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Master Thesis

AI governance in the context of Argentina. Digital government, indexes and performance.

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Title: Analysis of AI Solutions in Public Policies in Argentina. Opportunities and Challenges for their Implementation.

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Abstract

Indexes and readiness criteria for AI in the public sector might show some limitations in understanding each national case's different realities and the complexity of AI implementation in the public sector. They put a set of criteria at their disposal with a “non-negotiable” idea, but they are listed without context and history. Moreover, they do not take account of the notion of process and evolution. This notion is crucial to LMIC because of the need to catch up in the implementation of digitalization and digital transformation.

That is why LMICs, such as Argentina, should be analyzed, not leaving behind elements, characteristics, and particularities that can be crucial to apprehending how digital transformation, including AI adoption, is evolving in the public sector.

With this intention, this work reviews different aspects of the Argentinian case, applying a new framework that tries to show more clearly in which context AI in the public sector emerged in Argentina, how this happens, and which variables should play a big part in the Digital Governmental Ecosystem (as we called it).

The final intention is to develop a more accurate way to analyze Argentina's reality (and extend it to other LMICs), one that is more situated and adds value to the experiences in the path traveled so far for AI in the public sector.

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Chapter 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. 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.

Chapter 2

2. State of the art and theoretical background

This chapter 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 LMIC differs from that of the wealthiest countries, etc.

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. 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 regulation and political decisions to modify cultural barriers propel changes and innovation in public services.
- Infrastructure and cybersecurity.

A closer approach, the Latin American Artificial Intelligence Index (an endeavor of different universities and governmental agencies from Chile, IADB, CAF, and UNESCO, among others) placed Argentina, as we can see in Figure 1, in the fourth place of the ranking and enumerated enabling factors that have a strong influence on the maturity of the AI ecosystems:

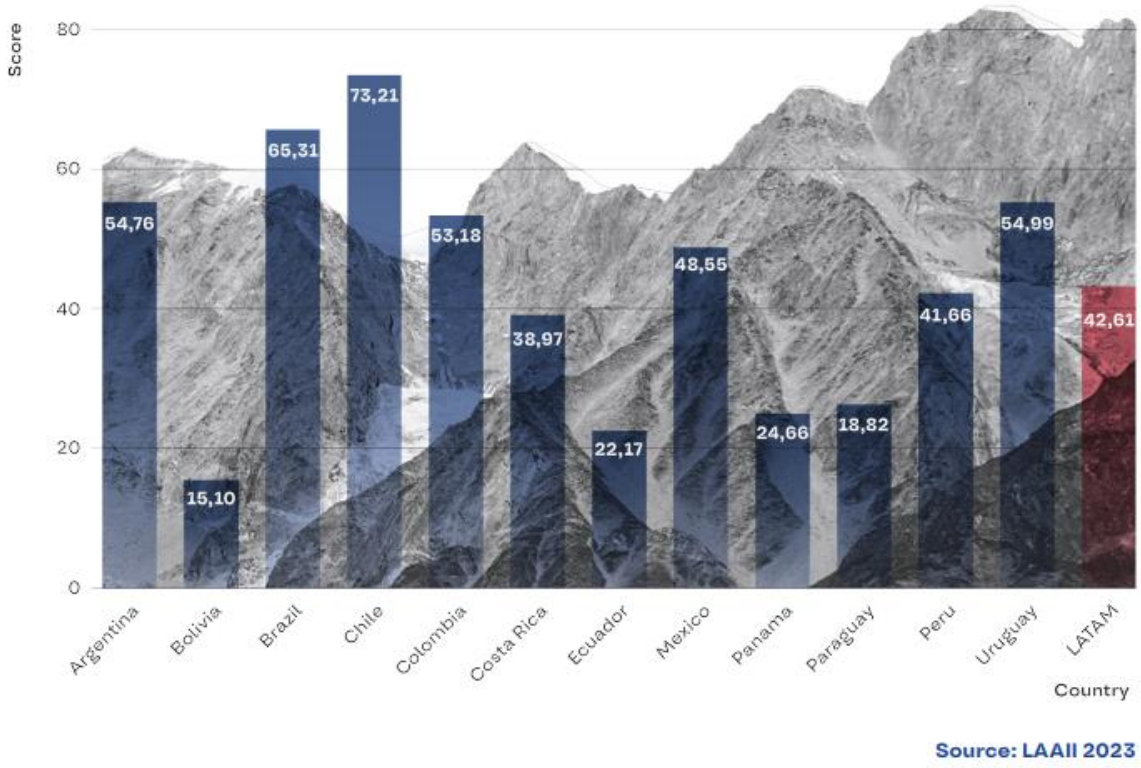
- Infrastructure, device, and technology maturity
- Data
- Talent

This index also analyzes the maturity of the research, development, and adoption ecosystem and presents the institutional and regulatory situation for Latin American and Caribbean countries. It describes the scientific environment and how governments act regarding AI growth in the region in the twelve countries, comprised in this study. However, though it takes a more situated approach to the Argentinian reality, its categories are similar to those of the international indexes.

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 American countries and Argentina, would face in the walkthrough of AI development. It is essential to question whether it is sufficient and efficient to evaluate the readiness of the public sector in

AI with these tools or whether it would be wiser to refocus the discussion to consider more specific and contextual elements that may explain this phenomenon and how it unfolds.

Figure 1 Latin America and the Caribbean AI index



We need to discuss some of the issues and barriers these indexes do not capture. First, more is needed to address the fact that "data must be available, and its quality must fulfill some requirements." In Latin America, digitalization and interoperability are vital infrastructural conditions for the existence of digital data, and they remain to be addressed. Even though the COVID-19 pandemic drove the digitalization of some processes and citizen services, many analog services prevail for different reasons, such as lack of connectivity or digital literacy. Digitalization remains a fantasy in large or inaccessible regions without sustainable and colossal government investments in connectivity and infrastructure (that low and middle-income countries do not have).

Even when they started with the digitalization of programs in the past, national governments struggled with their systems' scalability and maintenance, too. For example, as Novas mentioned (Novas, 2019, p. 84), when the Argentinian national government implemented its Electronic Documental Management platform, different problems arose: “1) it is a poorly legible platform, difficult to perform simple procedures; 2) even though its functionality improved, it is still slow and poorly agile” (Novas, 2019, p. 84). This platform was first designed for the City of Buenos Aires and, years later, was transferred to the national government, which implied a more significant operation and a larger volume of data and agencies using it.

Argentina has very high connectivity rates. Some studies indicate that 90% of the population has some access to the Internet. Still, there is a catch: 50% of this population is only located in the province of Buenos Aires and the federal district (City of Buenos Aires). The rich and central parts of the country are connected, as are the larger cities, but the situation of the rest is somewhat different. This unequal connectivity reflects the inequality in the country: the barriers to access and use of the internet prevail geographically and socio-economically.

In countries like Argentina, which do not have a mandatory long-life reskilling program in digitalization and AI for public servants, more must be discursively and politically accomplished rather than only enumerating the need for talent development. For example, even though the Argentinian public educational system offers more than 137 postsecondary education programs related to the technology sector, only around 50% of the public servants in Argentina have a postsecondary education level, and those who have finished postsecondary degrees have done it in health and education sectors (Maito, Garay, & Schachte, 2023, p. 7). This is a clear example of the issue's complexity because the public sector must simultaneously address the need for postsecondary education levels in different domains and the acquisition of digital and AI skills.

Additionally, the only index specifically addressing the reality of Latin America and the Caribbean is the Latin American Artificial Intelligence Index (ILIA), which is not focused on the public sector. It takes the country as a whole and indicates the conditions that should be considered to promote and develop AI solutions, some involving the public sector but exceeding it in the scope. Even though it is an excellent steppingstone to start producing information and analyses about the Latin American situation regarding AI topics, it does not bring to light what Latin American public services must address to implement AI solutions and underscores the urgent need for more comprehensive data and analysis on this topic.

Behind these indexes´ limitations, there is a more challenging underlying problem about governance by indicators, though this discussion is not the core aim of this work. An index could provide valuable information and help analyze a current picture of a specific issue. Still, these cannot be the only source of policy-making nor the only way to address a phenomenon, even less so if it is as broad and horizontal as AI use and development.

In the highly contrasting context of Latin America, some indexes and “readiness criteria” are only listings of good practices, not necessarily foundational guidelines for realistic implementations of AI in the public sector due to the absence of other core elements such as digitalization, resources, long-term policies and strategies on human resources and talent that have been already mentioned. As a region, Latin America and the Caribbean should develop more situated frameworks that consider the reality of this part of the global south based on these countries' actual situation in the AI adoption path in the public sector. This work will try to bring some insights to this discussion.

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.

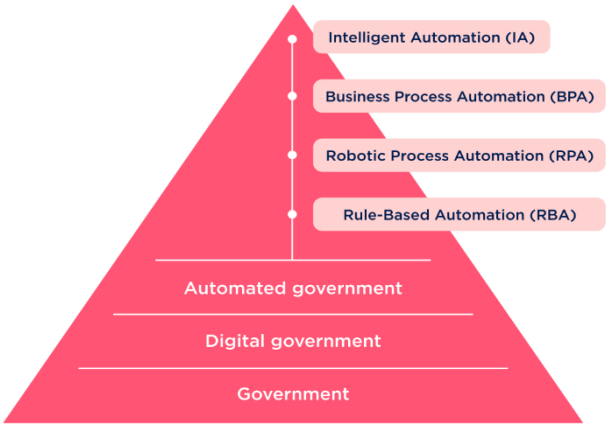
Adopting new technologies, such as AI, requires a deep understanding and a willingness to modify traditional and previous public sector activities and services.

In an exhaustive Inter-American Development Bank (Estevez et al., 2024) work, the authors make an enlightening classification: while a “traditional government” delivers public services to citizens upon request, over the counter, and provided by a human public servant, a “digital government” delivers services through digital channels upon request and provided by a human public servant. Yet an “automated government” delivers them proactively through digital channels, with an algorithm replacing or complementing the human public servant.[1] These definitions highlight the difference between each type of government regarding how public services are provided and the role of public servants in each case.

This differentiation is not just a theoretical construct but a crucial roadmap for the future of the public sector. Without a traditional and digital government, the transition to an automated government, which relies on the former's history, structure, and responsibilities and the latter's digital infrastructure, services, and capabilities, is not possible. This underscores the urgency of addressing digital governance before governments can fully embrace the potential of AI.

[1] Even though the replacement of the public servant in the automated government by a machine is a highly controversial concept that, for some authors, might raise questions about accountability, transparency, and even the rule of law, in this case, we only consider the classification to show the incremental change that every government type introduces in the way of digital transformation.

Figure 2 Types of Government Pyramid



Source: Inter-American Development Bank. 2024

Jonny Holmström, when identifying the preconditions to AI development in an organization, names digitization as the process of converting analog to digital. This stage occurs before the digitalization stage, defined as using digital technologies and digitized data to establish how work should be performed (Holmström, 2022, p. 330). He introduces the concept of using AI as part of a digital transformation of an organization and the concept of AI readiness "as an organization's abilities to deploy and use AI in ways that add value to the organization" (Holmström, 2022, p. 330). The digital transformation is, for this author, "the profound transformation of organizational activities, boundaries, and goals to leverage the opportunities of digital technologies." (Holmström, 2022, p. 331).

Both approaches provide us with new elements that the indexes do not. They are focused on previous steps (not conditions) that must be met to move forward with AI adoption. Furthermore, both put value creation as the main objective of digital transformation (including adopting AI tools).

Adding different approaches to tackling digital transformation, Lorenzo (2016) focuses on "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.

2.3 Maturity of the Digital Environment

Most high-income countries, including China, started their digitalization process decades ago. Some governments started collecting digital information and commenced a slow but sustained process to structure an institutional order, infrastructure, technology, and human capacity in the 1970s-1980s. These long-term policies are less influenced by political-administrative changes and are considered strategic, bringing resources and infrastructure over the years.

For LMIC, this staged and gradual process never occurred, and these changes were faced quickly. At the same time, it represents a challenge because political changes often imply a complete change of course or the abandonment of some public policies, putting at risk what was made. Acknowledging this is critical to understanding the government's difficulties in strengthening digital ecosystems; the scalability of the systems, technologically and coverage speaking, is only possible with resources, long-term projects, institutional and political consistency among different governments, etc. For example, some systems may shut down because the national government does not provide the resources to provinces or municipalities. In that case, the possibilities of scaling systems and overall innovation are minimal. One of the significant reasons for this is the high cost of the political transaction that federal countries, such as Argentina, need to cope with (the political party logic captures the negotiation) (Palumbo, 2019).

According to the IDB (Estevez, Janowski, & Roseth, 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. Sandboxes can incorporate innovation without high risk, but this public policy has yet to be massively implemented in Latin America and Argentina. Only Brazil, Colombia, and Bermuda have projects related to this matter. (Guio, 2024)

The same criteria can be extrapolated to the maturity of digital environments and the possibility of implementing digital transformation. Because of its maturity, AI will be desirable to implement when the digital ecosystem guarantees safety, respect for rights, etc., and when different levels of government are digitalized. This maturity takes time and requires sustainability, political decisions, and resources, all of which are scarce in Latin America.

The maturity of the Argentinian governmental digital environment will be analyzed in depth in the next chapter.

2.4 Public Value

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 other.” (Estevez, Janowski, & Roseth, 2024, p. 9). The political aspects (public value), jointly with operational (operational capabilities) and authorizing (strategic capabilities), are the elements required for a transformation towards digitalization and automation. Digitalization and automation, with their potential to reduce waste and improve resource management, offer significant efficiency gains that cannot be ignored or postponed. These times, the risk of failing to deliver public value increases while we undermine the priority of addressing digitalization transformation and automation.

This idea is central to analyzing low and middle-income countries (LMIC). Countries from Latin America or Africa cannot afford to address only problems like poverty without addressing digitalization. People who think that a country with this kind of problem should

first work with nutritional or hunger issues and, after solving those, tackle digital inclusion is not correct for many reasons, some of which will be developed. To pick one of those reasons, we can argue that the lack of access and use to digital services and connectivity in this global and connected world reproduces inequality in all social dimensions, such as education, health, social services, etc. Furthermore, that is the core of poverty. Not to mention, gaps between LMIC and high ones would increase even more.

Public value should be the primary goal of every government, especially in the case of LMICs, due to their complexity and limited resources. We often see cheap or "canned responses" that do not provide any real benefits and end up wasting time and resources for these countries. This is an underlying core tension: How can we reap the benefits of AI services for delivering public value while the literature and policymaking also advocate for a comprehensive digitalization of government to introduce AI-based services successfully? Regarding this matter, government digitalization is a process that can be conducted in different ways and pursue different objectives. For example, we can identify different dynamics, such as:

- Scaling and maturing the entire digital governmental system.
- Fragmentary efforts in different domains and levels of the government
- One-shot implementations in a specific context or public policy problem (ill-defined problems)

As we, public servants and policy designers know, these are a few of the probable scenarios that could be faced (but not all), and they do not entirely exclude each other. When we work in the Latin American context, these multiple approaches are the rule, not the exception, and they include all kinds of public policies, not only the digital governance ones. The recommendations frequently indicate that the path to digitalization requires a centralized and whole-of-government strategy that provides coherence and promotes order in the data,

technologies, and infrastructure (Estevez, Janowski, & Roseth, 2024, p. 78). However, as we point out, different dynamics appear to undertake digitalization and automation, coexisting bottom-up and top-down in public policy designs.

Collaborative and human-centered design is one of the best ways to face this multiplicity of public policy design, even though it implies that government from all levels (national, provincial, municipalities, etc.) should develop state capacities and institutionality related to this objective. For example, in Argentina, different types of federal councils could be the institutional space where they could be done.

These different approaches and methods are essential for this work because we can see how this mixed design appears when we examine the Argentinian case closely. This behavior is inherent to the urgency and limited resources LMICs face when designing and implementing public policies, particularly those related to digital transformation.

2.6 Public policies, frameworks, and legislation

Another big theme that some indexes mention but needs to be considered in context is the order and regulation of AI. Currently, the EU is the only big player with a law about AI, the United States has released an executive order with some directions stretching its position of no regulation, and China has its rules of massive control from the state. However, there is still a vacancy for a unified international order of AI. The need for a unified international order of AI is crucial to ensure that all countries benefit from AI fairly and equitably, regardless of their economic status. In this context, different strategies and pieces of legislation are expected to emerge at a national level, aligned with one of the “big players” positions and the benefits that this could bring to both parties.

According to Klein and Stewart (Klein & Patrick, 2024), the main objectives of global AI governance should be:

- Provide an authoritative platform for scientific and technical knowledge and information sharing on the latest state of AI capabilities and their potential ramifications
- Promote common norms and standards for the responsible uses of AI by both public and private actors and seek to harmonize national regulatory approaches.
- Support the broadest possible access to and equitable sharing of AI's benefits, focusing on LMIC's development needs.
- Foster global collective security by creating frameworks to deter and respond to destabilizing uses of these technologies by state and non-state actors, as well as preparing for any existential risks posed by the potential emergence of artificial general intelligence

For these authors, this complex regime should be multilateral and involve different stakeholders (extra- and intergovernmental), organisms, and initiatives.

For LMIC, the absence of a global AI governance affects the possibility of receiving AI benefits, such as innovations in medicine and drug discovery, improving access to better education, improving government efficiency, etc. The lack of access to and use of digitalization and AI broadens the breaches between LMIC and richer countries. This scenario tends to leave LMIC working in solitude without the possibility of accessing markets, funding, and technological innovation. A situation where there is no consensus on the global goals of AI governance limits the capability of LMICs to expand their public infrastructure and services that could benefit their citizens.

Latin America has an opportunity to work together to implement a joint, consistent, and situated AI policy, mainly on how governments will implement AI fairly, safely, and ethically.

Even though the countries' unions and political blocks in Latin American history have had ups and downs, AI is a whole-of-Latin America agenda. Santiago´s declaration[2], promoted by UNESCO and the Development Bank of Latin America and the Caribean (CAF) and which was signed in 2023 by Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, México, Perú, Paraguay, República Dominicana, Santa Lucía, San Vicente y las Granadinas, Surinam, Uruguay, and Venezuela seek to "establishing more local criteria for the AI development and implementation."

This declaration is a significant step forward as it establishes the creation of a workgroup to form an Intergovernmental Artificial Intelligence Council for Latin America and the Caribbean. Despite the differing position of the current Argentinian government, this declaration and the potential establishment of an AI Council represent a pivotal moment for the region. It presents an opportunity to address the main issues affecting our region, many shared among its countries. While many of these topics and problems were identified in this work, some still need to be included in the AI conversation as they directly impact the global south.

The Argentinian government has frozen the existing regional integration process in the political dimension, but Latin America is working together on topics and domains. AI and the Santiago and Cartagena de India's Declarations[3], two significant agreements that outline the region's approach to AI development and implementation, are examples of this.

[2] Declaration in: https://minciencia.gob.cl/uploads/filer_public/40/2a/402a35a0-1222-4dab-b090-5c81bbf34237/declaracion_de_santiago.pdf

[3] The Santiago's declaration was sing in 2023 and the Cartagena´s declaration was sign in 2024 and both are related to AI adoption in LAAC and are part of the same process and agenda. https://www.mintic.gov.co/portal/inicio/Sala-de-prensa/Noticias/383990:Colombia-y-15-paises-adoptan-la-Declaracion-de-Cartagena-de-Indias-para-la-Gobernanza-la-construccion-de-Ecosistemas-y-el-fomento-de-educacion-en-Inteligencia-Artificial-en-America-Latina-y-el-Caribe

2.7 Recapping Chapter 2

The limitations that the indexes show in contextualized analysis and the need to understand the complexity of the LMIC in its path to implementing AI in the public sector have underscored the necessity for a more comprehensive framework.

Recognizing the real obstacles and enabling factors to AI adoption is a task of significant weight that cannot be separated from the objectives that this technology incorporation seeks—public value—, the effort that implies developing all the state capacities[4] related to this, and the recognition of different ways to incorporate all this in the dynamics of the governments. Moreover, by governments, we do not only mean different countries but different levels of them too.

In LMICs like Argentina, there is a constant need to catch up in an almost impossible race. In this reality, the step-by-step process of digitalization and digital transformation is unclear. Moreover, it may not be desirable because of the velocity of the changes, which makes the gaps between rich and poor, connected and disconnected, etc., even more significant.

The next chapter will present the Argentinian case and how these concepts are applied.

[4] Not just a set of skills as customarily indicated. In this work, we use the state capability as the ability of a state to provide public value effectively through its public policies.

Chapter 3

3. The Argentinian Case

In this chapter, we will use all the concepts we identified in the previous chapter to describe the Argentinian situation. First, we list the most essential experiences identified in the last years regarding adopting AI in the public sector to have a vivid picture of the situation. After that, we will describe Argentina's digitalization, data governance, infrastructure, and institutional readiness to have the big picture of the Argentinian digital reality and AI experiences.

3.1 AI experiences in the Argentinian public sector

Even though advances and novelty in AI are acknowledged daily, in the Argentinian public sector, we can still identify a small number of AI initiatives. Some of them are:

- **Chatbot "Tina"**[5] is the National Government's first virtual assistant for the general citizenry, developed with artificial intelligence, available to help 365 days a year, 24 hours a day. Functionalities:

- Get information and access to more than 200 procedures
- Inquire about programs, scholarships, and subsidies
- Consult on health issues, inclusion and rights, justice, transparency and citizen participation, gender, and diversity.
- Download the Mi Argentina App's documentation in PDF, with accessible language and pictograms.

[5] See in https://www.argentina.gob.ar/tina

- Assist citizens by referring them to agency operators.

Along with the national government, Buenos Aires City implemented **"Boti,"** an AI chatbot that assists citizens. During the COVID–19 pandemic, the city government brought "IAtos," a tool that was part of the triage process and detected, through cough audios sent to "Boti," which persons were possibly infected. [6]

- **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. T**he provinces of La Pampa and Río Negro** are using AI to improve the process and the times of the procedures.[7]
- The State Prosecutor of the province of Buenos Aires implemented **Velox[8]**, a machine-learning model used to help lawyers prepare for the tax hearing issued by the State Prosecutor.

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[6] See in https://buenosaires.gob.ar/jefaturadegabinete/innovacion/plan-de-inteligencia-artificial/iatos

7 You can find information here: https://infohuella.com.ar/contenido/19601/por-primera-vez-en-la-pampa-la-justicia-usara-inteligencia-artificial-en-expedie and https://servicios.jusrionegro.gov.ar/inicio/comunicacionjudicial/index.php/noticias/item/4580-el-poder-judicial-incorpora-inteligencia-artificial-para-el-dictado-de-sentencias-monitorias

8 More information about this experience in https://ojs.sadio.org.ar/index.php/EJS/article/view/506

A few more experiences can be named (OECD and CAF, 2022), but they still represent isolated efforts that fell far short of the idea of AI tools implemented in the public sector. Let us consider that Argentina has, along with the national administration, 24 provincial governments, more than 1900 municipal governments, and different systems (executive, judicial, and legislative). This paper argues that these efforts are far from substantially expanding this technology. Before fully adopting it at different state levels and across different subnational jurisdictions, there is a long road to go.

3.2 The Argentinian situation

3.2.1 Digital Files Platform

The E-Government Survey 2022 ranks Argentina 41[9], indicating the country has a very high level of e-government development. This index is a compound of different indexes and data collected from national governments that rates the digital government landscape across all 193 Member States and accurately identifies the significant digital indicators a national government has at a specific moment. However, as we discuss it, more is needed to acknowledge a phenomenon fully.

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.

To be precise, of the twenty-three (23) provincial governments and one federal district, eight (8) provincial executive governments in Argentina have developed their own digital

9 https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2022

administrative file systems,[10] and sixteen (16) use the system provided for the national government (it is called Electronic Documental Management or GDE[11] in Spanish)[12]. In this heterogeneous landscape, the idea of the system's interoperability is still in debt. First, because the provinces that developed their system used diverse technologies and criteria created at different moments. Second, because of the various advances in implementation in these provinces. For example, the national government started using the GDE system in 2015, but five provinces did it between 2023 and 2024. In the case of municipalities, only around 90 (from more than 1900) use GDE today.

This is the picture in the more basic steps of the administrative activity, such as digital files. The breaches are more or less profound if we get deep inside every case and try to identify the different domains of these governments implementing digital systems (not all ministries and agencies start using it simultaneously or even initiate the process). This situation of digital governance in Argentina significantly impacts every other element of the digital ecosystem, such as data (amount, quality, unified criteria, etc.), cultural change, and the digital literacy of public servants.

One technology that the national government provides has been massively adopted at all government levels: the digital firm[13], which every province adopts and uses. Implementing a transborder digital firm is part of an international agenda with Uruguay, Chile, and Brazil.[14]

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10 Chaco, CABA, Formosa, Córdoba, Entre Ríos, San Luis, San Juan, Misiones y Corrientes

11 It is an integrated system of labeling, numbering, monitoring, and registration of movements of all actions and files of the Public Sector. https://www.argentina.gob.ar/jefatura/innovacion-ciencia-y-tecnologia/innovacion/gde-sistema-de-gestion-documental-electronica

12 Chubut, La Rioja, Salta, Santa Cruz, Tucumán, Catamarca, Buenos Aires, Jujuy, La Pampa, Neuquén, Río Negro, Santa Fe, Santiago del Estero, Tierra del Fuego y la Ciudad Autónoma de Buenos Aires

13 https://www.argentina.gob.ar/jefatura/innovacion-publica/innovacion-administrativa/firma-digital

14 You can find information from the Uruguay´s government here: https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/comunicacion/noticias/firma-transfronteriza-mercosur

Still, it is an exceptional effort between all the digital tools the national government could provide and implement.

This coexistence of different systems, evolving timelines, and technologies provides a complex scenario that, following the statement that indicates that without a digital government, it is difficult to move forward to digital transformation and the use of new technologies such as AI, it might collide with the experiences that already begin to appear dispersedly. Digital platforms are only one of the elements that should be considered in the AI adoption journey. Data, infrastructure, human skills, institutional design, and regulations structure the process, complementing the construction of a digital environment.

3.2.2 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[15] 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.

[15] To find information you can visit this site: https://www.argentina.gob.ar/datos-abiertos

3.2.3 Infrastructure

In the case of infrastructure, as we said previously, even though the internet coverage is high, it reproduces the inequity of the service distribution along the country. Some locations and populations still need to be communicated, affecting 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 minimum capabilities to invest in infrastructure because their budgets are mostly compromised in 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[16], 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[17]). Argentina's national government also has one of the top 500 supercomputers in the world.

[16] https://www.arsat.com.ar/

[17] https://www.argentina.gob.ar/jefatura/innovacion-publica/telecomunicaciones-y-conectividad/conectar/que-es-la-red-federal-de

Figure 3 REFEFO extension in km (2021-2023)

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

Note: Extension in km of the Federal Fiber Optic Network 2021-2023[18]. Self-made graphic from internal government documents.

Figure 4 REFEFO extension Map

Note: extension of the REFEFO until 2021. Source: https://www.argentina.gob.ar/jefatura/innovacion-publica/telecomunicaciones-y-conectividad/conectar/que-es-la-red-federal-de

[18] Between 2016-2019 there was no new km extended in the network. https://www.argentina.gob.ar/sites/default/files/2023/11/sip-informe_de_gestion_20-21_0.pdf

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 in order 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.

3.2.4 Institutional readiness, innovation, 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, its 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). However, achieving this is more challenging in LMIC, not only because public servants need specific skills but also because 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 Argentinean 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 Publica – COFEFUP) has been a critical platform for the provinces and national government to forge agreements and public policies for 30 years.

In 2023, the Federal Council of the Public Service demonstrated its strong commitment by initiating the drafting of a pivotal document titled “Towards 2030”. This document, which outlines critical objectives such as promoting technological infrastructure, connectivity, and essential technological services, is a testament to the council's potential as the ideal institutional platform for addressing AI in the public sector and its potential regulation.

Chapter 4

4. Different Approaches for Argentina and Latin America

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

As we have seen, the digital 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, for example.

It is imperative to develop specific analytical criteria to more precisely analyze the Argentinian case and to gain a deeper understanding of the current state of AI implementation in the public sector. 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 they interact.

4.1 Definitions

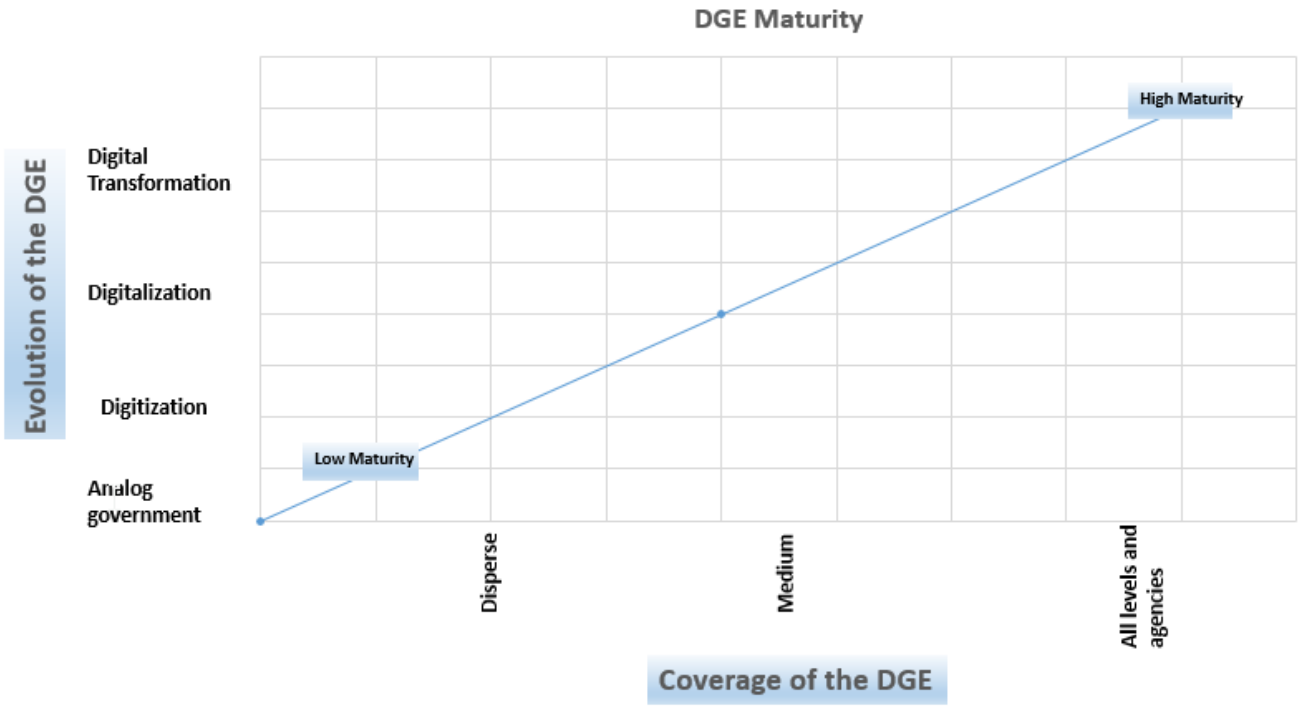
The **'Digital Governmental Ecosystem (DGE)'** is a comprehensive construct that encompasses all the institutions and agencies within the public sector. This includes the various powers of the state (executive, judicial, and legislative), the different levels of government (national, provinces, and municipalities), the systems, technologies, and data they use, the regulations that govern their operations, and the state capacities that ensure the delivery of public value.

This DGE depends on two combined variables, **evolution and coverage**, to determine its maturity level (low, middle, and high).

As we said before, this is a specific approach for government ecosystems because digital ecosystems usually encompass every possible actor, like the private sector, NGOs, the science sector, etc. Therefore, we often miss valuable information and deep analyses of the public sector and its digital reality. We will use “ecosystem” because it alludes to a complicated system with coordinated units interacting to create its environment. In this case, a particular one is the government. It provides the idea of something continuously in motion because of the movement of each unit.

Regarding **DGE and its evolution**, attention must focus on the main activities undertaken. Following Holmström's and other authors' definitions, the lowest evolution of DGE is analogic and traditional government, followed by digitization activities. After this, it is desirable to move on with digitalization activities and then to the digital transformation stage, which is the highest level of this evolutionary process. For example, if the main activities are focused on digitization, the DGE has a low level of evolution.

Figure 5 DGE model



Note: Self-created graphic that shows how DGE indicators work together.

When discussing spread or **coverage**, we indicate that the DGE has different government levels and agencies that were impacted or need to be impacted by any prior activities: digitization, digitalization, etc. 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.

4.2 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. The 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 at 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.

Figure 6 Characteristics in the different DGE Maturity Levels

	Low Maturity	Middle maturity	High maturity
Digital transformation activities	Inexistent	Disperse in governmental levels and agencies.	All levels of governments and agencies. Strategically planned.
Public value delivery	Minimum delivery	Not in its full potential	Highly public value delivery achieved

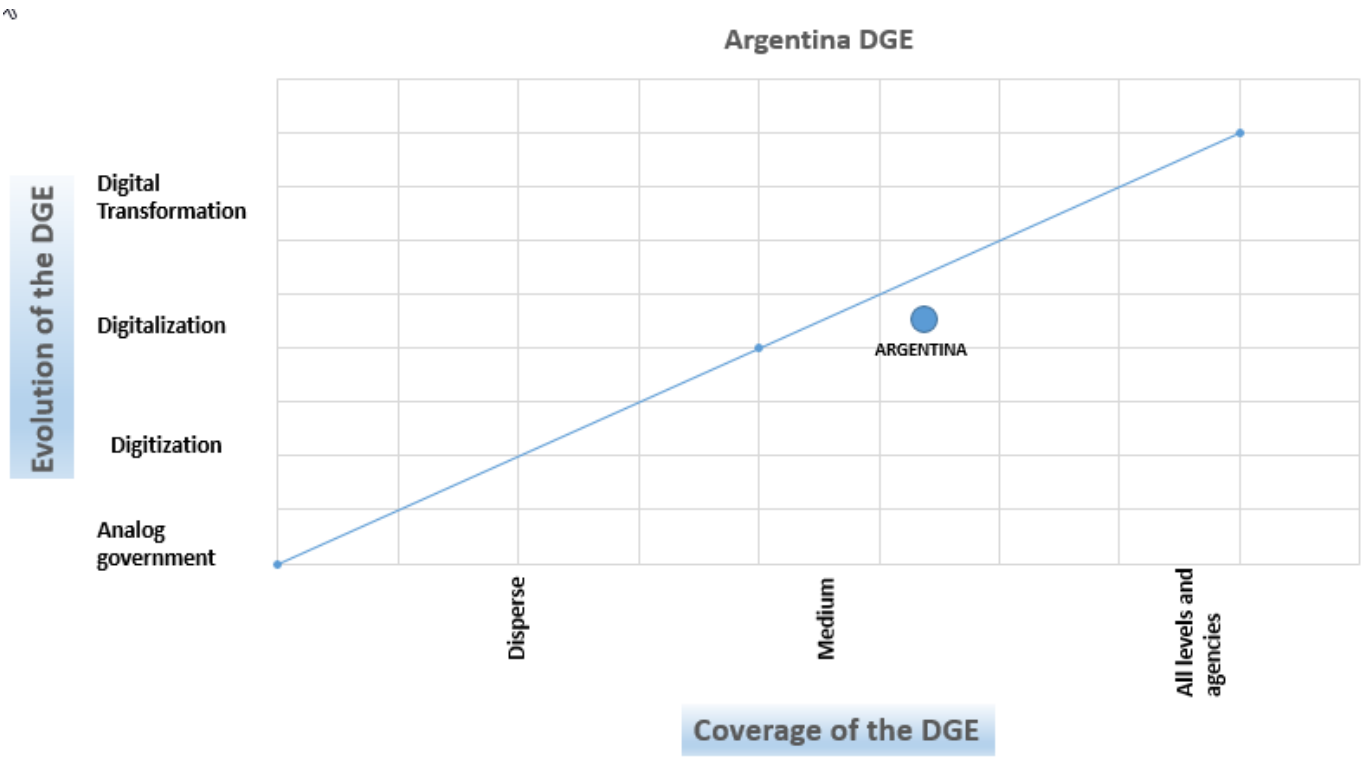
Data Governance	Data is not shared, and transactions are costly for governments and citizens.	Some data could be shared in some cases, but this depends on the capability to expand interoperability and re-engineered systems.	Data is shared, and the interoperability is fulfilled.
Digital Public Policy Design	Top-down. Disconnected from the citizen's needs. The traditional type of design.	Bottom-up and top-down simultaneously. More likely to have back and forth because of the political changes	Top-down and codesign. Strategic planned and long-term policies.
Connectivity and infrastructure	Practically non-existent	Urban zones connected.	Highly connected urban and rural zones
State capacities	Traditional, related to the analog state capacities (administrative and politics, mostly)	Mixed. Traditional ways coexist with new capacities without integration.	New capacities were deployed, integrating elements of the old institutional, political, and administrative

		(Digital capacities are incorporated).	capacities into a new generation of capacities.

4.3 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.

Figure 7 Argentina DGE maturity location



As Figure 7 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 also can 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.

However, 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. If we analyze the different AI solutions that we enumerate in Chapter 3, we can find out that chatbots from the national government and the city of Buenos Aires are partly outsourced, but the majority are in-house design and deployments. As another work about the adoption of AI in the judiciary sector of Argentina remarks, “the actors utilized their human, technical, and financial resources, as well as formal and informal intra-state or multi-stakeholder alliances.” (Aguerre & Frati, 2021)

Figure 8 In-house or outsourced Argentinian AI experiences

	Prometea	Chatbots	Velox	Río Negro and La Pampa´s justice system
Design, deployment, and management	In-house	Partially outsourced	In-house	In- house

Note: This figure shows some of the Argentinian AI´s experiences identified in this work and how they were done.

(Own production)

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, for example. 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.

This kind of analysis provides a better understanding of how different elements work together to shape a DGE and of making visible experiences and processes that otherwise could be put aside as exceptional cases, like AI adoption experiences in Argentina. Reediness criteria tend to make some elements invisible or overestimate some elements, depending on how or who analyzes a national case.

4.3 Other Elements from the Latin American context that should be considered

4.3.2 AI Value Chain

When we talk about AI, we do not think about the complete industry's value chain, which includes natural resources as commodities for computation machines and resources used to provide the enormous amounts of computational power that the AI industry requires.

Like the rest of the global south, Latin America provides data and commodities to the industry, and governments should acknowledge this fact in regulations and exchanges with nations that develop these AI systems, usually in the north. The extractive industry of lithium, copper, etc., commodities is critical to the computational industry. These minerals are available in Latin America, as well as cheap energy, water reservoirs, and other natural conditions required to expand this industry. This represents a substantial ecological impact that only seems to grow while the industry looks for increased efficiency (Crawford, 2021), and Latin American legislation and regulations to come should acknowledge this.

In the same direction, the AI industry requires cheap human resources, not only in the mines or in the assembly line. Crowdsourcing is the new way to provide the workforce with data entry in training models, label data, content moderating, etc. Countries like Argentina have an increasing number of technical professionals who outsource their work, which is still

cheaper than contract students from wealthy universities or professionals from the most prosperous countries (Crawford, 2021).

All these elements add complexity to LMIC countries and their agendas to face AI development and adoption.

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 also can 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 locals' 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:

- 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 achieved completely. This is a sign of a certain level of maturity of a DGE and must be seen as characteristic and process and not like 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. Of course, this lost fight that forces these countries to align with one of the big players, undermining their self-determination, realities, and languages, and puts all can be identified as a commodity in the computational value chain in danger.
- The LMIC regulation should address specific problems and particular characteristics; try to resolve each DGE's problems and not emulate foreign experiences.
- Different theoretical approaches, such as the DGE framework, help identify different ways of public policy design, coexisting in one case, as in the Argentinian example. This behavior is inherent to the urgency and limited

resources LMICs face in designing and implementing public policies, particularly those related to digital transformation. It is important to remember that codesign and human-centered design in policy-making, as innovative ways of policies (like sandboxes), are still missing in the picture of the LMIC.

- 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.

The DGE framework requires more work, contrasting with more realities and countries' cases, and must be discussed with all those who are part, in one way or another, of digital governance and digital transformation in the public sector. This work is only the first step to a more thorough discussion, one more respectful of national cases and experiences, struggles, and realities in the path of AI adoption in LMIC.

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