Rethinking AI Readiness: A Framework for LMICs with Argentina as Case Study

Lucia Mariana Galarreta Bolia[a]

[a]AI4Gov alumni, Politecnico de Madrid and Politecnico di Milano, Spain- Italy, https://orcid.org/0009-0004-0167-0257, lgalarretab@outlook.com.

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Abstract. Standard indices and AI readiness criteria often do not adequately capture digital transformation's complex and context-specific dynamics in the public sector, especially in low and middle-income countries (LMICs). These tools typically provide decontextualized, static indicators that fail to consider historical processes and the evolution of local institutions. This paper examines Argentina's experience with AI adoption in the public sector using the Digital Government Ecosystem (DGE) framework —a context-sensitive tool that emphasizes the interaction of institutional, organizational, and governance factors. Drawing on empirical data, the study analyzes how AI initiatives have emerged, evolved, and been influenced by both national and subnational dynamics. It argues that understanding AI implementation as a situated and evolving process is essential for developing more meaningful assessments and strategies in LMIC contexts. The findings aim to contribute to more accurate, locally grounded approaches to analyzing and guiding AI integration in public administration.

Keywords. AI Readiness criteria, AI index, digital government, digital transformation, Artificial Intelligence Institutional Capacity, AI Governance, Argentina, Global South, Low- and Middle-Income Countries (LMICs).
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1. Introduction

Like many Latin American countries, Argentina grapples with many challenges to ensure the full exercise of rights. These obstacles include poverty, low levels of education, poor connectivity in remote areas, technological backwardness, economic issues, and challenges to federal government organizations. The country's complex agenda involves addressing these 'fundamental problems' while striving for government technological improvement and digital innovation. This dual focus is crucial to prevent further widening of existing inequality.

While the UN E-Government Survey 2022 ranks Argentina at 41, indicating that the country has a very high level of e-government development, there are no significant examples of applying AI in public policies in Argentina. This could indicate that other variables may be needed to address this lag between AI adoption in the public sector and its relatively high performance on e-government indicators.

How does a country with a very high E-Government Development Index (EGDI) like Argentina have only so few AI initiatives in its public sector? What minimum conditions does Argentina need to implement AI solutions in public policies that respect rights and address the diverse problems of its population? More importantly, could existing frameworks and indexes provide categories to analyze the readiness levels to enable the implementation of AI to improve public service delivery in Latin America, or should other categories and frameworks be sought and developed?

While existing frameworks and indexes can provide categories for analyzing the readiness or conditions for AI implementation in the public sector, a more comprehensive understanding of the context and needs that hinder AI implementation is crucial. This emphasis on thorough research is necessary to develop practical recommendations and guidelines for the Argentinian public sector.

This research explores the existing frameworks and indexes and assesses their limitations. It also attempts to describe the conditions that influence how AI is adopted in the public sector in the complexity of the Argentinian case, based on data and policy analysis as of early 2024. Finally, it will propose a different approach to understanding how AI solutions are introduced into the public sector in Latin America, specifically in Argentina. Moreover, it is important to provide a more comprehensive perspective than those offered by some of the existing indexes.

2. State of the art and theoretical background

This section reviews existing indexes and AI readiness criteria, the main theoretical approaches, and the concepts used in this work. These will help frame a more situated analysis of AI implementation in Latin America and Argentina. It will explain how we understand the limitations of indexes as the only tool that provides information about national government conditions and readiness, mainly because they cannot grasp each context's challenges and opportunities. Federal or centralized governments are different, and for that, digital transformation is not adopted in the same way in each country. The adoption path of AI to low and middle-income countries (LMICs) differs from that of the wealthiest countries.

It also tries to address some crucial concepts to understand our case. Digitalization and digital transformation are required to analyze how AI is adopted in a country, and the importance of understanding the maturity of this digitalization process. One of the main objectives of this chapter is to define them and explain how they play a part in this analysis. It is also essential to understand why AI adoption in the public sector is related to the main objective of government, which, in my work, I frame as the provision of public value through different types of public policies and regulations.

2.1 The limitation of Indexes

There are many examples of public AI readiness indexes. Helen Tueni and Andrea Glorioso (2022)in their master's thesis, did an excellent job reviewing indexes and frameworks such as the OECD, the Government AI Readiness Index from Oxford Insights, and others. This builds on seminal work analyzing AI readiness in the public sector (Ubaldi, et al., 2019; Berryhill et al., 2019) that established foundational criteria for evaluating governmental preparedness for emerging technologies. Even though these have their differences in categories and approaches, the coincidences are focused on the following:

- Data and its availability, quality, and treatment.
- Public servant skills and technical capabilities around security and transparency.
- The existence of regulations and political decisions to modify cultural barriers propels changes and innovation in public services.
- Infrastructure and cybersecurity.

The Latin American Artificial Intelligence Index (ILIA) - developed by universities and governmental agencies from Chile, IADB, CAF, and UNESCO - represents a regional approach to measuring AI readiness. While it takes a more situated perspective and includes factors such as infrastructure maturity, data availability, and talent development, its categories largely mirror those of international indexes. Furthermore, as a general index rather than one specifically focused on the public sector, it provides limited insight into the particular challenges of government AI adoption.

All the indexes that analyze the readiness of the public sector have challenges in addressing the complexity of the problems that specific regions, such as Latin America and the Caribbean, would face in the walkthrough of AI development. These challenges extend beyond simple metrics to fundamental infrastructure issues. For instance, while indexes emphasize data availability and quality, they often overlook the fundamental challenges of digitalization and interoperability that many governments still face. Even when digitalization initiatives exist, as Novas's study (2019) of Argentina's Electronic Document Management platform shows, implementation often reveals significant operational challenges that indexes fail to capture.

The case of public servant capabilities also illustrates these limitations. Despite having over 137 post-secondary technology education programs in Argentina, only about 50% of public servants have postsecondary education, primarily in health and education rather than technology sectors (Maito, Garay, & Schachte, 2023). This example demonstrates how standard readiness metrics may miss the complex interplay between general education levels, specific technical skills, and actual public sector needs.

2.2 Digitalization

The previously analyzed indexes miss a crucial dimension in Latin America's AI path: the comprehensive

understanding and implementation of digitalization in the public sector. Adopting new technologies, such as AI, requires a deep understanding and a willingness to modify traditional and previous public sector activities and services.

In an exhaustive Inter-American Development Bank study, Estevez et al. (2024) propose an enlightening classification of government types based on their digital evolution. A "traditional government" delivers public services to citizens upon request, over the counter, and provided by a human public servant. A "digital government" advances this by delivering services through digital channels upon request, still provided by a human public servant. The most evolved form, an "automated government," delivers services proactively through digital channels, with algorithms replacing or complementing human public servants.

This classification aligns with Holmström's (2022) conceptualization of digital evolution in organizations. He identifies digitization - the process of converting analog to digital - as a preliminary stage that precedes digitalization, which involves using digital technologies and digitized data to establish new ways of working (Holmström, 2022, p. 330). Building on this foundation, he frames AI adoption as part of a broader digital transformation, defining AI readiness as "an organization's abilities to deploy and use AI in ways that add value to the organization. This represents "the profound transformation of organizational activities, boundaries, and goals to leverage the opportunities of digital technologies" (Holmström, 2022, p. 331).

Estevez et al. and Holmström's approaches provide valuable insights that standard readiness indexes often overlook. They emphasize that digital transformation is a progression of steps rather than a set of conditions, and both frameworks place value creation at the core of digital transformation efforts, including AI adoption. This progression is not just theoretical but represents a crucial roadmap for the public sector's future. Without successfully establishing traditional and digital government foundations, transitioning to an automated government, which relies on this accumulated history, structure, and capabilities, becomes problematic. This understanding underscores the urgency of addressing fundamental digital governance issues before governments can embrace AI's potential meaningfully.

2.3 Maturity of the Digital Environment

To understand how digital transformation unfolds in different contexts, Lorenzo (2016) introduces the concept of "maturity models" to indicate the incremental path organizations must take to increase digital maturity. The maturity refers to the formalization and optimization level of the process these organizations acquired (Lorenzo, 2016, p. 575) This concept is crucial for our work because it introduces the concept of time in a step-by-step development towards an ultimate ideal state of digital transformation, seeing it as a process, not as a moment, like indexes do. At the same time, maturity models focus on organizations as their core unit, which is a limitation for understanding an ecosystem's broader capabilities, as this work aims to do.

The historical development of digital government demonstrates the concept of maturity in this context. In high-income countries, some governments began collecting digital information and establishing institutional frameworks, infrastructure, technology, and human capacity as early as the 1950s. This process was driven by the need to enhance efficiency and manage information, alongside the introduction of computer technologies. This early adoption of information technology laid the groundwork for the development of electronic government and facilitated digital transformation in subsequent years (Margets, 2022). These initiatives are characterized by their long-term policies, which are less subject to changes in political administration. They are considered strategic, as they provide resources and infrastructure over time.

According to Estevez et al. (2024), one crucial condition for implementing new technologies in a digital governmental ecosystem is to do so with proven and mature ones, guaranteeing safety and respect for citizen rights. This principle emphasizes the importance of ensuring that digital systems and processes have reached an appropriate level of maturity before they are widely implemented, particularly in contexts where institutional capacities may be limited or resources are constrained.

The maturity criteria apply fundamentally to digital environments and their readiness for digital transformation. AI implementation becomes desirable when the digital ecosystem demonstrates sufficient maturity to guarantee safety and rights protection across different government levels. This maturity requires time, sustainability, political decisions, and resources—elements that are often scarce in developing regions. Therefore, the challenge goes beyond technical capabilities; it also involves prioritizing long-term policies, ensuring sustained resource allocation, and maintaining institutional consistency. These factors are essential for fostering robust digital ecosystems that can support the adoption of AI.

2.4 Public Value in Digital Transformation

One of the main objectives of a government is to create public value: "To produce public value with no (or minimal) waste of government resources such as time, effort, authority, and others" (Estevez, Janowski, & Roseth, 2024, p.

9). This objective becomes particularly critical in the context of digital transformation as it involves three interconnected elements: political aspects (public value creation), operational capabilities, and strategic capabilities. These elements form the foundation for transformation towards digitalization and automation, where the potential to reduce waste and improve resource management offers significant efficiency gains that cannot be ignored or postponed. In the current technological landscape, the risk of failing to deliver public value increases when governments undermine the priority of addressing digital transformation and automation.

The pursuit of public value through digital transformation can follow multiple pathways, each with its own implications for government effectiveness. These pathways manifest in different dynamics:

- Scaling and maturing the entire digital governmental system—This is a comprehensive approach that seeks to enhance public value creation across all government functions and levels simultaneously.

- Fragmentary efforts in different domains and levels of government—This is a more targeted approach, where public value is enhanced in specific areas or services based on immediate needs or opportunities.

- One-shot implementations in specific contexts - Focused interventions addressing particular public policy problems, often in response to well-defined challenges or opportunities for innovation.

These pathways are not mutually exclusive but rather represent different strategies for enhancing public value through digital means. In the Latin American context, these multiple approaches often coexist, reflecting the region's complex reality of public administration. While traditional recommendations advocate for a centralized, whole-of-government strategy to provide coherence in data, technologies, and infrastructure (Estevez, Janowski, & Roseth, 2024, p. 78), the practical pursuit of public value often requires a more flexible approach. This results in the coexistence of bottom-up and top-down initiatives in public policy design, each contributing differently to public value creation through digital transformation.

2.5 Public policies, frameworks, and legislation

The regulatory landscape for AI presents significant challenges and variations globally. Currently, the EU is the only major player with comprehensive AI legislation. At the same time, the United States has taken a more flexible approach through an executive order that outlines regulatory directions. China, meanwhile, has established strict state control rules. Despite these different approaches, unified international AI governance remains a notable vacancy, creating uncertainty for countries developing their own regulatory frameworks. (Klein & Patrick, 2024)

In response to these regulatory challenges, some jurisdictions explore innovative governance approaches such as regulatory sandboxes. As analyzed by the Economic Commission for Latin America and the Caribbean (ECLAC) (Guio, 2024), these sandboxes offer a controlled environment to test new technologies and regulatory frameworks before full-scale implementation. They represent a balanced approach between innovation and regulation, allowing governments to understand and address potential risks while fostering technological advancement. However, in Latin America, the adoption of such innovative regulatory tools has been limited, with only Brazil, Colombia, and Bermuda implementing sandbox initiatives (Guio, 2024). This limited adoption reflects a broader challenge in implementing flexible regulatory frameworks that can support AI innovation while protecting public interests.

This regulatory context has particular implications for LMICs. Without global AI governance frameworks, these nations face significant barriers in accessing and benefiting from AI innovations in crucial areas like healthcare, education, and government efficiency. The lack of established international standards and governance mechanisms exacerbates existing technological gaps between LMICs and more prosperous countries, often leaving developing nations to work in isolation, cut off from markets, funding, and technological innovation opportunities.

The regulatory landscape thus extends beyond mere legal frameworks to encompass broader questions of technological access, innovation capacity, and international cooperation. As countries develop their AI policies and regulations, they must balance multiple considerations: promoting innovation, protecting public interests, ensuring ethical use of AI, and maintaining competitiveness in the global digital economy. For LMICs, this balance is particularly challenging given resource constraints and the need to catch up with rapid technological advancement while ensuring appropriate safeguards are in place.

2.6 Revisiting Key Concepts through the LMIC Lens: Towards an Integrative Framework

The previous sections have outlined several key dimensions that shape how digital transformation and AI adoption unfold in the public sector: readiness indexes, digitalization processes, digital maturity, public value creation, and regulatory frameworks. When these dimensions converge in LMIC contexts, they create a distinct landscape that demands careful consideration. Unlike high-income countries that underwent gradual digital evolution over

decades, LMICs face unique challenges in their digital transformation journey, requiring them to address basic digitalization needs while simultaneously pursuing advanced technological capabilities.

Traditional indexes and "readiness criteria" often prove insufficient in this highly contrasting context, offering merely listings of good practices rather than foundational guidelines for realistic AI implementations in the public sector. This limitation stems from their failure to account for core elements such as digitalization infrastructure, resource constraints, and the need for long-term policies and strategies on human resources and talent development.

The contrast between high-income and low- and middle-income countries is particularly stark in their digitalization pathways. While developed nations followed planned and gradual digitalization efforts, LMICs typically experience rapid and disorderly changes, leading to less structured and more complex digitalization processes. The UN E-Government Survey consistently highlights these disparities in digital infrastructure and capacity between developed and developing nations.

This situation is further complicated by the political dynamics in LMICs, where changes in administration often result in policy discontinuity or abandonment, jeopardizing previous achievements. The challenge of strengthening digital ecosystems becomes particularly acute when considering system scalability, which requires sustained resources, long-term projects, and institutional consistency across different governments. For instance, some systems may become inoperative when national governments fail to provide resources to provinces or municipalities, severely limiting possibilities for scaling and innovation. In federal countries like Argentina, this challenge is amplified by the high cost of political transactions, where party politics often dominate negotiation processes (Palumbo, 2019, p. 143).

The creation of public value, which should be the primary goal of any government, becomes especially critical in LMICs given their complexity and limited resources. Unfortunately, we often observe the implementation of "canned responses" that provide little real benefit while consuming precious resources. This creates a fundamental tension: how can these countries harness AI's benefits for public value creation while simultaneously building the comprehensive digital foundation that the literature suggests is necessary?

The global context further compounds these challenges. The absence of global AI governance particularly affects LMICs' ability to access and benefit from AI innovations in areas such as healthcare, education, and government efficiency. Without such governance, the gap between LMICs and more prosperous countries continues to widen, often leaving developing nations to work in isolation, cut off from markets, funding, and technological innovation opportunities.

However, regional initiatives offer some hope. Despite historical fluctuations in Latin American cooperation, AI has emerged as a unifying agenda, exemplified by the Santiago Declaration. This agreement establishes a workgroup for an Intergovernmental Artificial Intelligence Council for Latin America and the Caribbean, which represents a pivotal moment for the region. Despite varying national positions, including Argentina's, this initiative creates an opportunity to address shared regional challenges and ensure the Global South's perspectives are included in broader AI discussions.

Given these realities, Latin America and the Caribbean must develop frameworks that better reflect their circumstances and actual position in the AI adoption journey. These frameworks should account for the unique challenges and opportunities present in the Global South, moving beyond traditional assessment models to create more relevant and actionable guidance for digital transformation. This recognition forms the foundation for the analytical framework proposed in this work.

3. The Argentinian Case

In this section, we will analyze Argentina's adoption of AI in the public sector through the conceptual lens developed in the previous chapter. This analysis will allow us to identify Argentina's specific challenges and opportunities in implementing AI technologies within its complex institutional framework. First, we will examine the most significant AI initiatives implemented in recent years, evaluating not only their technical characteristics but also how they reflect the broader digital maturity of Argentina's public sector. After establishing this empirical foundation, we will assess the country's digital infrastructure, data governance practices, and institutional readiness to develop a comprehensive understanding of Argentina's digital ecosystem and its capacity for AI integration.

This analysis reflects the situation in Argentina as of early 2024. While specific digital government initiatives may evolve with changing administrations, the structural challenges and institutional arrangements tend to persist beyond political transitions. Readers should consider potential developments that may have occurred after the research period.

3.1 AI experiences in the Argentinian public sector

Despite the global acceleration of AI technologies and their increasing adoption in public administration worldwide, Argentina's public sector shows a relatively limited implementation of AI solutions. The existing initiatives can be categorized into several functional areas:

- Citizen-facing conversational AI

The national government's "Tina" chatbot is a virtual assistant that is available 24/7. It provides citizens with information on more than 200 procedures, programs, scholarships, subsidies, and consultations on health, inclusion, justice, transparency, and gender issues.

Similarly, Buenos Aires City implemented "Boti," an AI chatbot for citizen assistance. During the COVID-19 pandemic, this platform was enhanced with "IAtos," an AI tool that detected potential COVID infections by analyzing user cough audio samples.

- Judicial process automation

The "Prometea" system applies artificial intelligence techniques to prepare court opinions automatically. The development of PROMETEA began in 2017 by the Prosecutor's Office in the Autonomous City of Buenos Aires, Argentina. This tool increases efficiency: brought a reduction from 90 minutes to 1 minute (99%) for the resolution of a tender process, from 167 days to 38 days (77%) for processes of the requirement to trial, and from 190 days to 42 days (78%) for protection housing with citation of third parties, among others. (Estevez, Fillottrani, & Linares Lejarraga, 2020)

Like Prometea, there are other experiences in the provinces' justice systems. The provinces of La Pampa and Río Negro are using AI to improve the process and the times of the procedures.

The State Prosecutor of the province of Buenos Aires implemented Velox, a machine-learning model used to help lawyers prepare for the tax hearing issued by the State Prosecutor.

A few additional experiences can be mentioned (OECD and CAF, 2022). While the AI initiatives in Argentina demonstrate the potential of AI to enhance efficiency and service delivery, they often rely on relatively limited technologies. For example, chatbots like Tina and Boti primarily use rule-based systems or basic natural language processing, which can be helpful for citizen interaction. Although Prometea and Velox employ more advanced AI techniques, they focus on automating specific tasks within defined domains. These initiatives are isolated efforts rather than examples of widespread AI adoption within the public sector. This situation highlights the absence of a strategic, national-level plan for AI implementation in Argentina, leading to a fragmented landscape where AI initiatives are concentrated in specific areas without integration into the overall governmental structure.

This fragmentation suggests that, despite technical experimentation, AI adoption remains disconnected from systemic public sector transformation. Understanding this misalignment is critical for informing institutional reforms and capacity-building efforts. These patterns of AI adoption align with broader regional trends identified by Aguerre (2020), where AI implementations in Latin American public sectors tend to be isolated, technologically conservative, and concentrated in urban centers rather than integrated into comprehensive digital transformation strategies.

These experiences highlight a public sector that, despite making significant progress with concrete and replicable solutions, still struggles with strategic coordination. In Argentina, the use of AI in the public sector is mainly focused on improving administrative efficiency and automating processes. However, as we will present in 3.2, there is a lack of a clear governance framework to ensure sustainability, transparency, and social participation in AI development. This underscores the need to transition from isolated technological adoption to a comprehensive and deliberative public policy on AI.

To fully understand the limited scope of these AI initiatives, it is important to consider the scale of Argentina's public sector. Beyond the national administration, Argentina consists of 24 provincial governments, over 1,900 municipal governments, and distinct systems across the executive, judicial, and legislative branches. Given this complex and decentralized structure, the identified AI initiatives represent isolated cases within a much larger and more intricate governmental landscape. This institutional complexity suggests the need for a more nuanced framework to analyze digital readiness—one that accounts for the multilevel nature of governance and the evolutionary process of digital transformation, as will be proposed in Section 4.

3.2 The current Argentinian digital public sector context

The E-Government Survey 2022 ranks Argentina 41st, reflecting a high level of e-government development. However, this overall ranking obscures a more complex reality within Argentina's federal structure, where uneven digital adoption leads to significant variations across different levels of government. Below, we will outline some observations about the Argentine landscape.

Digital Administration System: Argentina's unique federal structure and multiple independent governmental levels present a complex digital landscape. Provinces and municipalities responsible for decentralized services like health, education, and taxes contribute to this complexity. This context underscores that a high level of digitalization at the national level does not fully capture the country's digital reality.

Argentina presents a heterogeneous implementation scenario in the foundational area of administrative document management. Of the twenty-three (23) provincial governments and one federal district, eight (8) provincial executive governments have developed their own digital administrative file systems, while sixteen (16) use the system provided by the national government (called Electronic Document Management or GDE in Spanish). This diversity creates significant interoperability challenges, stemming from both technological differences and varying implementation timelines. For example, while the national government began using the GDE system in 2015, five provinces only adopted it very recently, between 2023 and 2024. At the municipal level, digital adoption is even more limited, with only about 90 municipalities (out of more than 1,900) using GDE as of early 2024.

One technology that has achieved widespread adoption is the digital signature, which enables legally binding electronic authorization of documents, providing security, authenticity, and non-repudiation for digital transactions. Every province has implemented this technology, demonstrating that cross-government digital tools can succeed when they offer clear value and align with existing legal frameworks. Implementing transborder digital signature capabilities with Uruguay, Chile, and Brazil further illustrates the potential for regional digital integration when adequately coordinated.

This uneven landscape affects every element of the digital ecosystem, from data quality and availability to cultural change and digital literacy among public servants. Digital platforms represent just one dimension of AI readiness, which depends on data governance, infrastructure, human capabilities, and regulatory frameworks.

Data Governance: Even though the national government has an open data policy, the volume of datasets available could be higher. With around 1200 datasets, the datos.gob.ar portal provides data from the national government and technical assistance to provinces and municipalities if they are willing to promote a data governance policy. Currently, only 14 provinces and 80 municipalities have open data portals. The same methodology is used with interoperability and authentication platforms, where the national government puts them at the disposition of the provinces. However, this adoption is entirely voluntary and sometimes challenges the technology teams of each part. In fact, the national government is promoting compatibility with provincial platforms that use X-Road, but only two start the first tests. There is no doubt that the improvement in the coordination between agencies and governmental levels to make better use of data already existing is a necessity that breaks the silo logic of the data and starts to create a fertile data governance space where AI could thrive.

Infrastructure Development: In the case of infrastructure, as we said previously, even though the internet coverage is high, it reproduces the inequity of the service distribution across the country. Some locations and populations still need to be communicated, impacting the digitalization level of government services. Moreover, connectivity is mainly through mobile phone networks, which are only used in individual communication activities or are limited to recreational use. Therefore, we should highlight that provinces and municipalities have minimal capabilities to invest in infrastructure because their budgets are mostly compromised by the payroll of their administrations and other priorities. That is why the investment in digital infrastructure for the provinces and municipalities might come from the national government or internationally funded projects from different organizations. In LMIC, that is the rule.

At the national level, the landscape is better, and the national government has more infrastructure. Argentina has ARSAT, at least for the moment, a national company that provides telecommunication services to the central government and the provinces that can afford them. For example, ARSAT has a data center and cloud services and is one of the critical actors in extending the country's optical fiber network (Federal Fiber Optic Network, in Spanish REFEFO). Argentina's national government also has one of the top 500 supercomputers in the world.

YEAR	2021	2022	2023
	DECEMBER	DECEMBER	SEPTEMBER
Total Km	**31.876**	**32.585**	**32.804**

Fig. 1 REFEFO Extension in km (2021-2023) Self-made figure from internal government documents.

Even though there are still many things to do, Argentina has achieved vast improvements at all its governmental levels related to digital governance and is in a privileged position in the region.

This work does not intend to investigate every case of every subnational government per se. Still, it is essential to describe this complexity to explain why AI tools remain isolated cases dispersed in different agencies along the country's territory. Hence, digitalization at all levels and across the country is a leading condition that governments should address to adopt automation tools such as AI. To enhance what is missing, the maturity of the national digital ecosystem should be analyzed as a whole, with all the governmental levels and stages.

Institutional readiness and human capacity: as mentioned, Argentina is a federal country with different government levels and various institutional designs, where updated and out-of-date technologies coexist. Access to a shared digital infrastructure will not be achieved in the short and medium term because of the absence of a strategic plan for digitalization at all governmental levels that includes a unified infrastructure and interoperable systems. The need for more economic resources is one of the main reasons. This is why data exchange, data governance, and interoperability become core challenges.

At all levels of government, it is still more challenging to have in-house technological expertise than in the private sector, and provincial and municipal governments find this even more difficult because of the existing gaps in resources, education, state capacities, etc. These differences operate between provinces and municipalities and between them and the national government. Where an agency, a ministry, a province, or any part of a government is lucky enough to have a couple of well-trained people in the technology team, empowered to innovate, an improvement is willing to rise. These isolated, short-term solutions show the absence of a national plan or strategy to incorporate AI tools into the public sector at all governmental levels.

Even if this is a problem that every nation has worldwide, in the case of LMIC, the consequences provoke an overreliance on digital and AI solutions made by private companies that have a profound ignorance of government processes, their activities, the rights that must be attended to in public matters, etc. This is crucial to understanding the dispersed experiences with AI solutions in the Argentinian public sector.

Today, with AI development, the risk is high and costly for the government to leave private companies entirely in charge of their AI projects. Even if they outsource the technological expertise, there are many components, such as legal expertise, internal processes, and borderline cases, that only civil servants can provide (Estevez, Janowski, & Roseth, 2024, p. 87). For example, in the case of the TINA chatbot, the UX team is in-house (government) even though the national government contracts with Meta (because of the use of WhatsApp) and with Botmaker to integrate data, API, etc., and deploy the chatbot. It is essential to highlight that even if some AI experiences are partly outsourced, most cases we introduce in the 3.1 part are entirely in-house experiences.

Latin America and the Caribbean are rich in linguistic diversity, with Spanish and Portuguese serving as the predominant national languages alongside many other dialects and languages of native and different ethnicities. This diversity is not a hindrance but a valuable asset that enriches our region. However, it does present a challenge in developing a regional or national technological sector that genuinely reflects the needs and interests of our diverse continent, as the industry predominantly uses English as a universal language. This characteristic underscores the disparities between the South and North and the private and public sectors. The reliance on the private sector for AI or other outsourced projects often leaves the public sector in the hands of companies that do not even program in the same language.

One of the critical criteria for readiness, as identified by indexes, is the acquisition of skills and technological competencies by civil servants. This is crucial, as it enables the government to be more efficient and effective without outsourcing technological development. In the global AI race and the battle for global power, the rapid adoption of new technologies is more feasible if the innovation and capabilities are tailored and hosted within the government (Margets, 2022). Beyond highlighting the risks of excessive outsourcing, it is essential to outline

strategies to foster in-house AI capacity. These include creating interdisciplinary teams within government units, establishing public sector AI labs, investing in upskilling programs for civil servants, and fostering partnerships with local universities and research centers. Such efforts build technical expertise and enhance institutional memory and autonomy in AI governance. However, achieving this is more challenging in LMIC because public servants need specific skills, and the technological industry is structured and tailored for the central and wealthiest nations.

In 2019, Argentina unveiled an AI National Plan, a significant step that, unfortunately, has not been fully implemented. Since then, we have seen some scattered governmental actions that could pave the way for creating an ecosystem conducive to AI solutions, but there is still much room for growth. Notable among these actions are a couple of regulations and incentives for the Argentinian case: the AI National Plan (2019), which is yet to be executed, and a Disposition with recommendations for using AI in the public sector (2023). The disposition, titled "Recommendation for a reliable Artificial Intelligence," marks the first regulatory act of the Argentine state in this field. It is based on the UNESCO "Recommendation on the Ethics of Artificial Intelligence," Asilomar AI Principles, and OECD AI Principles, among other principles and papers on the topic.

The absence of global AI governance and the limited regulation framework in Argentina make the condition regarding the existence of regulation, according to what indexes usually indicate, far more complex for LMIC to achieve. The geopolitical competition, the inexistence of a global AI governance, and the breaches in access to every element that enables AI expansion (such as digitalization, funding, technology, infrastructure, education and scientific knowledge, markets, etc.) made it way more difficult for these types of countries to create regulations that could bring security, guarantee rights and create a fertile ground to grow AI initiatives and are the dominant barriers to AI implementation in the public sector. However, it does not imply that AI could not emerge.

Formulating a national AI strategy is a pressing need that must be co-designed, at least with the provinces. A comprehensive national strategy should encompass the entire public sector, not just the national government. In this context, Argentina's various thematic federal councils serve as institutional spaces where all provincial and national governments can collaboratively design strategies to address the sector's needs and challenges. For instance, the Federal Council of the Public Service (in Spanish, Consejo Federal de la Función Pública – COFEFUP) has been a critical platform for the provinces and national government to forge agreements and public policies for 30 years.

Section 4 introduces the Digital Governmental Ecosystem (DGE) framework, a novel approach used in this study to analyze the dynamics of digital transformation (and ultimately AI adoption) within Argentina's public sector more comprehensively than indexes.

4. Different Approaches for Argentina and Latin America

To clarify how we can address Argentina's reality as part of a Latin American landscape, we cannot have precise analyses of the readiness for AI implementation in public service if we ignore the degree of evolution of the digital environment.

As we have seen, the ecosystem concept is more related to the whole digital environment, including the private sector, all kinds of organizations from the social sector, and governments. At the same time, the maturity concept is usually used at the organizational level, undermining the relevance of a holistic view of the government's digital situation at all levels in the federal organization.

Developing specific analytical criteria to analyze the Argentinian case more precisely and gain a deeper understanding of AI implementation in the public sector is imperative. These criteria, which should consider the government as an ecosystem, will incorporate indicators that can gauge the level of maturity and, consequently, the potential for AI adoption in the public sector. Next, we will explain and describe this concept and how it interacts.

4.1 Defining the Digital Governmental Ecosystem (DGE)

To analyze the Argentinian case and other LMICs more precisely, it is necessary to move beyond traditional frameworks and indexes. This work proposes the concept of the Digital Governmental Ecosystem (DGE) as a more comprehensive and nuanced approach to understanding digital transformation and AI adoption in the public sector.

The DGE framework draws upon concepts from various theoretical perspectives. The Digital Governmental Ecosystem (DGE), as Systems Theory establishes, is understood as a complex system composed of interconnected components. Changes in one component can trigger cascading effects throughout the entire system. This

theoretical approach highlights the interconnectedness and interdependence of elements within the public sector, aligning with established research in systems theory and political systems. Notable scholars in this field include Easton, Parsons, Almond, and Powell, among others. (López Montiel, 2008).

Of course, and as its name indicates, DGE is based on the Ecosystem as a Model. Crucially, the DGE framework adopts the concept of ecosystems from the natural sciences. The ecosystem, understood as the "set of organisms and their physical environment interacting in a place," provides a globally applicable and flexible model for understanding complex systems. Its applicability across temporal and spatial scales and adaptability to diverse situations make it helpful in analyzing the digital government's dynamic and evolving nature. Any location presenting these conditions could be considered an ecosystem, regardless of size or the brevity of interactions. (Armenteras, et al., 2016).

Lastly, DGE is based on the theoretical construct of Digital Governance. It incorporates principles of digital governance, emphasizing the need for effective leadership, coordination, and regulation to guide the development and evolution of the digital ecosystem. This perspective underscores the importance of governance mechanisms in shaping the adoption and impact of digital technologies in the public sector (Naser, 2021).

The Digital Governmental Ecosystem (DGE) is a comprehensive construct encompassing all the institutions and agencies within the public sector. This includes:

- **Governmental Structures:** The various powers of the state (executive, judicial, and legislative) and the different levels of government (national, provincial, and municipal).
- **Technological Infrastructure:** The systems, technologies, and data utilized by governmental entities.
- **Regulatory Framework:** The regulations that govern the operations of public sector institutions and agencies.
- **State Capacities:** The resources, skills, and capabilities that enable the delivery of public value.

4.2 DGE Maturity

The maturity level of the DGE is assessed based on two combined variables: **evolution and coverage.**

Evolution refers to the main activities undertaken by governmental entities, progressing from analog and traditional government to digitization, digitalization, and ultimately, digital transformation (Holmström, 2022), representing the highest level of the evolutionary process. For example, if the main activities are focused on digitization, the DGE has a low level of evolution.

Meanwhile, **coverage** indicates the extent to which different government levels and agencies have been impacted or need to be impacted by prior activities such as digitization and digitalization. Coverage can range from narrow and dispersed to broad. For example, we can find a highly digitalized national government in Argentina, but the provinces and municipalities are behind in this process. So, the DGE's coverage is narrow and could be placed in the dispersed or medium position.

The maturity of the DGE influences the adoption and implementation of digital technologies, including AI, in the public sector. A mature DGE provides a more favorable environment for successful AI adoption, while a less mature DGE may face challenges in effectively leveraging AI's potential.

4.3 How does all this work together

The element of coverage in a federal organizational government is crucial in the process of digital innovation and AI incorporation in the public sector because citizens' primary services and data (and their lives) are located and generated in their closest governmental levels, even though some tools and solutions are deployed at the national level and then transferred to provinces and local governments.

If the evolution of the DGE is low and in a small number of agencies and government levels, public value will not be achieved to its full potential. The relationship between both elements will show us how mature the DGE is. By maturity, as we previously indicated, we identify how this relation is and how it materializes in government actions with all the elements that public value requires: efficiency, effectiveness, and capability to resolve people's problems. A thriving DGE that brings public value leads to a more comprehensive implementation of AI in the public sector.

When the DGE has a low or middle level of maturity, digital transformation activities such as AI adoption are expected to be dispersed, with sustainability, scalability, and interoperability deficiencies. Mostly, no part of a strategy. It is more likely to be none or a few pieces of legislation.

4.4 The Argentinian DGE

Until 2023, Argentina seemed to be on the road to increasing its DGE maturity, even with back-and-forth. Considering the information in Chapter 3 and our new framework, we can quickly locate Argentina at a middle level of maturity, with some elements highlighting the tendency to increase it.

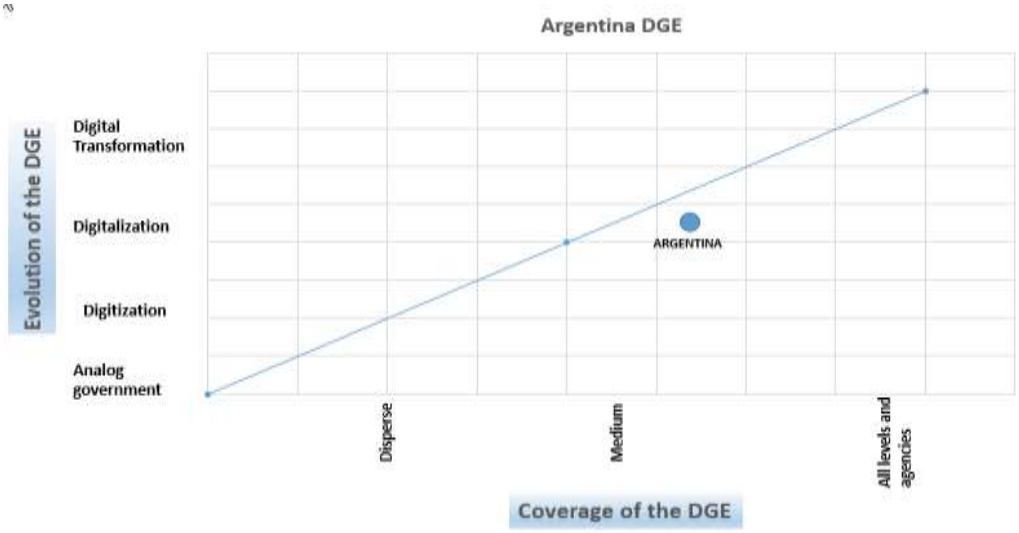

Fig. 2 Argentina DGE maturity location. Source: Author's elaboration

As Figure 2 shows, Argentina mainly covers all the middle maturity conditions. However, we can identify the tendency to cover all the government levels because the national government and all the provinces are already in the evolution stage of digitalization, even though many municipalities and some agencies at all levels are behind. We can also identify that the infrastructure and connectivity with ARSAT as a provider of cloud services and the REFEFO are closer to the conditions of a highly mature DGE. Moreover, even though AI initiatives in Argentina are dispersed, this shows a tendency to evolve into a digital transformation stage if the state's capacities and resources in AI tools could be strengthened over time.

Nevertheless, the actual situation enlightens that this level of DGE maturity brings only the possibility of AI implementation in some silos or situations that are more related to the disparity and gaps between agencies and governments: those who have some state capacities (recourses, skills, infrastructure, coordination between intra and extra state, etc.) could deploy an AI solution to a public problem.

Returning to our question about how LMIC can obtain the benefits of AI adoption to increase public value when we still need to go ahead with digitalization, the answer is given by the national experiences, as we did with Argentina. Even though the ideal condition shows that digitalization comes first before AI, other elements enable AI in the public sector to emerge in this case, and they all provide elements to the maturity of the DGE.

The process is simultaneous and unique for each case and evolves according to the decision-making. Every country's process differs and could take different approaches. Some could strengthen every level of government first and then focus on evolving the DGE. As we already indicated, these processes in Latin America are disorderly.

This framework guarantees a more realistic and individualized approach for every national case. It provides a dynamic view of the strengthening process of the DGEs where the "readiness criteria" are not the center of the analysis. We can avoid the need to force or dismiss a case if it does not apply to an AI readiness index. Digital transformation and automation are fundamental parts of AI's emergence in the public sector, but not determinants of its existence. Other elements are very distinctive to each process. Reediness criteria tend to make some elements invisible or overestimate some aspects, depending on how or who analyzes a national case.

Conclusions

This work tried to address the Argentinian public sector's current situation concerning AI implementation against a Latin American backdrop. The analysis includes the elements and processes that structured the implementation

of AI as one of the stages of the digitalization of government and its transformation to automation. As the indexes indicate, Argentina requires consistent development of its infrastructure, frameworks, regulations, and a well-trained public servant body. However, we must extend our analysis beyond the existence or absence of these requirements to explain how AI is being implemented in Argentina, since these tools cannot grasp contextual factors involved in digitalization as a prerequisite for a comprehensive inclusion of AI across government.

It is necessary to dive into the DGE, analyze it as a whole, and take it as a living creature that grows and expands in disorder, in different directions, and with different velocities. By doing so, we can approach a possible explanation of why Argentina has a dispersed and small amount of AI experiences in the public sector. We can also try to seek solutions related to the structural needs of the DGE instead of focusing on resources and time on isolated efforts, like a reskilling program for public servants without knowing what they need, or a strategy or regulation that does not consider the current situation of the provinces and local governments. In the end, this kind of action only increases the internal gaps between provinces or municipalities with more resources and between them and the national government, and, of course, increases the inefficiency in government.

The maturity of the DGE is a concept that brings the idea of process, growth, and movement. The variables used in this work, such as evolution and coverage, bring to light that in one DGE, there coexist different realities, such as municipalities without relevant internet access and provinces with a ministry that still uses paper system files with a national government that provides digital ID or a city the integrated chat-GPT to the city chatbot. With this in sight, it is possible to design better public policies customized to each reality and co-design without leaving anyone behind. It also allows leveraging the existing AI solutions and digital transformation momentum that some agencies, governments, and stakeholders are conducting to benefit the whole DGE.

Therefore, we can provide some insights related to various topics of this work. Here are some limitations and future research ideas.

- Indexes are an excellent start to introduce some realities and comparatives between countries, but they are insufficient to explain the profound reasons and singularities of a digital transformation process. Readiness criteria would overestimate or put aside elements or experiences that are relevant or interesting for each case.

- AI implementations can emerge even though the path to digital transformation has not been completely achieved. This is a sign of a certain level of maturity of a DGE and must be seen as a characteristic and process, not as a lack of something.

- LMICs should simultaneously address catching up to digital transformation; meanwhile, they should try not to be left behind and minimize the loss of public value in delivering public policies.

- The LMIC regulation should address specific problems and particular characteristics; try to resolve each DGE's issues and not emulate foreign experiences.

- Resources of all kinds (state capabilities, infrastructure, etc.) remain the main agenda for the LMIC. In federal countries, this must be addressed at all governmental levels, in a coordinated way.

While this study provides valuable insights into the Argentinian public sector's current situation concerning AI implementation, several limitations should be acknowledged. First, the focus on a single case study limits the generalizability of the findings to other LMICs. Future research should consider conducting comparative studies to analyze AI adoption in the public sector across multiple regional countries.

Second, the availability and quality of data on AI adoption in the Argentinian public sector posed challenges to conducting a more comprehensive analysis. Future research could explore alternative data sources or develop new data collection and analysis methodologies.

Third, the Digital Governmental Ecosystem (DGE) framework, while offering a novel approach to understanding AI adoption in the public sector, requires further validation in different contexts. Future research should continue to develop and refine this framework to enhance its applicability and generalizability.

Finally, this study focused primarily on AI adoption in the public sector. Future research should broaden its scope to explore other important aspects of digital transformation, such as citizen participation and digital inclusion, to provide a more holistic understanding of the phenomenon.

These limitations highlight potential avenues for future research that can build upon this study's findings and contribute to a more comprehensive understanding of AI adoption in the public sector in LMIC.

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