
Iran					2018
Azerbaijan					2020
Estonia					2020