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fAIr Tech Radar

Exploring the Adoption of Artificial Intelligence in Latin America and the Caribbean

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Inter-American Development Bank
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fAIr LAC

fAIr Tech Radar

Exploring the Adoption of Artificial Intelligence in Latin America and the Caribbean

NTT DATA

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An initiative of

In collaboration with

About fAIr LAC

fAIr LAC is an initiative of the IDB Group and a partnership between the public and private sectors, civil society, and academia to influence both public policy and the entrepreneurial ecosystem in promoting the responsible and ethical use of AI.

About BID Lab

IDB Lab is the innovation and venture capital arm of the Inter-American Development Bank Group. We promote entrepreneurial innovation and disruptive technologies to benefit vulnerable and poor populations and activate new industries for sustainable growth in the future. www.bidlab.org

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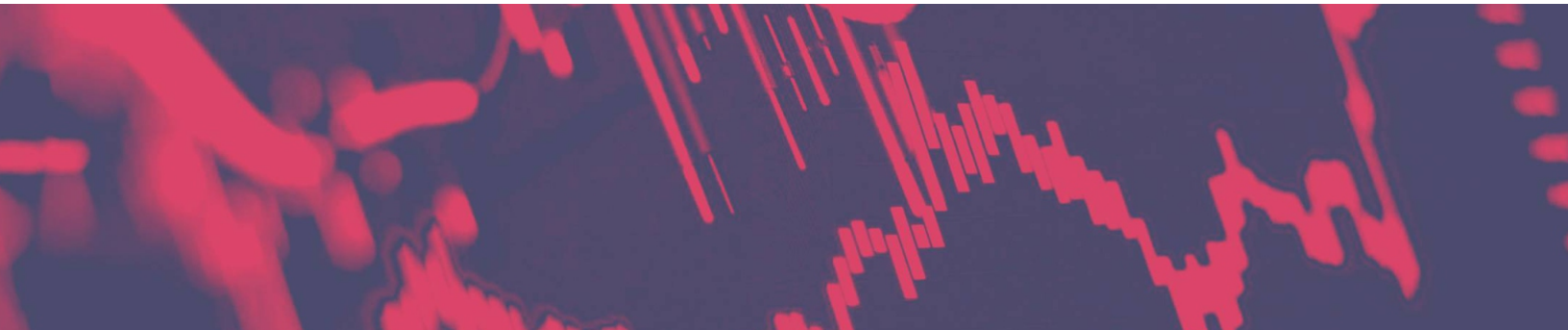


Foreword

We are living in a time of change. The emergence of artificial intelligence (AI) as a general-purpose technology is not just a new chapter in technological evolution, but a fundamental transformation in the way we produce, decide, create, and interact. This revolution, both silent and noisy, is creeping into our routines with the promise of intelligent, flexible, and accessible tools that complement human decision-making and amplify our technical and creative capabilities.

For startups and SMEs in Latin America and the Caribbean (LAC), this technology represents a way to improve productivity, innovate more quickly, and generate competitive advantages. However, in a context marked by strong structural inequalities, its adoption requires a responsible approach that does not amplify existing gaps and create new forms of exclusion.

For this reason, at the IDB we promote AI that is people-centered, inclusive, and oriented toward sustainable development, which does not deepen social and economic inequalities or generate lost opportunities for the most vulnerable groups in the region. This approach seeks to prevent AI from "amplifying existing structural gaps, reproducing or intensifying algorithmic biases, limiting equitable access to its benefits, or generating automated decision-making processes without adequate human oversight mechanisms."

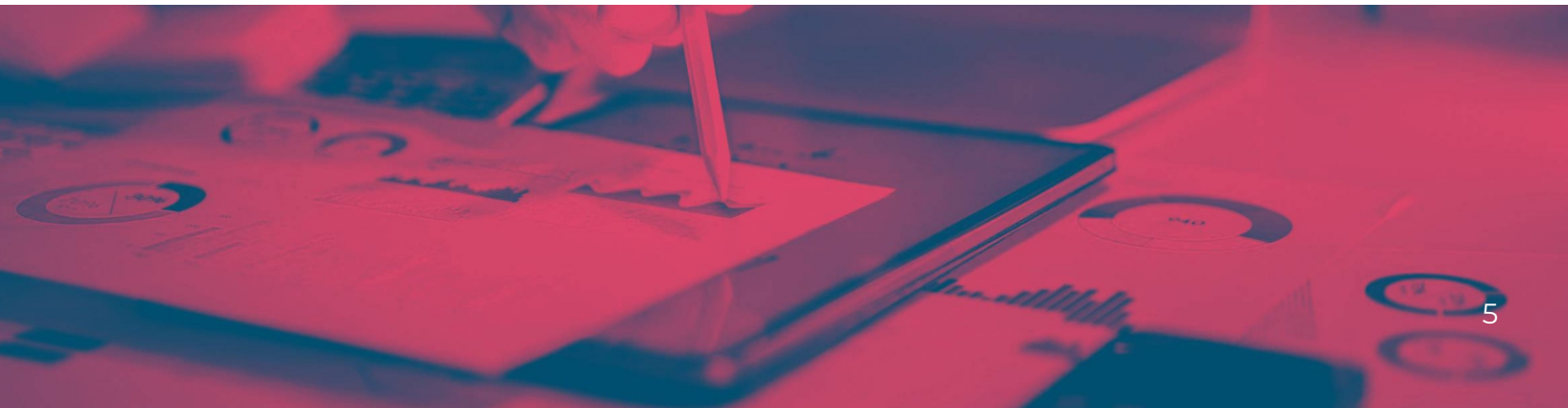
FAIr Tech Radar is a strategic diagnostic tool that provides a deeper understanding of companies' level of maturity and readiness for this technology.

This study systematizes findings on how these companies are using—or plan to use—AI, what capabilities they have developed, what barriers they face, and what risks must be considered for effective and responsible adoption.

We hope that this information will prove to be key not only for entrepreneurs, management teams, leaders, and business owners, but also for business organizations, governments, technology companies, investment funds, private sector support agencies, and multilateral development agencies. All of these actors need to more precisely target their programs, initiatives, policies, financial instruments, and regulatory frameworks to maximize the positive impact of AI on productive and inclusive development in the region.

In short, we are facing a historic opportunity for AI to be not only a driver of efficiency and innovation, but also of equal opportunities. Harnessing its potential without exacerbating existing gaps requires vision, capabilities, and, above all, coordinated action. fAIr Tech Radar, part of the IDB Lab's fAIr LAC initiative, is a step in that direction.

Marcelo Cabrol
Chief Strategy Officer, IDB Lab



Executive Summary

In Latin America and the Caribbean (LAC), progress in the adoption of artificial intelligence (AI) is taking place in a context marked by structural asymmetries, regulatory frameworks under construction, and profound heterogeneity in digital capabilities.

The fAIr Tech Radar study, promoted by IDB Lab in partnership with NTT DATA and the Entrepreneurship Center at the University of the Andes, emerges as a response to this reality.

Its objective is to develop a comprehensive, accessible, and actionable tool that allows for the evaluation not only of companies' technical and organizational capabilities to adopt AI, but also their degree of alignment with the principles of access, transparency, explainability, privacy, security, accountability, and human well-bely improvement. By integrating the dimension of responsibility, the aim is to facilitate the strategic and sustainable adoption of AI in the region, aligned with the common good and the inclusive use of AI.

Methodologically, the study combines a comparative review of international frameworks on responsible artificial intelligence (RAI) with the application of structured surveys to 75 companies in nine countries in Latin America and the Caribbean, which made it possible to measure technical and responsible maturity in the use of AI.

Based on the fAIr Lac 3S framework, the instrument evaluates three key dimensions: Solution, Systems, and Society (3S). Based on these three dimensions, an AI Responsible Use Maturity Index was constructed, which allows for the comparison of levels of progress and gaps by type of organization.

The results of the study reveal an average regional maturity of 2.9 (on a scale of 1 to 5), indicating significant technical adoption of artificial intelligence (AI) in Latin America and the Caribbean, although still in its infancy in terms of governance and social responsibility.

Micro and small businesses (2.5 on average) implement accessible, low-cost solutions focused on efficiency, but with little formalization of responsible practices or oversight. Medium-sized companies (3.2) are beginning to institutionalize governance structures and AI committees, making progress in data privacy and traceability. Large companies (3.3) have the most comprehensive compliance and security frameworks, although they face challenges in terms of agility and cross-cutting integration. Finally, corporations (2.6) have extensive resources, but their internal bureaucracy limits the effective application of global policies in local environments.

By dimension of the 3S model, the best performance is observed in Solution (3.1), followed by System (2.9) and Society (2.5), where the largest gaps in diversity, inclusion, and sustainability persist.

According to the seven ALTAI (Assessment List for Trustworthy AI) principles , the most notable advances are in Privacy and Data Governance (3.0) and Human Oversight (2.8), while the areas lagging behind are Social and Environmental Well-being (2.4) and Diversity and Equity (2.5).

The findings show maturity at multiple speeds: startups innovate quickly, but without structures to ensure the application of an IAR; SMEs show challenges in innovation and responsibility, although there is a balance between both categories; and corporations advance with regulatory solidity but less flexibility. Overall, maturity in the responsible use of AI does not depend linearly on organizational size, but on three complementary logics: resource constraints, cost-benefit balance, and institutional inertia.

At the regional level, progress is notable on the technical front, but still limited in terms of governance, social impact, and sustainability. The region faces an emerging gap: moving from adopting the technology to ensuring the responsible use of artificial intelligence.

The results of the fAIr Tech Radar confirm that Latin America and the Caribbean are undergoing a phase of accelerated technical adoption but institutional inequality. The challenge lies not only in expanding technological coverage, but also in strengthening responsible governance, accountability, and the social sustainability of the AI ecosystem.

In summary, fAIr Tech Radar confirms that Latin America and the Caribbean are moving toward the adoption of artificial intelligence, but the key challenge is to turn technical innovation into responsible innovation.

Compared to more advanced regions such as Europe or East Asia, the region lags behind in infrastructure, specialized talent training, and binding regulatory frameworks; however, it shows high potential for convergence if it consolidates public-private cooperation networks and training programs in responsible AI.

IDB Lab, under the umbrella of fAIr LAC+, will continue to drive this transition so that AI can consolidate its role as an engine of productivity, trust, and inclusive development in the region.

The goal is to provide governments, companies, and multilateral organizations with actionable evidence to guide policies, investments, and standards that ensure artificial intelligence is not only innovative but also responsible, inclusive, and socially legitimate.

[1] Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment | Shaping Europes digital future

Chapter 1.
The global context of artificial intelligence and the challenges facing Latin America and the Caribbean

1. The global context of artificial intelligence and the challenges facing Latin America and the Caribbean

Artificial intelligence (AI) is reshaping production systems, generating new ways of creating value, and transforming entire sectors of the global economy. However, its adoption in Latin America and the Caribbean (LAC) is taking place in a context marked by structural asymmetries, disparate capacities, and regulatory frameworks that are still under development.

Despite growing interest in this technology, there is still no common guideline on how companies adopt AI: How prepared is LAC to harness the potential of AI? How far have LAC companies gone in terms of AI adoption? Are LAC companies using AI to compete in sectors dominated by large players? Are we facing a wave of transformation or a new source of inequality?

This chapter introduces notions about AI adoption in LAC companies, based on a systematic review of global and regional literature. The objective of this first chapter is to identify common patterns, enabling factors, and persistent obstacles that limit effective and responsible AI adoption.

This analysis, summarized in Table 1, compares recent studies addressing AI adoption in different contexts, including LAC, and allows us to place the regional case within a comparative perspective.

Preliminary findings show strong heterogeneity in maturity levels. While some ecosystems are moving toward strategic and responsible AI integration, others are still operating in exploratory stages, without sufficient internal capabilities or technology governance frameworks. Factors such as infrastructure availability, investment in innovation, talent development, and regulation emerge as key determinants.

Assessing the level of maturity in AI adoption is crucial to measuring the ability of companies to integrate this technology.

In LAC, 31% of SMEs have already invested in AI (Microsoft, 2024), and 72% plan to do so in the short term. However, many face challenges related to a lack of technical skills, low understanding of the strategic value of AI, and risks associated with unsupervised automation.

In summary, this chapter offers a starting point for understanding the advances, gaps, and tensions surrounding the adoption of AI in Latin America. Only with this knowledge is it possible to design and plan policies, investments, programs, and actions that ensure that artificial intelligence is an engine of productive transformation and inclusive development.

Table 1.1. Recent studies addressing the adoption of AI in different contexts

Study	EAFIT (2023)	El estado de la IA McKinsey (2024	CESIEP (2024)	Pymes en Latinoamérica (2024)	WSJ Intelligence & NTT (2024)	Global Index on Responsible AI
Region	Colombia	Global	Latin America	Latin America	Global	Global
Motivations	Improvement of administrative processes	Cost reduction, revenue increase	Technological innovation	Process optimization	Governance and risk management	AI adoption with a focus on human rights
Barriers	Acquisition costs, lack of experiencie	Inaccuracy, implementation risks	Inequality, lack of infraestructure	Lack of infraestructure, costs	Data privacy, costs	Lack of regulation and transparency
Key Findings	Increased likehood of adopion with investment in R&D	72% increase in Generative AI adoption	Widening inequality gaps	High adoption of AI and positive impact on productivity	Need for robust frameworks and assessment tools	AI must be adopted with a focus on human rights
MaturityLevel	Lo-medium in SMEs	High in advanced technology companies	Inequality according to national infraestructure	Low-medium; high in digital natives	High when clear structures are in place	Varies widely by country
Main Challenges	Technological limitations, lack of training	Inaccuracy, implementation risks	Unequal education, lack of regulation	Training initial investment, strategic vision	Little strategic understanding of AI	Lack of regulation and transparency
Relationship with other Studies	Aligned with AI Maturity Matrix and CESIEP on structural challenges	Aligns with AI Maturity Matrix in terms of adoption and technological challenges	Reinforces the need for public policies such as those in EAFIT and AI Maturity Matrix	Complements EAFIT and CESIEP with updated data; applies AI Maturity Matrix	Connects with Safer AI and AI Mautiry Matrix	Complements Safer AI Ratings (focus on ethics) and AI Maturity Matrix (country level)

Table 1.2. Recent studies addressing the adoption of AI in different contexts

Study	State of European Tech	Global AI Index (Tortoise)	EAIDB	Safer AI Ratings	WSJ Intelligence & NTT (2024)	AI Maturity Matrix (BCG)
Region	Europe	Global	Global	Global	Global	Latin America
Motivations	Closing the AI investment gap	Lead global AI adoption	Growing responsible AI ecosystem	Risk management and governance	Assessing AI readiness and exposure	Understanding the risks associated with AI implementation in Latin America
Barriers	Lack of funding, braindrain	Unequal R&D capacity	Limited dissemination outside tech ecosystems	Lack of common methodologies	Gaps in talent, R&D, and participation	Infrastructure, lack of resources, social gaps
Key Findings	Europe needs to close the AI investment gap	The US and China lead global adoption	Growing responsible AI ecosystem	Risk management is key to trust in AI	70% of economies are below the AI maturity threshold	Companies are rapidly adopting AI technologies, but face challenges
MaturityLevel	Medium-high in some countries	Very high (US,China), medium (Latin America)	High in specific hubs	Varies by sector and company	Low-medium in Latin American countries	Low-medium
Main Challenges	Lack of funding, braindrain	Unequal R&D capacity	Limited dissemination outside tech ecosystems	Lack of common methodologies	Gaps in talent, R&D, and participation	Lack of economic resources and talent to ensure transparent and fair implementation of AI
Relationship with other Studies	Connects with GlobalAI Index in terms of investment ranking	Useful for placing LatAm in the global context	Related to Safer AI and Global Responsible AI Index	Complements Global Index and CEO Study on governance	Helps compare countries; useful in combination with regional studies	fAIr LAC/IDB Lab, Development Program, Global Index AI

1.1. The global landscape

Artificial intelligence (AI) is no longer a promise for the future but has established itself as a strategic technology with tangible effects on productivity, efficiency, and innovation. According to McKinsey (2024), companies that integrate AI report increases of between 15% and 20% in efficiency, as well as a considerable reduction in operational errors.

In sectors such as manufacturing, healthcare, financial services, and retail, its adoption has led to significant improvements in operational efficiency, service personalization, and new product development.

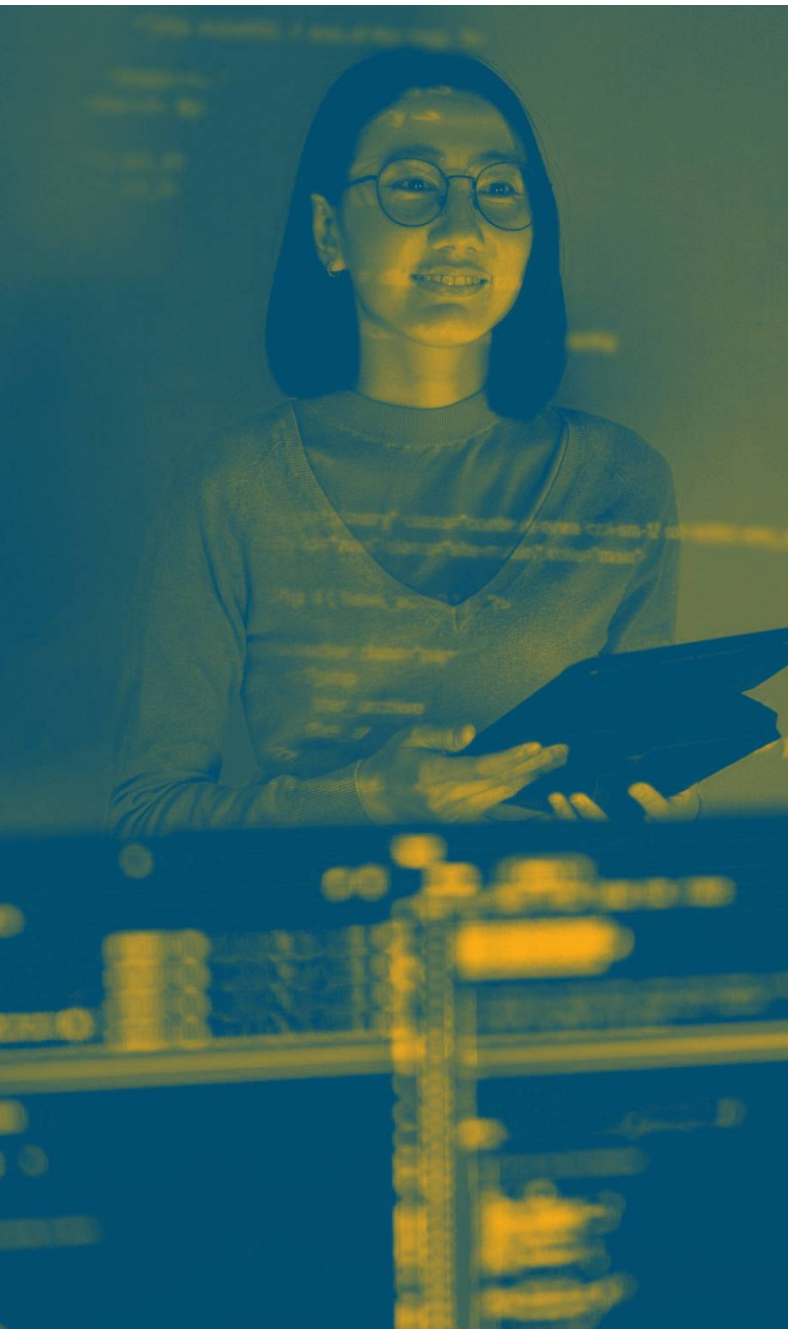
AI has also become a driving force in the reconfiguration of production systems and human capabilities: not only by automating tasks, but also by amplifying the capacity for analysis, decision-making, and personalization in multiple sectors.

A turning point has been the proliferation of large language models (LLMs), such as those developed by OpenAI, Google, Meta, DeepSeek, and Mistral. These models, once reserved for large corporations, are now accessible to startups, SMEs, and even workers, at low cost or even for free. This "democratization of AI" allows smaller players to participate in digital transformation processes, accelerate their innovation, and compete in global markets.

Concrete examples of this progress can be seen in various sectors. For example, in the healthcare sector, AI is used to interpret medical images, personalize treatments, and optimize patient management. Tools such as AI-assisted diagnostics are improving response times and clinical accuracy, especially in oncology and chronic diseases.

However, alongside these advances, significant risks are emerging. Unplanned automation can displace jobs and create new types of exclusion. The use of biased or poorly governed data can amplify pre-existing inequalities, and the lack of cybersecurity and adequate human oversight can compromise trust. At the institutional level, many companies still lack the specialized talent and internal governance structures to integrate AI strategically and responsibly.

From a geopolitical perspective, AI has accelerated a new race for technological supremacy. The United States and China lead in innovation, talent, and investment; the European Union is promoting a regulatory approach focused on human rights; and Japan is applying AI and robotics to its demographic challenges. According to the Global AI Index (Tortoise Media, 2024), these countries and regions are leading the implementation and development of AI due to their technological infrastructure, investment environment, and advanced regulatory frameworks.



United States

It stands out for its innovation in AI, home to tech giants such as Google, Amazon, and OpenAI, which lead in research and development. Its academic and business ecosystem fosters innovation, backed by world-renowned universities and a vibrant startup scene that attracts significant venture capital investment.

China

It is boosting its global position in AI with strategic government policies and solid technological infrastructure in 5G and big data, led by companies such as Baidu, Alibaba, and Huawei with great technological innovation capacity.

European Union

Although more fragmented, it is a pioneer in ethical regulations for AI, promoting multinational collaboration with projects funded by programs such as Horizon Europe, and supported by research centers in Germany and France.

Japan

It leads in advanced robotics and applies AI to address demographic challenges, with companies such as Sony and Toyota integrating AI into personal assistance and autonomous vehicles.

Other relevant studies on the preparation and use of AI around the world propose different approaches to maturity in artificial intelligence:

- AI Maturity Matrix (BCG)[2], which measures the degree of exposure to AI solutions in different economies and their readiness to leverage their use, concludes that, of the 73 countries evaluated, more than 70% are below the midpoint in digital maturity, AI governance, talent, and ecosystem. The gaps are greater in emerging economies.

- Global Index on Responsible AI (Oxford Insights)[3]: Measures alignment with human rights and ethical governance of AI in 138 countries. It reveals that many countries lack binding regulations, accountability mechanisms, or impact assessment.

- State of European Tech Report (Atomic, 2024)[4]: Highlights record growth in investment in AI startups in Europe, but warns of the talent gap and the need for consistent regulatory frameworks.

Other relevant frameworks include the Global Index on Responsible AI, which measures progress toward human rights-aligned adoption in 138 countries; and the EAIDB ecosystem map[5], which monitors more than 300 startups with explicit commitments to responsible AI. In turn, Safer AI ratings[6] focus on risk management practices in technology companies, evaluating aspects such as risk identification, analysis, and mitigation.

These assessments agree that most countries are still far from integrating AI in a safe, responsible, and effective manner. In this context, Latin America and the Caribbean face specific challenges that limit their ability to leverage this technology as a driver of development.

[2] Which Economies Are Ready for AI? | BCG
[3] The Global Index on Responsible AI
[4] State of European Tech | Homepage
[5] EAIDB
[6] SaferAI

1.2. Overview in Latin America and the Caribbean

Artificial Intelligence (AI) in Latin America and the Caribbean (LAC) is projected to consolidate its position as a catalyst for digital transformation in the region, despite the lack of advanced technological infrastructure, the shortage of specialized talent, and the lack of understanding of how to integrate it.

Brazil, Mexico, Argentina, and Colombia are leading the adoption of AI thanks to both public and private investment. These countries have promoted initiatives to develop startups, empower their SMEs, and create public policies that foster technological innovation and establish international partnerships.

The adoption of AI in some sectors of the economy is beginning to show remarkable progress, with several countries positioning themselves as leaders in the region due to their efforts in investment, development, and policy. For example, in both Argentina and Chile in the health sector: AI in diagnostic imaging, medical record management, and telemedicine. Notably, the pandemic accelerated the adoption of these technologies, especially in rural areas.

The Latin American AI Index (ILIA 2025) , developed by CENIA, assesses the AI readiness of 19 Latin American countries. Chile, Brazil, and Uruguay stand out as "pioneers" not only in technology but also in their environment that fosters innovation. At the same time, there is a noticeable awakening among the countries that are lagging behind, such as Ecuador, Costa Rica, Guatemala, and some Caribbean countries, which are accelerating their progress in digital infrastructure, AI education, and policy adoption.

[7] Índice Latinoamericano de Inteligencia Artificial (ILIA) 2025

Chile leads the ranking due to a combination of strong enabling factors: advanced digital infrastructure, AI talent, and clear national strategies for responsible AI. Brazil's main strength is its infrastructure (data center capacity) and a more mature adoption ecosystem, the result of greater progress in research, development, and innovation. However, it still faces challenges in governance. Uruguay, for its part, ranks third, achieving a good balance between technical capacity and institutionality, with a focus on AI in public services and citizenship.

Despite a notable increase in efforts to train AI talent in the region, no country in the region has reached the levels of global leaders. LAC continues to face a number of structural challenges to the effective and responsible adoption of artificial intelligence (AI), especially in the context of SMEs. While AI is transforming industries globally, in LAC, its impact is primarily visible in the entrepreneurial ecosystem.

A World Bank study (2024) estimates that between 26% and 38% of jobs in LAC are exposed to the impact of generative AI. Although most jobs will be transformed (with productivity improvements of 8% to 14%), between 2% and 5% could be completely automated. These effects may deepen inequalities if not accompanied by active retraining and education policies.

While AI is transforming industries globally, in LAC, its impact is primarily visible in the entrepreneurial ecosystem.

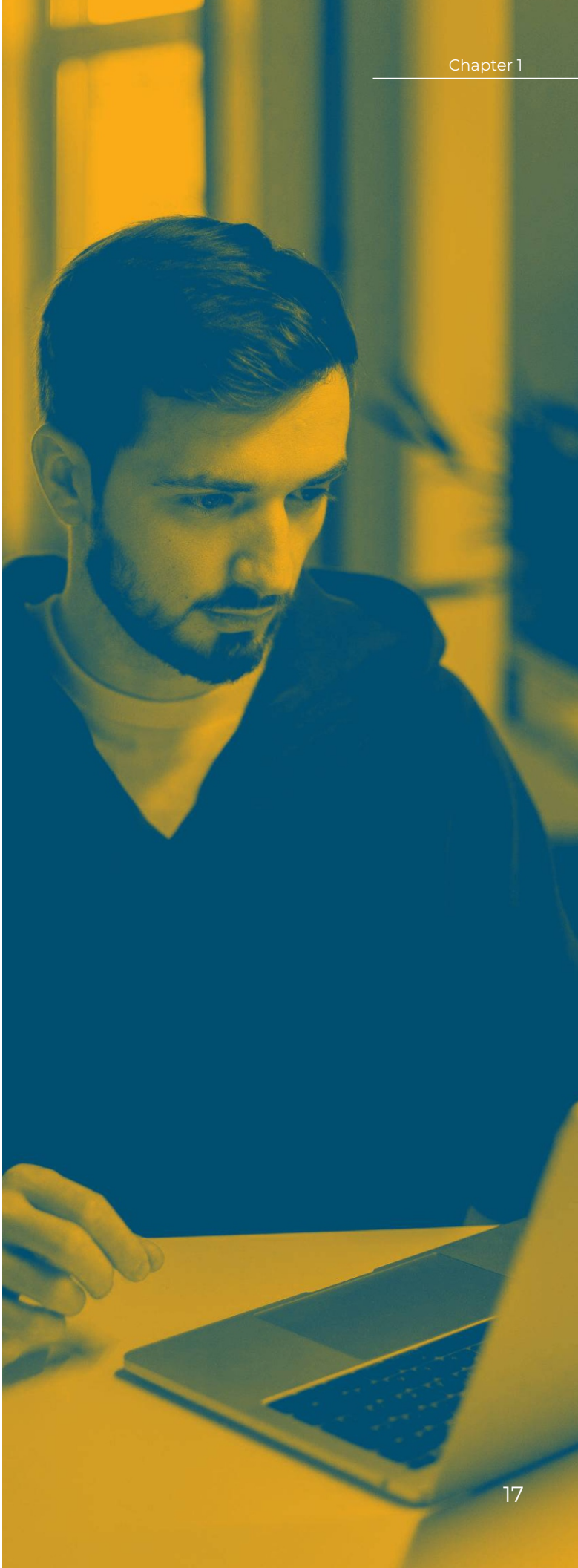
The risks are not limited to automation: socioeconomic inequality, lack of digital infrastructure, and the technical skills gap limit the ability of companies to reap the benefits of AI. These disparities are accentuated when considering the relative lag of SMEs behind large companies in terms of investment and capabilities for technology adoption.

In terms of governance, the Global Index on Responsible AI shows that only Uruguay (ranked 18th), Brazil (17th), and Chile (22nd) have average levels of institutionality in responsible AI. Mexico lags further behind (ranked 64th), revealing regulatory and operational gaps.

Finally, startups and SMEs face particular barriers: lack of access to talent, limited digital infrastructure, scarce financing, and low understanding of AI risks. If not addressed, these barriers could leave much of the regional productive fabric out of the technological revolution. The lack of robust regulatory frameworks, the brain drain, and poor public-private coordination exacerbate the situation.

Even so, AI offers a unique opportunity for leapfrogging, especially if policies are implemented to reduce the digital divide, strengthen institutions, and ensure responsible adoption and use focused on human development.

Clear examples include how Africa went directly from a lack of fixed telephony to the massive use of mobile payments, or how China avoided the expansion of credit cards to adopt digital payments using QR codes. This phenomenon not only accelerates technological inclusion, but can also drive economic and social growth when accompanied by appropriate public policies, such as investment in connectivity, digital literacy, and ethical regulatory frameworks. Studies by organizations such as UNCTAD and UNIDO confirm that leapfrogging works in developing countries, especially in sectors such as telecommunications, renewable energy, and digital services, provided that conditions such as minimum infrastructure, technological standards, and sound governance are in place.



1.3. The need for a responsible framework for action

As AI redefines economic sectors and social relationships, it also amplifies risks that must be addressed in a coordinated manner. These include the impact on employment, cyber vulnerability, algorithmic biases, the concentration of informational power, and the loss of control over personal data.

The adoption of AI is creating a new two-tier divide: between companies—where those that fail to adopt this technology will be left behind—and between countries—where those without the capacity to develop or govern AI will be technologically dependent on more advanced powers.

This situation threatens to exacerbate existing inequalities, especially in regions such as LAC, with high socioeconomic and technological gaps.

In this context, various international frameworks underscore the urgency of establishing clear governance principles. The global study by WSJ Intelligence and NTT (2025[8]) indicates that more than 70% of CEOs surveyed consider it crucial to have robust AI risk management and governance structures in place. Key concerns include the impact on employment, cybersecurity, algorithm transparency, and personal data protection.

Contemporary approaches to responsible use AIhighlight the need for clear regulations, impact assessments, algorithmic explainability, and meaningful human oversight. Adoption without these elements not only exposes companies to reputational and legal risks, but also undermines public trust in the technology.

In short, the development of frameworks for the responsible adoption of AI is not only a regulatory issue, but also a necessary condition for this technology to contribute to sustainable economic development, the reduction of gaps, and the strengthening of capacities in regions with high transformative potential such as LAC.

Against this backdrop, one essential question guides the rest of this study: how can companies and startups in the region turn AI into a strategic ally for responsible growth, without losing competitiveness or taking unnecessary risks?

Throughout the following sections, we explore concrete answers to the questions facing those who innovate with AI today: from how to understand and justify automated decisions to the latest trends in identifying biases, assessing risks, and aligning solutions with international frameworks and standards.

fAIr Tech Radar aims to be an accessible and useful guide for those wondering where to start, what others are doing, and how to translate responsible use into tangible value: traction, investment, better products, and long-term trust.

[8] Paid Program: The Innovation Spectrum: Where Do You Stand on the Path to Progress?

Chapter 2.
Conceptual framework and methodology of the study

2. Conceptual framework and methodology of the study

Artificial intelligence (AI) is rapidly transforming economic and social systems, opening up unprecedented opportunities for innovation, but also generating significant risks in terms of equal opportunities, transparency, and security. In Latin America and the Caribbean (LAC), these technological advances coexist with structural gaps—such as lack of infrastructure, shortage of specialized talent, and weak digital governance—that particularly affect startups and SMEs, which are key players in the region's productive transformation.

fAIr Tech Radar aims to develop a framework to assess and guide the degree of preparedness of companies in LAC both in harnessing the innovative potential of AI and in aligning with principles of responsible artificial intelligence.

In this context, the study " " fAIr Tech Radar , promoted by IDB Lab in partnership with NTT DATA and the Entrepreneurship Center of the Universidad de los Andes, seeks to offer a strategic tool to guide the responsible, practical, and contextualized adoption of artificial intelligence.

The central idea behind fAIr Tech Radar is to provide a comprehensive, accessible, and actionable tool that allows these companies to assess not only their technical and organizational capabilities to adopt AI, but also their degree of alignment with the principles of access, transparency, applicability, privacy, security, accountability, and improvement of human well-being. In this sense, the Radar combines a technical and responsible use, perspectivesimultaneously addressing the potential for efficiency and the risks associated with the use of AI.

The selection of these common principles as the central pillars of the research methodology ensures that the study focuses on the most critical and widely agreed-upon dimensions of the current landscape of responsible artificial intelligence (RAI). This conceptual framework allows for a comprehensive understanding of the perceptions, challenges, and levels of maturity of stakeholders in the region, as well as the design of relevant responses from the perspective of public policy, investment, and intervention.

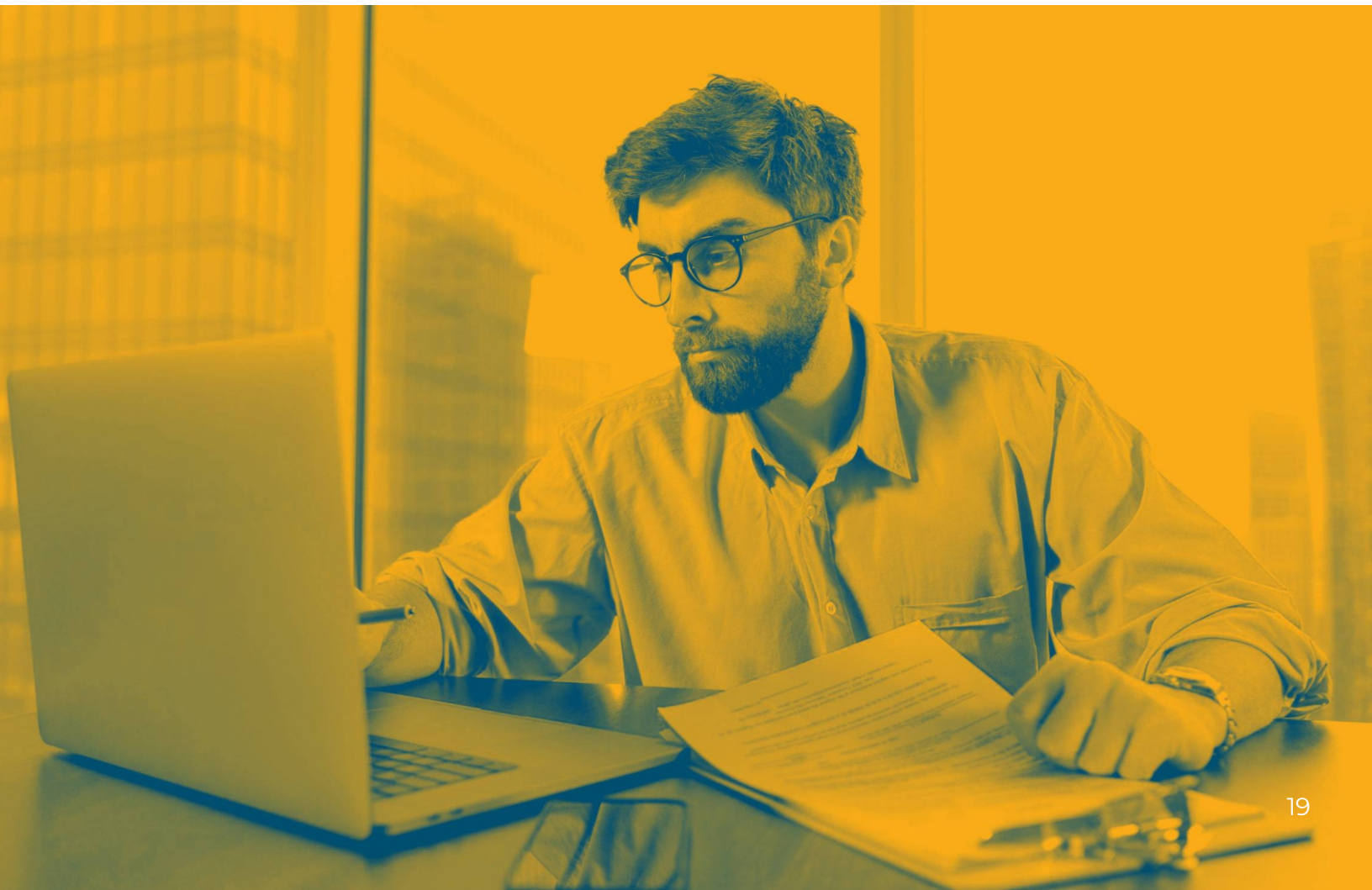
The specific objectives of the study are:

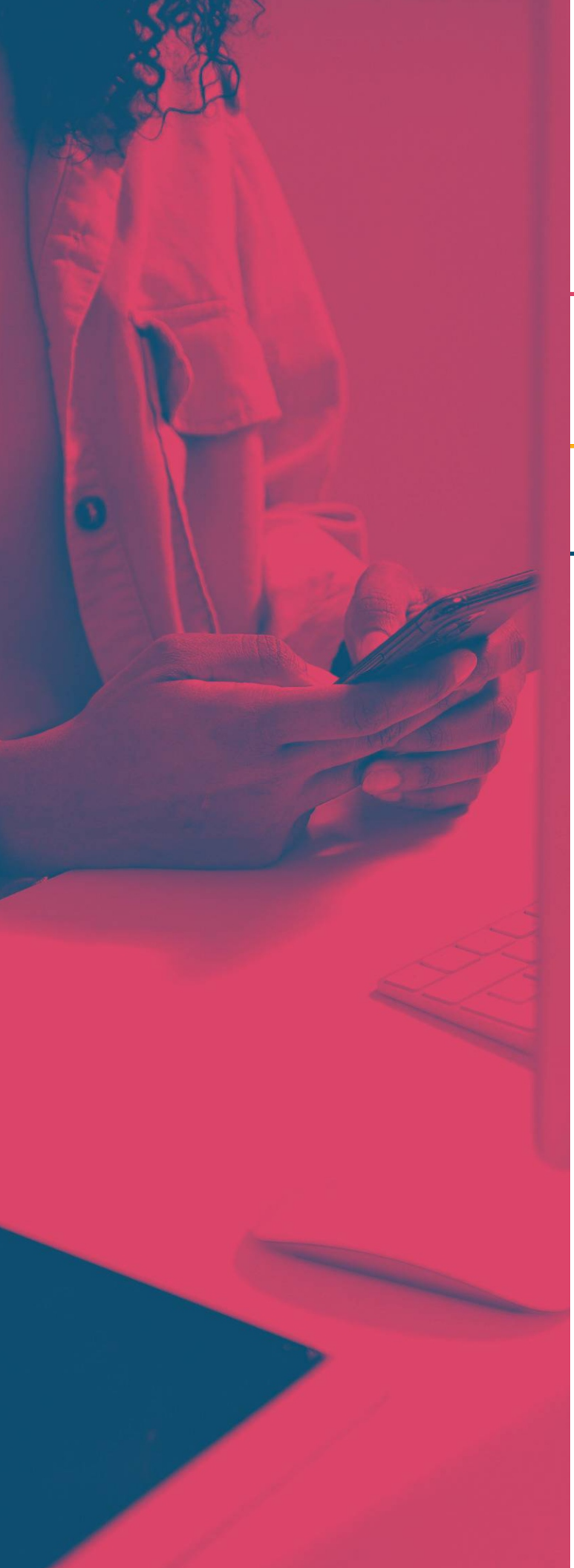
01 **To diagnose the level of maturity** of startups and organizations in the region in integrating AI in a responsible, effective, and strategic manner.

02 **To identify structural barriers and key enablers** that affect the responsible adoption of AI, considering technical, institutional, and cultural aspects.

03 **To design a practical self-assessment tool**, adapted to the LAC context, to guide internal decisions and external interventions.

04 **To promote future regional standardization**, based on shared principles, that facilitates collective action and strengthens technological governance in the region.





Given the exploratory nature of the fAIr Tech Radar, the following hypotheses are formulated in descriptive and comparative terms:

Hypothesis 1: The average maturity in responsible AI (RAI) varies according to the size of the organization, being higher in medium and large companies.

Hypothesis 2: The Solution dimension of the 3S model shows greater development than System and, especially, Society.

Hypothesis 3: Within the ALTAI principles, those associated with Privacy and Data Governance achieve the highest scores, while Social Well-being and Diversity register the lowest.

These hypotheses guide the analysis of results and allow for the identification of maturity patterns and areas for improvement in the responsible adoption of AI in Latin America. In short, fAIr Tech Radar proposes a comprehensive vision that articulates diagnosis, practical guidance, and capacity building. Its purpose is to contribute to artificial intelligence becoming an engine for inclusive, sustainable development focused on human development.

The tool is aligned with the 3S approach of fAIr LAC —Solution, System, and Society— which allows for a comprehensive analysis of how AI is implemented, managed, and governed.

The methodology consists of two pillars: a robust conceptual basis and empirical application through structured surveys. The conceptual component is based on a comparative analysis of international frameworks on the responsible use of AI, identifying seven key principles—equity, transparency, explainability, accountability, privacy, and security—that guide the design of the measurement instrument.

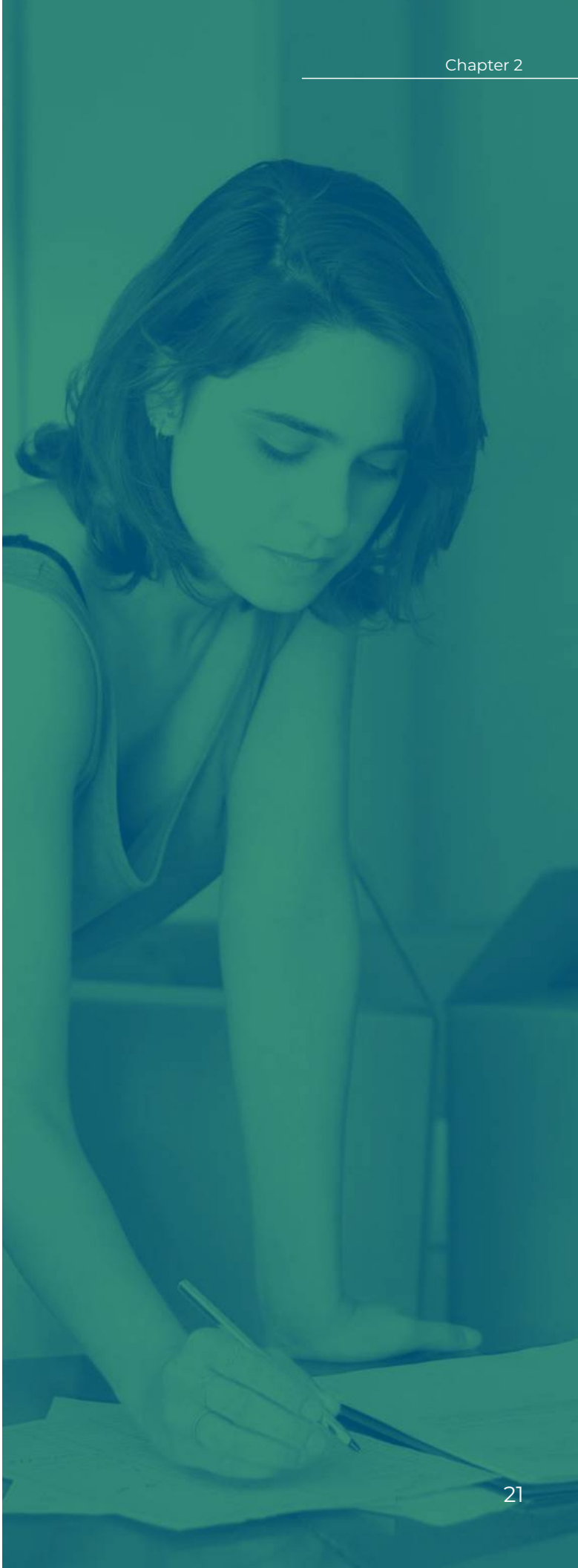
Based on this foundation, a self-administered and voluntary survey was designed and applied to companies in different countries in the region, with a special focus on startups and SMEs due to their relevance in LAC.

It is important to note that the results presented in this report come from a self-administered survey answered by 75 companies. Although the sample includes organizations of different sizes and from different countries in Latin America and the Caribbean, its composition does not necessarily reflect the actual distribution of the region's business fabric. The survey was disseminated through an open call via various channels, which implies the possibility of self-selection biases associated with organizations with greater interest or affinity for the topics of the study. Consequently, the findings should be interpreted as a first exploratory approximation that contributes to characterizing patterns, trends, and initial gaps in the responsible use and adoption of artificial intelligence in the regional ecosystem.

The values obtained (1–5) are interpreted as levels of qualitative maturity.

The questions were organized into three dimensions as a test of the robustness of the measurement:

- **Solution:** measures the degree of AI adoption in products, services, and internal processes, as well as alignment with strategic business objectives.
- **System:** evaluates technical and governance capabilities, including infrastructure, interoperability, cybersecurity, data protection, and use of third-party services.
- **Society:** analyzes organizational culture, knowledge of IAR principles, staff training, and consideration of impacts on vulnerable groups.



Dimensions of responsible AI (RAI)

Solution	System	Society
Measures the degree of AI adoption in products, services, and internal processes, as well as alignment with strategic business objectives	Assesses technical and governance capabilities, including infrastructure, interoperability, cybersecurity, data protection, and use of third-party services	Analyzes organizational culture, knowledge of IAR principles, staff training, and consideration of impacts on vulnerable groups.

Responsible AI (RAI) maturity levels

The information collected is visualized through analytical dashboards, comparative graphs, and key KPIs (e.g., AI investment intensity, transparency commitments, and security). This visualization allows for the identification of gaps as well as the documentation of best practices and opportunities for intervention.

In this context, fAIr Tech Radar not only describes the state of AI adoption in the region's business fabric, but also produces actionable inputs to guide strategies, public policies, and institutional strengthening processes. The complete technical description is included in a methodological appendix available upon request.

As part of the study and its robustness test, the ALTAI (Assessment List for Trustworthy Artificial Intelligence) model was integrated, a framework developed by the European Commission's High-Level Expert Group on Artificial Intelligence, whose purpose is to provide a practical tool for assessing the level of compliance with the requirements for the responsible use of AI systems, including the aspects ethical, technical, and social necessary to be considered "trustworthy." (Trustworthy AI).

The ALTAI principles were incorporated as a cross-cutting layer into the 3S model, associating each principle with the corresponding dimension according to its nature: technical robustness with Solution; governance and privacy with System; diversity and

social well-being with Society. The results are presented in aggregate form and their final interpretation considers the correspondence between the two frameworks.

This methodological strategy of robustness testing allows practical recommendations to be derived even with limited databases. It also allows each of these models to be compared and produces a parsimonious result that highlights the details technical and implementation of AI , while providing a holistic measure of the degree of responsible use.tools.

Unlike other models focused solely on performance or efficiency, ALTAI guides the assessment toward respect for fundamental rights, human values, and the rule of law, seeking a balance between innovation and protection. This emphasis is relevant for Latin America and the Caribbean (LAC), where regulatory frameworks are still developing and companies face the challenge of innovating responsibly amid technological asymmetries and heterogeneous institutional capacities.

The framework identifies seven key requirements that must be considered to ensure the responsible use of AI. These requirements are evaluated throughout the system's life cycle—design, training, implementation, and oversight. In the fAIr Tech Radar study, these requirements are interrelated with the three dimensions of the 3S model (Solution, System, Society) used to ensure the robustness of the results.

Finally, these requirements are linked to the three dimensions of the 3S model (Solution, System, and Society), ensuring the methodological consistency of the analysis:

- **Solution:** technical robustness and security, transparency, human oversight.
- **System:** data privacy and governance, accountability.
- **Society:** diversity and equity, social and environmental well-being.

This correspondence ensures that fAIr Tech Radar translates ethical principles into verifiable metrics, allowing us to observe the consistency between the discourse of responsibility and organizational practice. In this way, the RAI principles provide the ethical framework, ALTAI the evaluation guide, and 3S the analysis structure, configuring a comprehensive and coherent model for measuring the maturity of the responsible use of artificial intelligence in Latin America and the Caribbean.

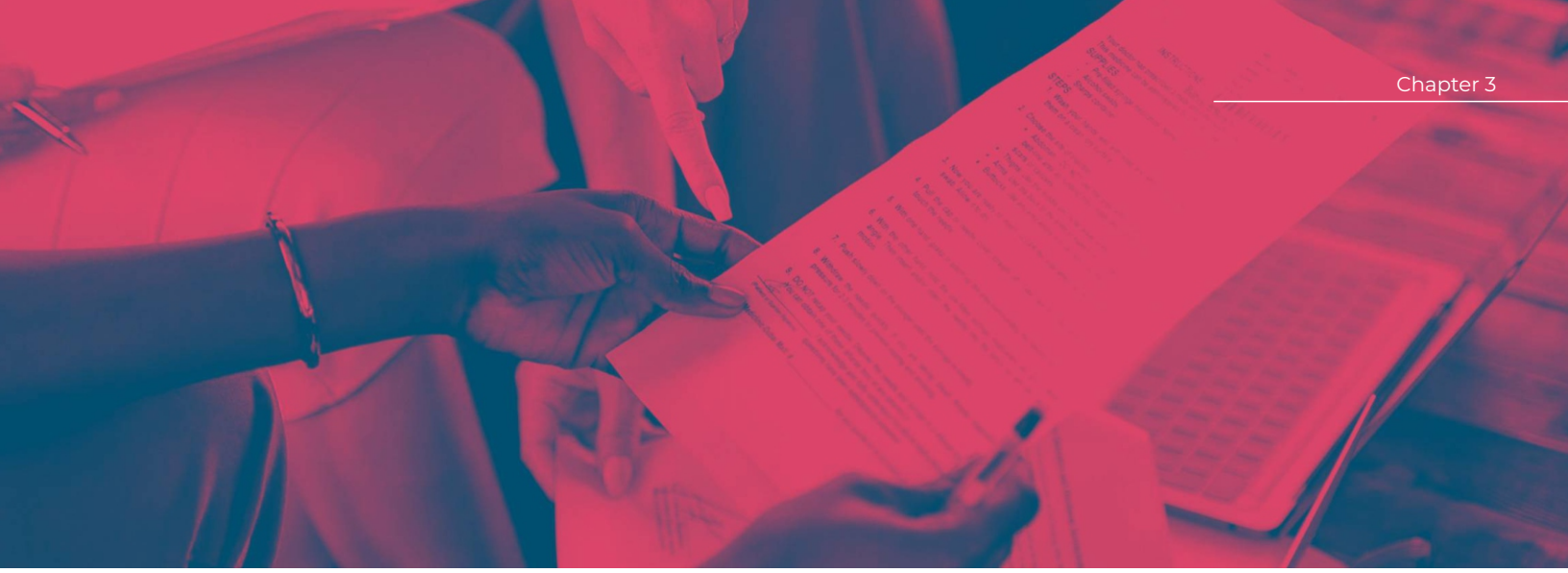
	Principle ALTAI	Description	Risks if not properly implemented
01	Human supervision	Ensure that AI systems are under meaningful human control, including human-in-the-loop mechanisms that allow for intervention, override, and correction of automated decisions.	Uncontrolled automation, erroneous or illegitimate decisions, and loss of trust.
02	Technical robustness and security	Requires AI to be technically sound, secure against failures or attacks, and capable of maintaining consistent performance.	Security vulnerabilities, critical failures, or unverifiable decisions.
03	Privacy and data governance	Promotes the protection of personal information and the traceability of the lifecycle of data used to train and operate AI systems.	Leaks, regulatory non-compliance, loss of legitimacy.
04	Transparency	Includes process traceability, algorithm explainability, and clear communication about AI capabilities and limitations.	Opacity, algorithmic "black boxes," public mistrust.
05	Diversity, non-discrimination, and equity	Promotes the inclusion of diverse groups in design and evaluation, preventing bias and exclusion.	Algorithmic discrimination, unequal impacts, loss of social legitimacy.
06	Social and environmental well-being	Ensures that AI contributes positively to human well-being and environmental sustainability, avoiding negative externalities.	Social harm, environmental impact, lack of sustainability.
07	Accountability	Defines explicit responsibilities for the operation, maintenance, and failure of AI systems. Including audits, documentation, and traceability.	Ambiguity of responsibilities, failures without corrective measures, loss of institutional trust.

In order to represent the heterogeneity of the regional productive fabric, the participating companies were classified into five groups according to their size and degree of organizational consolidation:

Category	Main characteristics
Micro-enterprises	Startups with fewer than 10 employees; they incorporate AI through accessible, low-cost tools.
Small businesses	Up to 50 employees; prioritize the automation of operational tasks and improved efficiency.
Medium-sized companies	Between 51 and 250 employees; have basic governance structures and show interest in scaling analytics to predictive models.
Large companies	More than 250 employees; have areas dedicated to data and innovation and are moving toward institutionalized IAR practices.
Corporate	Multinational conglomerates or holding companies with diversified operations; they implement global accountability and compliance frameworks, although with variations in their local implementation.

The conceptual and methodological framework presented in this chapter forms the basis for the empirical analysis developed in the study. The combination of the 3S and ALTAI models and segmentation by organizational size allows us to identify how the maturity of responsible use of artificial intelligence is evolving at different speeds in Latin America and the Caribbean. The following chapter presents the results of this assessment, analyzing adoption patterns, responsible practices, and associated risks according to company type and size.

Chapter 3.
Results and analysis of the use of artificial intelligence in Latin America and the Caribbean



3. Results and analysis of the use of artificial intelligence in Latin America and the Caribbean

A survey of seventy-five organizations of different sizes and from different sectors in Latin America and the Caribbean provides an initial empirical characterization of the level of maturity in the adoption of artificial intelligence (AI) and its responsible use in the region. Based on the 3S model—Solution, System, and Society—and the seven principles of the ALTAI framework, an organizational maturity index was constructed that translates ethical guidelines into operational metrics, enabling comparison between types of companies and the identification of structural gaps.

The results show that the region is undergoing a phase of accelerated technical adoption, driven by the growing availability of accessible tools and competitive pressure to innovate. However, there are still gaps in governance, transparency, and social inclusion. In general, organizations in the region incorporate AI with a pragmatic approach, focused on operational efficiency and cost reduction, but with limited institutionalization of ethical or internal oversight frameworks.

Organizational size has been found to influence the speed and depth of adoption, although not in a linear fashion: micro and small enterprises prioritize immediate efficiency; medium-sized enterprises balance compliance and opportunity; and large corporations, although more subject to regulatory frameworks, move forward with less agility. In this sense, the evidence supports the idea that maturity in the responsible use of AI is determined by the availability of resources, internal capabilities, and institutional structure rather than by scale per se.

Likewise, the findings show a recurring sequence: organizations tend to progress first in the technical dimension (Solution), while the organizational (System) and social (Society) dimensions show more incipient levels of development. This reveals a central tension: the adoption of AI is advancing faster than the internalization of its principles of responsibility.

This chapter examines how these differences are reflected in the maturity index results, disaggregating patterns by company size, by 3S dimension, and by ALTAI principle. The objective is to identify the factors that enable—or limit—truly responsible, inclusive, and sustainable AI adoption in the region.

The chapter is organized into three complementary sections:

01. **Overall maturity index results**, analyzing the aggregate performance of the sample and the differences observed according to organizational size—micro, small, medium, large companies, and corporations—to identify patterns of adoption and levels of integration of responsible practices.

02 **Analysis by dimensions of the 3S model (Solution, System, and Society)**, allowing for a distinction between technical maturity, organizational maturity, and social maturity in the use of AI.

03 **Behavior of the seven dimensions of the ALTAI framework**, highlighting strengths and weaknesses around principles such as human oversight, data privacy, diversity, and social well-being.

This structure seeks to offer a progressive reading: from the descriptive to the interpretive level and from there to the identification of critical factors and recommendations for moving toward a truly responsible AI adoption model in Latin America and the Caribbean.

Working hypothesis and analytical approach. Based on the methodology presented in the previous chapter, the analysis of results is structured around three working hypotheses that guide the interpretation of the findings.

- **Hypothesis 1:** The size of the organization conditions not only the speed of adoption of artificial intelligence (AI), but also its degree of strategic integration, creating gaps between operational innovation and strategic integration.

- **Hypothesis 2:** Maturity in the responsible use of AI depends on the institutional capacity of organizations to translate ethical principles into governance practices, which is reflected in the strength of their internal structures and the degree of formalization of their policies.

- **Hypothesis 3:** The transition to responsible AI does not follow a linear growth pattern, but rather responds to three different logics—resource constraints, cost-benefit balance, and organizational inertia—determining different adoption trajectories among startups, SMEs, and corporations.

Based on these hypotheses, the following sections present the results obtained in measuring the maturity index, organized progressively: first, the overall results and differences by company size; then, the findings by dimension of the 3S model; and finally, the analysis of the seven principles of the ALTAI framework, which allows us to observe the degree of institutionalization of responsible AI practices in the organizations surveyed.

3.1. General results and regional maturity

The overall analysis of the fAIr Tech Radar results shows that the average regional maturity is 2.9 (on a scale of 1 to 5). This value indicates substantial progress in the technical adoption of AI and lagging behind in the integration of governance, transparency, and social responsibility frameworks. Most of the organizations surveyed are at intermediate stages of maturity, with expanding operational capabilities but without consolidated structures to ensure the responsible use of AI. This pattern confirms the region's progress toward the widespread adoption of the technology, but with the institutionalization of responsible AI practices still in its infancy.

By organizational size, there is heterogeneity in the pace and depth of adoption. Micro and small businesses take a pragmatic approach, focused on solving immediate needs through accessible automation and data analysis tools, although with little formalization of internal policies or oversight mechanisms. Medium-sized companies balance innovation and compliance by beginning to establish committees or roles related to data governance and introducing responsibility criteria into their development processes. Large companies and corporations score highest on the index due to their technical and human resources, although they face challenges related to agility and cross-cutting consistency of their policies across different areas.

The pattern suggests a multi-speed adoption model: many companies are in a phase of "technical maturity" (Solution), characterized by the incorporation of AI solutions that optimize operational efficiency (System), but which do not yet translate into sustainable or socially responsible strategies (Society). The gap between adoption and responsibility emerges as the main regional challenge: the use of AI is expanding, but institutional mechanisms to ensure its reliable and legitimate use are still being consolidated.

In summary, the overall results of the fAIr Tech Radar confirm that the process of AI adoption in Latin America and the Caribbean is in a stage of technical consolidation and organizational transition.

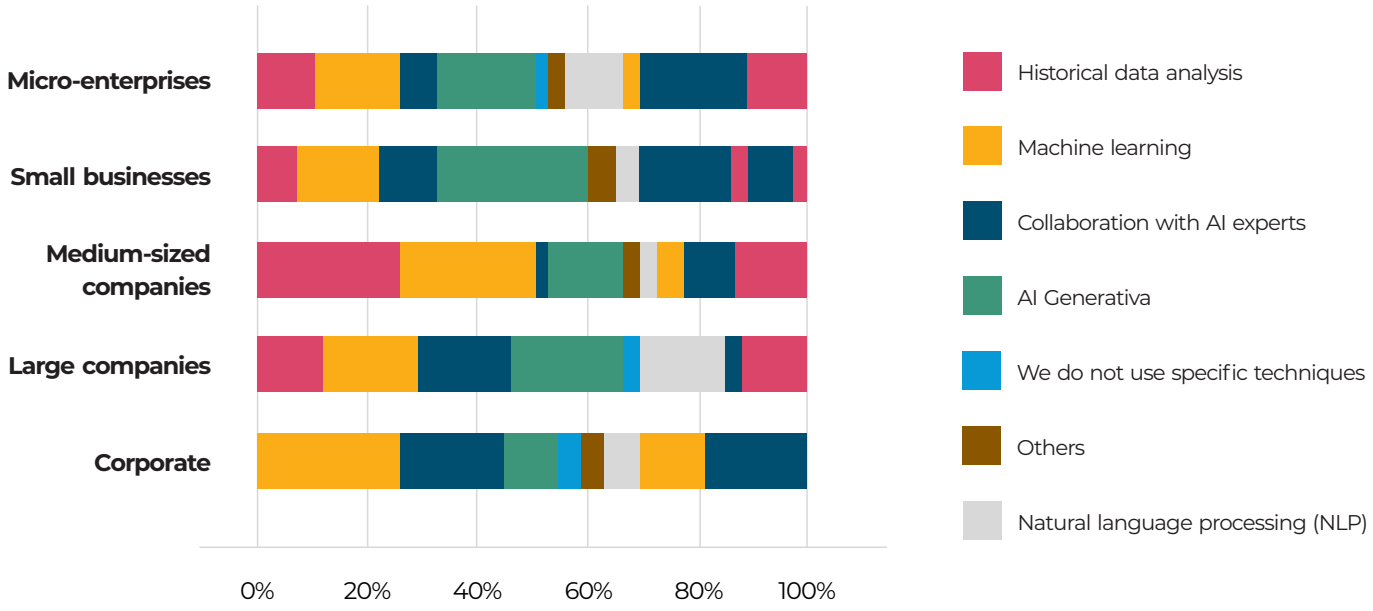
The following sections delve deeper into this trend, analyzing how these differences are expressed according to company size and to what extent they are reflected in the dimensions of the 3S model and the principles of the ALTAI framework.

3.2. Company size and maturity: variation in how companies adopt AI and integrate responsible practices.

- How does the way in which companies of different sizes adopt artificial intelligence vary?
- What drives small companies to focus on immediate solutions, while large companies explore more complex and regulated models?
- Why are large corporations not the leaders in AI adoption?
- Could size be considered a factor that limits innovation or, on the contrary, a catalyst for the institutionalization of responsible practices?

These questions open the door to an analysis that reveals not only different patterns in AI adoption, but also the challenges and opportunities faced by each organization in the region.

Graphic 1



Analysis of the adoption of specific artificial intelligence (AI) features in Latin American companies reveals a differentiated pattern according to organizational size.

Micro and small businesses account for the highest number of use cases. The pattern suggests a push for access to AI via low-cost, rapidly adopted tools (generative AI, NLP) aimed at responding to immediate operational needs.

Medium-sized companies articulate data analysis on two levels: i) Maintaining a descriptive-diagnostic approach aimed at understanding both the current situation and the historical evolution of their operations, which allows them to gain visibility into past patterns and trends. ii) Evolving toward more advanced data analysis practices, incorporating machine learning capabilities as a way to enable a prescriptive level of analysis.

Even on a moderate scale and with more experimental initiatives, these organizations reflect their intention to anticipate future results through scenario simulations, predictive modeling, and advanced segmentation of customers, products, and services. The goal is to enable a hyper-personalized value proposition, either to anticipate existing market movements or to identify and capitalize on emerging niches.

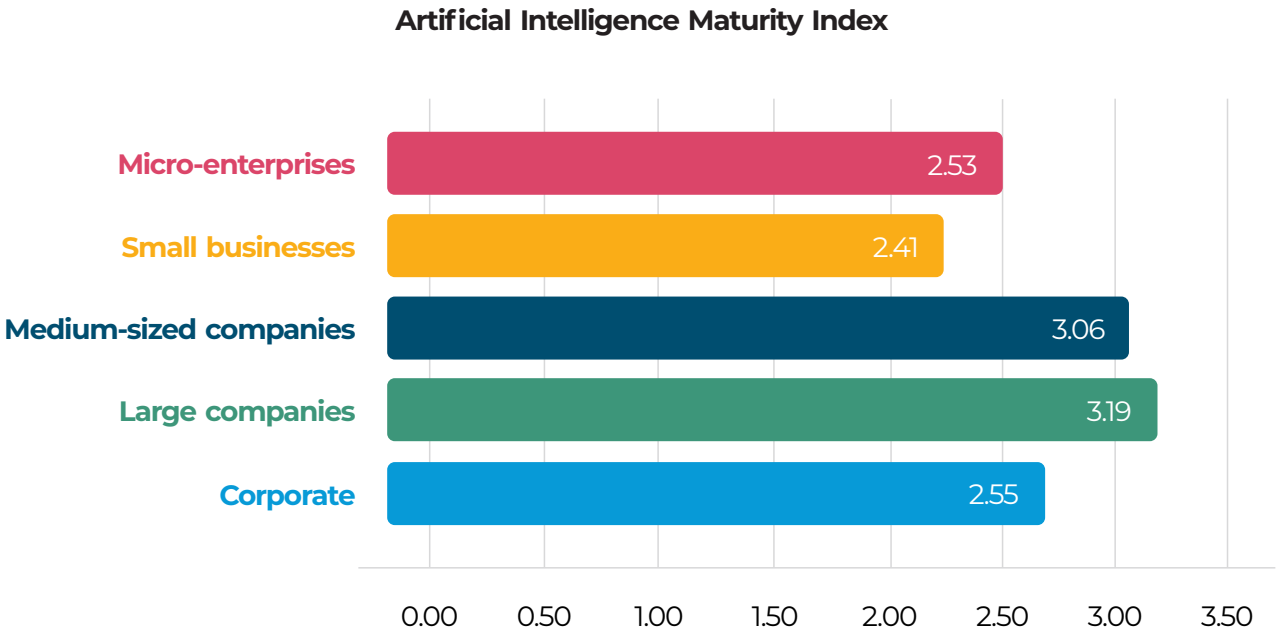
Large corporations manage a more structured and controlled analytics portfolio, aligning with a clearly defined corporate strategy and stricter regulatory frameworks. They prioritize collaboration with experts and specialized partners to accelerate the adoption of more complex machine learning models, integrated into robust technological architectures and governed by security and regulatory compliance policies.

Far from limiting themselves to isolated projects, they treat analytics as a strategic asset: adoption roadmaps, centers of excellence in analytics and AI, and open innovation schemes for knowledge transfer. They seek not only to optimize operational efficiency, but also to achieve sustainable competitive advantages through hyperautomation, prescriptive analytics at scale, and the creation of more resilient and adaptive business models.

These patterns reinforce the hypothesis that while small companies focus AI on immediate productivity gains and basic optimization, medium and large companies add more complex dimensions linked to governance, responsible practices, and the design of advanced solutions. A gap persists between technological accessibility and depth of organizational integration, with differentiated effects throughout the production chains.

- Does the size of an organization determine its ability to apply responsible practices in artificial intelligence?
- Are micro and small businesses ready to go beyond operations, or must medium and large businesses balance regulation, innovation, and sustainability?

These questions allow us to explore how the resources and capabilities associated with the size of organizations make a difference in the maturity of the responsible use of AI and in their ability to generate social legitimacy.



To establish more precisely the relationship between company size and the integration of responsible practices, the dimensions that characterize the responsible use of AI were identified in a composite index scaled from 1 to 5, with the following dimensions:

01. **Responsibility in governance and oversight.** Human-in-the-loop oversight controls, committees, or roles responsible for incorporating the Ethics by Design approach into objectives and a roadmap to ensure fairness and reliability of algorithms.

02 **Responsibility in data and algorithms.** Criteria for lawful and responsible collection, quality assurance and data representativeness, diversity and inclusion criteria in training, and transparent documentation of algorithmic decisions.

03 **Social responsibility and inclusion.** Active participation of diverse groups in design, community impact assessment, co-creation with stakeholders, and feedback mechanisms with users and stakeholders.

04 **Environmental responsibility and sustainability.** Analysis of environmental risks and the sustainability of AI projects throughout their life cycle.

This classification is consistent with the requirements of the ALTAI list. Based on preliminary evidence, the following patterns are observed according to the size of the organizations surveyed:

Dimensions of responsibility	Microenterprise	Small	Medium	Large	Corporate
Governance and supervision	2.55	2.58	2.98	3.14	2.58
Data and algorithms	2.61	2.50	3.57	3.25	2.57
Social and inclusion	2.60	2.32	3.11	3.21	2.29
Environment and sustainability	2.36	2.23	2.57	3.17	2.75
	2.53	2.41	3.06	3.19	2.55

The interaction between company size and maturity level in the responsible use of artificial intelligence allows us to identify three behavioral patterns:

Micro and small businesses. These are at the bottom of the responsible AI use scale (2.53 and 2.41). They report initial efforts that, while showing interest in incorporating responsible activities into AI, still lack formal processes and show a more reactive than strategic adoption. In practice, these organizations tend to prioritize the functional implementation of AI to meet immediate needs, postponing the incorporation of frameworks for responsible useAI. This leads to rapid technical evolution, with deficits in oversight, governance, and transparency, exposing them to ethical and reputational risks.

Medium and large companies. They achieve the highest scores (3.06 and 3.19), although these are relatively moderate given the scale of the index (1–5), consolidating their position as the most advanced group in areas such as governance, data management, and sustainability. They emphasize the development of resources, talent, and the structures necessary to institutionalize responsible AI practices. The existence of oversight frameworks, specialized committees, and greater regulatory capacity allows

these organizations to move toward responsible regulatory and strategic , practicesconsciously and consistently integrating reliability and sustainability into their operations.

Corporations. Their index of 2.55, very close to that of micro-enterprises, can be explained by the complexity and heterogeneity that characterizes large corporations, as well as their organizational inertia. Despite sophisticated global policies and regulatory guidelines, in practice, their implementation is diluted and slowed down by the diversity of business units, geographical dispersion, and different strategic priorities. In addition, the high degree of internal bureaucracy slows down decision-making chains and reduces agility in adapting to the requirements of these technologies, especially in critical areas such as security, regulatory compliance, and governance. This reveals how the real challenge for the responsible use of AI lies not only in designing global ethical frameworks, but also in ensuring the rapid and flexible execution that AI requires to generate trust, legitimacy, and resilience.

- Is there really a proportional evolution in the maturity of responsible use AI as companies grow in size?
- What are the drivers or logicals that explain the advances and lags in the responsible use of AI for organizations of different sizes?
- What does the evidence reveal about micro-enterprises and startups?

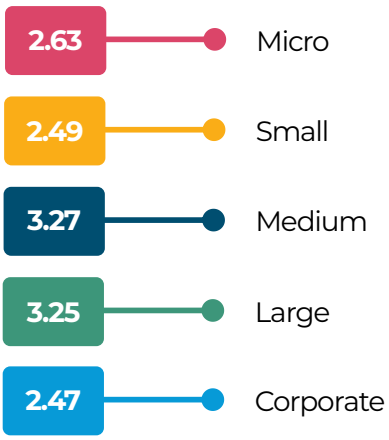
The analysis shows that organizational size, although an imperfect approximation, maintains a functional correlation with maturity in the responsible use of AI, mediated by available resources, internal capabilities, and organizational culture.

The results indicate that the evolution of maturity is not linear, but rather follows three structural logics: limitations/availability of resources and capabilities, cost-benefit balance, and organizational inertia.

The results are reported organized into the seven dimensions of the ALTAI analytical framework: responsibility, social and environmental well-being, diversity and equity, privacy and data governance, technical robustness and security, human oversight, and transparency.

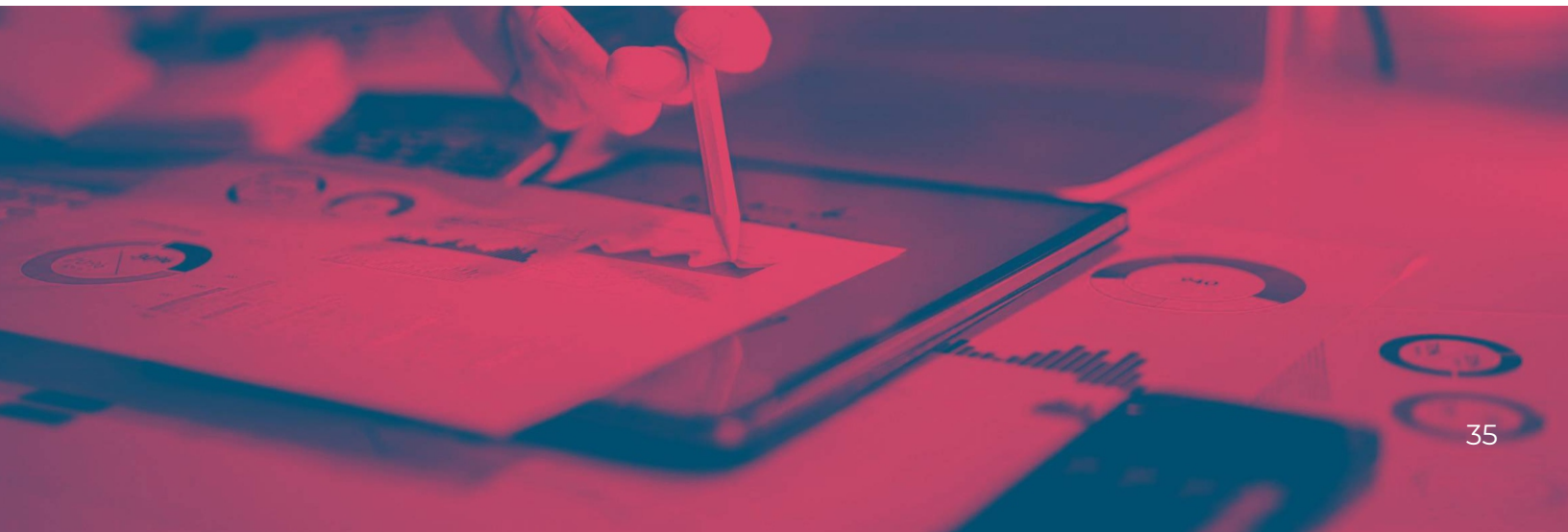
Results by organizational size

Average maturity by size scale 1 to 5):



Results by organizational size

ALTAI	Microenterprise	Small	Medium	Large	Corporate	(Pearson)
Accountability	2.49	2.6	2.93	3.13	2.75	0.18
Social and environmental well-being	2.4	2.12	2.77	3.13	2.43	0.16
Diversity, Non-Discrimination, and Equity	2.6	2.32	3.11	3.1	2.43	0.08
Privacy and Data Governance	2.89	2.86	3.93	3.42	2.5	0.06
Technical Robustness and Safety	2.54	2.55	3.4	3.33	2.37	0.13
Human Supervision	2.81	2.48	3.38	3.28	2.33	0.01
Transparency	2.68	2.5	3.36	3.33	2.46	0.11
Average	**2.63**	**2.49**	**3.27**	**3.25**	**2.47**	



Micro and small businesses. Innovation with limited resources. They operate under a logic of survival and scaling. AI is used as a pragmatic, low-cost tool to solve immediate problems, which explains why their advances in responsibility are incipient and lacking in sophistication:

- They are in the middle of the scale (≈2.5 on average).
- They reflect existing but initial efforts. They are characterized by the absence of formal processes and reactive responsible integration lacking intentstrategic.
- Many correspond to startups, which prioritize operation and scalability over governance or sustainability in processes leading to the responsible use of AI.

Medium and large companies. Balance between compliance and opportunity. They operate under the logic of complying in order to compete. They adopt responsible use practices due to regulatory pressure and international customers, made possible thanks to their resources, capabilities, and structure. These companies demonstrate greaterdynamism and potential to consolidate a proactive model of AI governance and responsible use.

- They are in the upper middle of the scale index (≈3.25).
- Greater progress in governance, data, and sustainability, with high performance in privacy and dat (3.93 in medium-sized companies).
- Organizational capacity (talent, resources, and structures) to institutionalize processes conducive to responsible use theof AI.

Corporate. solid structures with greater inertia. They operate under the logic of controlling in order not to lose. Abundant resources are allocated to maintaining stability and regulatory compliance, which ensures governance but limits the flexibility needed to advance responsible innovation.

- They are in the middle of the scale: (2.55).
- Their greatest strength lies in their ability to take responsibility for their actions (accountability), but they lag behind in human supervision and technical robustness.
- Their internal complexity and organizational heterogeneity contribute to the organizational inertia that these companies exhibit, due to their global policies that are unsuccessful in effective. implementation

Robustness of the responsible use of AI analysis

The assessment of the responsible use of artificial intelligence (AI) lacks a single, comprehensive analytical framework. Given the emerging and strategic nature of the field, this study implements a robustness analysis that integrates the 3S model (Solution, System, and Society) with the ALTAI indicators to obtain a structural and multiscale view.

3S Model

The 3S model assesses AI responsibility from three interdependent dimensions, which allow us to move from technical reliability to social legitimacy:

- **Solution:** Analyzes the technological product (algorithm/model/system) and its technical robustness, effectiveness, verifiability, interpretability, bias management, and testing in diverse contexts. It seeks to ensure that the solution not only works, but is also reliable, secure, and traceable.

- **System:** Includes the organizational environment in which the solution operates: internal processes, governance, data flows, continuous review policies, institutional responsibility, human roles involved, audit mechanisms, maintenance, and control. Evaluates whether the solution is integrated into an ecosystem with rules, oversight, and accountability, rather than as an isolated artifact.

- **Society:** Analyzes the broader social impact that the AI system has on communities, end users, regulations, equity, human rights, transparency to the public, social acceptance, externalities, legitimacy, and social sustainability. It considers the extent to which the technology coexists legitimately with social values, equity, and social expectations.

The 3S model assumes that a technical solution is not responsible by design, but rather by its ability to integrate into an appropriate system that controls risks and serves society without causing unforeseen harm.

Usefulness of the 3S model as a test of robustness

- **Comprehensive coverage:** Unlike other approaches focused on the technical dimension (e.g., algorithmic biases), the 3S model incorporates organizational structure (System) and social impact (Society), allowing for a holistic assessment. AI is understood as a tool for organizational and social transformation, not just a technological solution.

- **Scalable logic:** The model allows the assessment to be adjusted according to the size, resources, and maturity level of each organization. Micro-enterprises tend to show strength in Solution and lag in System and Society, while larger with greater resources companies seek to advance in all three dimensions.

- **Connector between innovation and legitimacy:** The 3S demonstrates that responsible AI is a strategy for sustainability and trust, not a passing trend. It promotes the reduction of regulatory barriers, social acceptance, and institutional legitimacy.

- **Tool for self-assessment and responsible financing:** In the context of investors and stakeholders, the 3S model serves as a reference framework for analyzing reputational risks using ethical criteria.

Hypothesis. Robustness analysis based on the 3S model suggests that maturity in the responsible use of artificial intelligence does not depend solely on compliance with technical or regulatory metrics, but rather on internal consistency across three levels: the design of the technological solution, the robustness of the organizational system, and the legitimacy of the impact on society.
In practice, organizations tend to advance more quickly on the technical level (Solution), while the other dimensions (System and Society) show more incipient levels of development.

Introductory paragraph

- To what extent do organizations manage to transcend the principles of responsible use AIfrom technical design to the domainsocial?

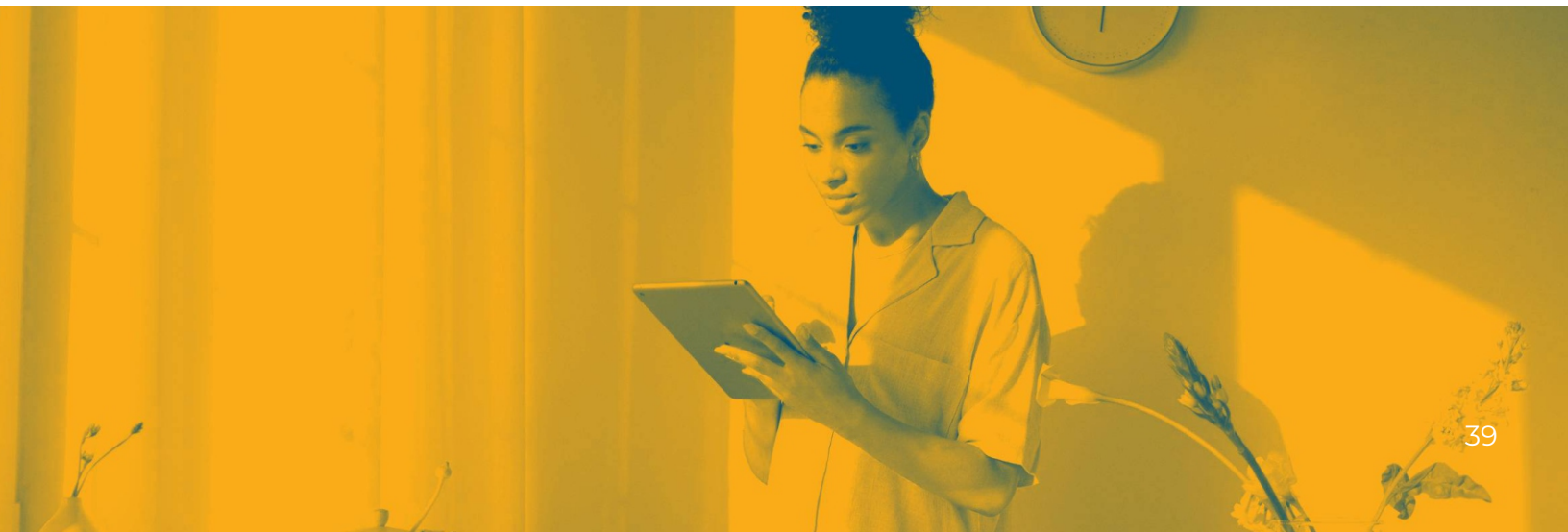
- Why do dimensions such as transparency and human oversight seem more advanced at the System level, while social and environmental well-being still lag behind?

The 3S model allows us to identify critical tensions:

- Technical advances that do not always generate tangible impacts.
- Formal recognition of diversity without effective implementation mechanisms.
- Persistent gap between the discourse of responsibility and its practical application.

The result reveals that the maturity of responsible use AIrequires not only technical capacity, but also cultural, institutional, and social consistency to transform principles into sustainable trust and legitimacy.

ALTAI	System	Society	Solution
Transparency	2.89	2.47	2.66
Diversity, non-discrimination, and equity	2.74	2.54	2.39
Accountability	NA	2.47	2.8
Social and environmental well-being	NA	2.34	2.69
Human supervision	2.82	NA	2.66
Privacy and Data Governance	3.01	NA	NA
Technical Robustness and Safety	2.68	NA	NA



Key Findings

- **Diversity, non-discrimination, and equity.** This principle is reflected in the three dimensions of the 3S model, confirming its cross-cutting relevance. However, empirical evidence shows that, although diversity is recognized in declarative frameworks, its practical implementation remains limited. Two main weaknesses persist:
  - Insufficient incorporation of diversity criteria in the design and validation of solutions.
  - Lack of forward planning to ensure sustained improvements and tangible social impact.

As a result, diversity is recognized as a normative value, but without mechanisms to ensure its translation into concrete actions and verifiable benefits.

Identified Risks.

1. **Algorithmic bias:** the absence of practical integration of diversity can perpetuate or amplify biases in AI results.
2. **Reputational risk:** shortcomings in fairness can lead to public criticism, loss of user trust, and negative exposure in the media and social networks.
3. **Legal and regulatory risk:** in contexts with regulatory frameworks for equality and non-discrimination, poor implementation can lead to sanctions or litigation.
4. **Risk of social exclusion:** Lack of effective inclusion can marginalize vulnerable communities and reduce legitimacy and social acceptance.

- **Transparency.** Organizations report high levels of technical understanding of data flow—how data is captured, processed, and used to generate results—but only 58% have formal metrics in place to measure traceability and explainability.

  A significant proportion still do not implement maintenance and continuous improvement mechanisms to update these indicators and derive corrective actions.

Identified Risks.

1. **Risk of operational opacity:** the absence of mechanisms for updating and maintaining indicators can lead to systems whose traceability deteriorates over time.
2. **Risk of loss of trust:** without sustained transparency, users and decision-makers may perceive AI as a "black box," undermining its legitimacy.
3. **Regulatory risk:** in sectors subject to auditing or transparency regulations, the lack of continuous traceability can lead to sanctions or usage blocks.
4. **Risk of internal inefficiency:** the absence of actions derived from indicators limits the capacity for organizational learning and continuous improvement.
5. **Reputational risk:** Inconsistent transparency can be interpreted as resistance to accountability, affecting the external perception of responsibility.

- **Accountability.** Organizations recognize the importance of taking responsibility for the use of artificial intelligence. However, there is still a significant gap between this recognition and its practical implementation.

  This lack of consolidation limits the ability to build trust in both the social impact of AI and the clarity of its application in concrete solutions.

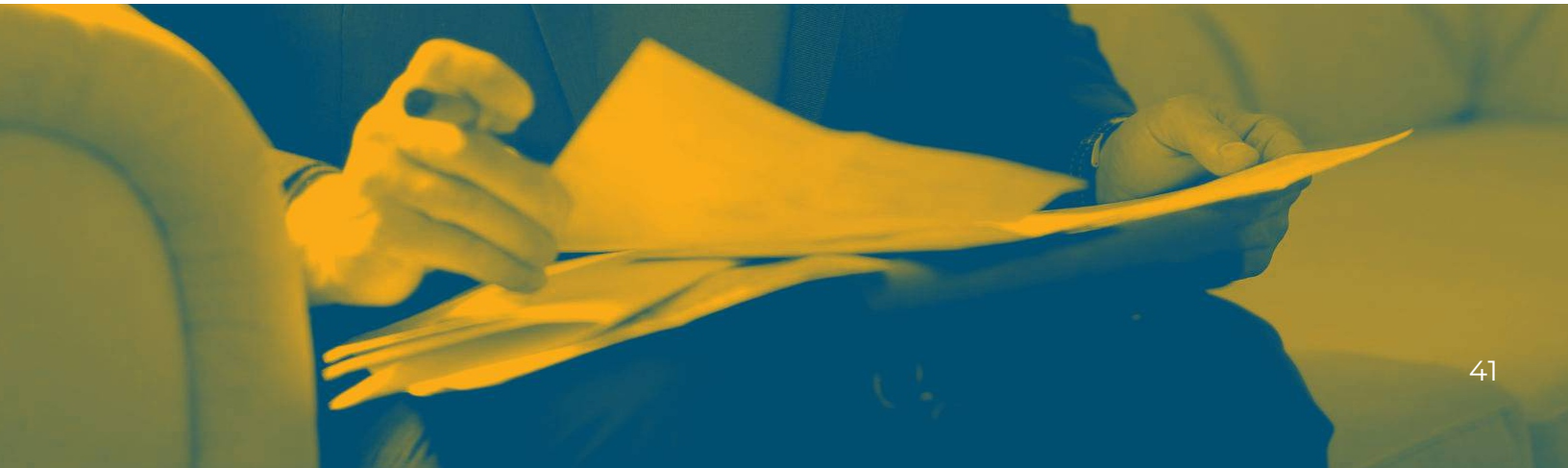
- **Social and environmental well-being.** It has a low rating in the Society pillar (2.34) and a slightly better performance in Solution (2.69). This indicates that, although social and environmental impacts are considered in the design and deployment of its AI solutions, this concern is not translated into broader planning with direct involvement of society. In practice, social and environmental well-being remains a secondary or indirect objective linked more to minimum compliance than to a core value strategy.

Identified risks.

1. **Errors without clear accountability:** erroneous AI decisions that do not have defined correction protocols or assigned responsibility.
2. **Lack of traceability in incidents:** absence of detailed records that allow for auditing and explaining how results are obtained.
3. **Delays in resolving failures:** prolonged times to correct AI errors due to the lack of a standardized escalation procedure.

Identified Risks.

1. **Reputational risk:** perception of low priority given to sustainability and social well-being, with erosion of trust among customers, communities, and regulators.
2. **Regulatory risk:** regulatory pressure on sustainability may result in sanctions, delays, or loss of access to certain markets if environmental and social criteria are not integrated from early stages.
3. **Risk of unforeseen negative impact:** possible generation of adverse social or environmental externalities (e.g., excessive energy consumption, bias against vulnerable groups, digital exclusion).



- **Human oversight.** Achieves a relatively high score in System (2.82) and is also present in Solution (2.66) in the 3S model. Shows progress in mechanisms for intervention, correction, or reversal of AI decisions in internal systems. However, its application in final solutions is less robust, meaning that the theoretical-procedural framework is not consistently translated into the final tools and products that operate in real environments.

Identified Risks.

1. **Operational risk:** automated decisions without timely human oversight due to a lack of consistency in final solutions.
2. **Trust risk:** perception of a lack of real capacity for intervention, weakening trust in AI and in the organization that implements it.
3. **Regulatory and compliance risk:** non-compliance in sectors that require human intervention (finance, health, justice).
4. **Legal liability risk:** claims or penalties associated with negligence in the control of automated systems and lack of security controls.
5. **Reputational risk:** reinforcement of narratives of "black boxes" and lack of accountability in the use of AI.

Startups

Hypothesis. Maturity in the responsible use of AI in startups stems from their ability to respond quickly to immediate operational needs. This pragmatism brings speed and adaptability, but it also opens a gap in the social and responsible dimension of AI.

Introductory paragraph

- To what extent can startups balance their innovative agility with the need to incorporate responsible practices in artificial intelligence?
- Is their low score in the Society dimension of the 3S model an inevitable result of their resource constraints and pragmatic approach, or is it a missed opportunity to differentiate themselves?

Compared to established organizations that institutionalize governance and social legitimacy, startups prioritize immediate AI implementation, rapid scaling, and survival in dynamic environments, relegating aspects of equity, inclusion, and sustainability.

Startups adopt AI as a pragmatic and operational tool to immediately solve problems of productivity, efficiency, and automation, rather than for deliberate strategic transformation. This pragmatic emphasis responds to their need to innovate quickly with limited resources and explains their agility in technology adoption. The emergence of generative

AI reinforces the pattern: accessible, rapidly deployable tools allow them to scale their capabilities, prototype solutions, and compete at greater speed. However, it also amplifies the tension between disruption and responsible use by postponing the integration of robust governance and accountability frameworks.

Unlike large corporations, whose institutional capacity allows for the gradual incorporation of governance and oversight, startups prioritize day-to-day operations and rarely formalize principles of responsibility. This imbalance is exacerbated by high infrastructure costs (e.g., specialized governance platforms, specialized data privacy and security, technical talent, and regulatory compliance), creating a "compliance trap" in which economic constraints make it difficult to implement responsible practices without compromising business viability.

STARTUPS vs. other types of organizations (A reading from the 3S framework)

Startups

- Prioritize the Solution and System dimensions
- They apply AI mainly to immediate and operational tasks, seeking business continuity and efficiency.
- They devote less attention to the Society dimension linked to governance and social responsibility.

Conclusions 1

The size of the organization and associated resources influence the level of maturity of responsible AI use, although not in a linear fashion:

- **Micro and small.** they move forward with a pragmatic and reactive approach.
- **Medium and large.** they have the greatest potential, with the capacity to institutionalize responsible AI .
- **Corporations.** despite their resources, they face rigidities that slow their progress toward the responsible use of AI

Overall, the region shows two speeds of maturity. While some organizations use AI as an immediate solution for operations, others are moving more slowly in integrating it under governance and accountability frameworks.

Recommendations

- **Micro and small.** promote practical guidelines and accessible resources that strengthen their basic governance and security capabilities.

- **Medium and large.** promote the responsible use of AI to transcend compliance and move toward strategic differentiation and responsible innovation.

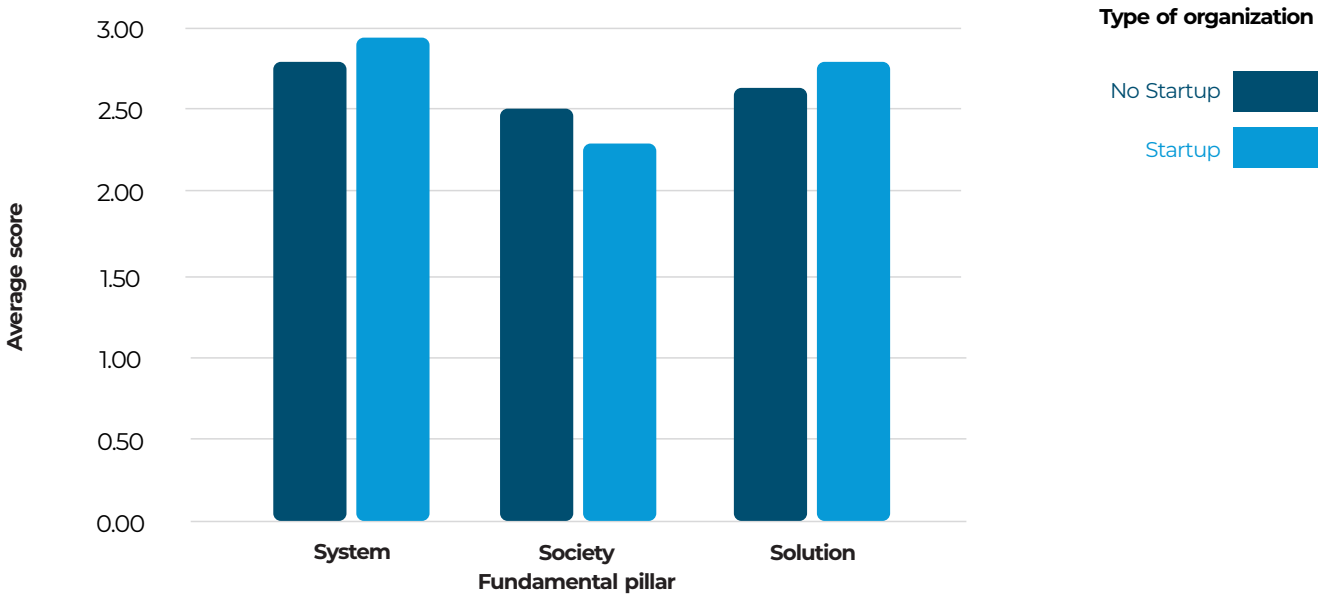
- **Corporate.** institutional flexibility mechanisms that balance compliance and agility, preventing regulatory robustness from acting as an operational brake

Summary

Consolidating the responsible use of AI in Latin America requires not only resources and regulation, but also alignment between regulatory, frameworksbusiness strategies, and sustainable value creation.

Startups, focused on day-to-day operations, focus AI on technical and operational aspects, while medium and large organizations emphasize governance and institutional responsibility as the basis for sustainable maturity.

Average rating (score) by fundamental pillar and type of organization



The study of maturity in the responsible use of artificial intelligence (AI) in LAC allows us to identify that organizational size is a key variable in understanding the heterogeneity in the integration of responsibility and governance practices. However, this relationship is not linear: it responds to different dynamics of resources, institutional capacities, and operating logics. Micro and small enterprises, as well as startups, concentrate their efforts on applications aimed at solving immediate operational needs; this positions them as innovative actors, but with an incipientin the responsible use of AI, maturity limited by their pragmatic approach and the scarcity of resources and capacities.

In this context, three distinct logics are identified:

Corporations and large companies: despite having abundant resources, they tend to view AI as a general-purpose technology rather than a transformative element at the core of their business, which reduces its disruptive potential.

Micro and small businesses: they show greater capacity for innovation, although this is conditioned by a lack of resources and capabilities and less attention to social and sustainability dimensions.

Medium-sized companies: they improve their flexibility to take risks with the ability to institutionalize governance practices for the responsible use of AI; this allows them to consider AI as a more transformative and strategic technology, with a more harmonious balance between disruption and responsible risk management.

In general terms, this overview suggests the existence of a process of building maturity in the use of AI at different speeds and priorities, where differences in size reflect both limitations and opportunities.

The central challenge is that the responsible adoption of AI not only reflects organizational capabilities, but also articulates with responsible business strategy and contributes to the creation of sustainable social value.

Conclusions 2

The analysis confirms that the maturity of use AIdoes not follow a linear path. It depends on factors such as organizational size associated with resource availability, as well as consistency between discourse and execution. Micro and small businesses prioritize the immediate application of AI in operational processes to sustain productivity and continuity with limited resources and capabilities. Medium and large companies, thanks to their greater organizational capacity and, manage to institutionalize governance structures, quality metrics, and diversity. In contrast, large corporations, despite having global policies and sophisticated control frameworks, see their local implementation diluted by complexity and internal bureaucracy, reaching levels of maturity similar to smaller companies.

The robustness of these results is strengthened by the use of the 3S model analysis (System, Society, and Solution) and shows a clear pattern: organizations advance more quickly in technical dimensions—transparency, data governance, human oversight—while responsibility, diversity, and social and environmental well-being lag behind. This gap shows that the measurable and the operational are given priority, relegating those principles that underpin social legitimacy and sustainability. Therefore, the integration

of AI should be understood as an evolutionary process, not as a static checklist, represented by a pyramid of maturity for the responsible use of AI.

Social Impact — Addressing social andenvironmental well-beingthrough AI.

Diversity and Equity — Ensuring the fairness,technical robustness, andsafety of AI.

Ethical Foundations — Establish transparency,data governance, andhuman oversight.

At the base of this pyramid are the technical foundations that are essential for the adoption of AI, regardless of organizational size: data traceability and transparency, human oversight mechanisms, and minimum information governance practices.

At an intermediate level are the principles of resilience and accountability, which encompass diversity of data sets, clear allocation of roles and responsibilities, and technical robustness validated through stress testing and regular audits.

At the top are the most advanced principles, those that require advanced strategic resources and capabilities to integrate social and environmental well-being into corporate planning: impact dashboards, sustainability metrics, and social return on investment assessments.

Differentiated path of action

This progressive framework allows the roadmap for action to be adapted according to the type of organization and its starting point:

- At the outset companies ,should focus on the basics, relying on solutions such as cloud as-a-service and codes or principles of traceability and basic control that do not compromise their economic viability.
- Medium and large companies, with more resources, can move towards intermediate and high levels, institutionalizing oversight committees, building MLOps workflows with automated validation, and using tools to detect bias in data and models.
- At more advanced stages, organizations should aim to create centers of excellence in responsible AI, align general frameworks through agile governance schemes, and consolidate dashboards that integrate environmental and social impact metrics into decision-making.

It should be noted that organizational rigidity and inertia can slow down the process, so having more resources does not necessarily guarantee greater maturity in the responsible use of AI.

Internal roles in responsible adoption

The implementation of these guidelines requires cross-functional coordination between different areas:

- **Technology and data science.** ensure technical robustness, explainability, and data governance.
- **Legal and compliance teams.** ensure privacy, transparency, and accountability.
- **Human resources.** promote diversity in teams and data sets.
- **Sustainability.** integrates environmental and social criteria.
- **Senior management.** defines the strategic vision.
- **Communication and marketing.** strengthen trust and transparency with customers and society.

Institutional environment and key players

Creating a favorable environment for AI in Latin America and the Caribbean requires the coordinated participation of multiple actors:

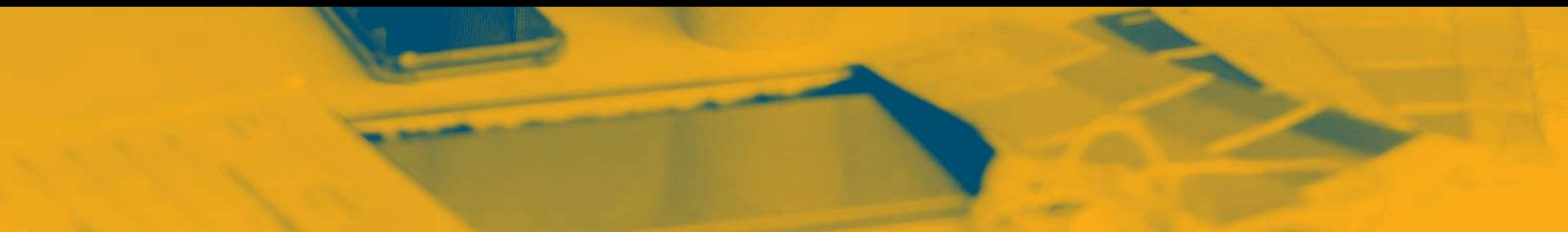
- **Academia and experts.** they contribute practical, experienceapplied research, and interdisciplinary training that integrates data science, law, and sustainability.
- **Governments and regulators.** establish regulatory frameworks that balance innovation and control.
- **Multilateral organizations.** they guarantee shared standards and prevent regional fragmentation.
- **Civil society and NGOs.** act as guarantors of social legitimacy and citizen participation

Summary

The maturity of responsible use AIin Latin America depends not only on resources or organizational size, but also on the ability to advance in stages from technical fundamentals to social and environmental well-being.

A roadmap differentiated by size, internal alignment of strategic areas, and collaboration between institutional, academic, and social actors are the key levers that will enable the construction of a practice reliable, inclusive, and sustainable of responsible useAI, capable of generating economic value while balancing social and environmental impact.

Appendices



Annex I. Principles of Responsible Artificial Intelligence (RAI)

The global expansion of artificial intelligence (AI) has generated substantial opportunities for the transformation of productive sectors, public management, and everyday life. However, its implementation also introduces ethical, social, and economic risks that require regulatory and governance frameworks capable of balancing innovation with the protection of rights.

In this context, the Responsible Artificial Intelligence (RAI) approach provides a guiding framework for the development, adoption, and use of AI systems in ways that maximize their contribution to collective well-being and minimize potential negative impacts or structural inequalities. The concept of responsible AI is based on a set of normative and operational principles aimed at maximizing the benefits of AI and mitigating its negative impacts. These principles include:

- **Transparency:** AI systems must provide understandable and verifiable information about the processes that lead to their automated decisions.
- **Equity:** Algorithms and models must be designed to avoid discrimination based on gender, race, age, or other characteristics, ensuring fair and unbiased treatment.
- **Accountability:** It is necessary to precisely define the entities and actors responsible for the consequences of AI use, including accountability mechanisms, human oversight, and redress.
- **Privacy and data protection:** AI must be developed under privacy-by-design criteria, ensuring compliance with regulatory frameworks and effective protection of personal data.
- **Security and robustness:** systems must demonstrate technical reliability and resilience to failures or attacks, operating within controlled and auditable parameters.
- **Social benefit:** the application of AI must be geared towards generating public value, so that the development and use of AI contributes to the common good, promoting sustainable and inclusive solutions.

Sources: UNESCO, 2021; Stefanini Group, 2025; Florkin, 2025

Global and regional reference frameworks for responsible AI

1. Global reference frameworks. At the international level, various organizations have developed frameworks of principles, guidelines, and public policies aimed at promoting responsible, trustworthy, and human-centered artificial intelligence (AI).

2. The United Nations Educational, Scientific and Cultural Organization (UNESCO) was the first entity to approve a global regulatory instrument on responsible AI. Its Recommendation on the Ethics of Artificial Intelligence (2021), adopted by 194 Member States, establishes principles related to inclusion, equity, sustainability, and accountability. The Recommendation incorporates implementation tools such as Ethical Impact Assessment and Ethical Readiness Methodology, applied in countries such as Chile and Mexico to measure institutional maturity in responsible AI governance. For its part, the Organization for Economic Cooperation and Development (OECD) updated its Principles on Artificial Intelligence in 2024, initially adopted by 47 member countries. These principles consolidate the vision of AI that is human-centered, reliable, explainable, and respectful of fundamental rights, promoting responsibility throughout the life cycle of AI systems, from design to implementation and monitoring. In addition, multilateral forums such as the G7 and G20 have issued joint statements reaffirming the need for international cooperation to harmonize criteria for ethics, technical interoperability, and regulatory governance. Along the same lines, the United Nations is moving toward the formulation of a global governance framework for AI, focused on the protection of human rights, digital equity, and environmental sustainability. Latin America and the Caribbean: challenges, progress, and responsible governance.

In Latin America and the Caribbean (LAC), the adoption of these principles is particularly urgent due to structural inequalities, technological gaps, and regulatory frameworks that are still under development. Although several countries have formulated national AI strategies, limitations persist in incorporating a human rights-based approach, applying ethical impact assessments, and establishing binding governance mechanisms. UNESCO has played a catalytic role in promoting AI accountability in the region.

Through the implementation of its Recommendation, it has promoted processes of self-assessment of responsible capacities in countries such as Chile and Mexico, as well as promoting spaces for regional dialogue, such as the Montevideo Ministerial Meeting (2024), focused on adapting global ethical frameworks to contexts characterized by low technological infrastructure and high social vulnerability. However, the region faces substantial challenges in moving toward responsible AI adoption, including:

- Socioeconomic inequality, which restricts equitable access to the benefits of technology.
- Digital and educational talent gaps, which hinder the ability of small and medium-sized enterprises (SMEs) to incorporate and implement AI solutions in an effective, transparent, and responsible manner.
- The absence of specific regulatory frameworks on AI, especially in critical areas such as algorithmic public procurement, ethical impact assessments, and mechanisms for redress and human oversight. Insufficient coordination between government, academic, and civil society actors, which reduces the effectiveness of technology governance policies and fragments national AI strategies.

These challenges are particularly relevant for SMEs, which constitute the productive core of the region but often lack the financial, human, and regulatory resources necessary to comply with the ethical and transparency standards required by international frameworks. In this context, democratizing access to responsible AI practices, promoting training in ethical principles, and accompanying technological implementation with inclusive public policies are essential conditions for preventing the digital revolution from deepening existing inequalities. In short, responsible AI is not a normative option, but a structural condition for this technology to act as an engine of inclusive transformation and human development. International frameworks led by UNESCO, the OECD, the G7, and the United Nations offer a clear roadmap for responsibility, governance, and digital rights; however, their local adaptation and contextualization in regions such as Latin America and the Caribbean are essential. Regional cooperation, institutional strengthening, and the design of rights-based public policies will be crucial to ensuring that AI effectively contributes to social well-being, avoiding new forms of exclusion or technological dependence.

Annex II. Artificial Intelligence Maturity Frameworks

The expansion of artificial intelligence (AI) has driven the creation of maturity frameworks aimed at assessing the capacity of countries and organizations to adopt this technology in a responsible and effective manner . These frameworks are analytical tools that make it possible to diagnose levels of preparedness, identify structural gaps, and guide development strategies around responsible AI.

The central purpose of these models is to ensure that AI is implemented in accordance with principles of responsible governance, ensuring safe and equitable use that is aligned with social welfare. In this sense, maturity frameworks serve not only as technical assessment tools, but also as public policy instruments that facilitate informed decision-making, investment prioritization, and the formulation of regulatory standards consistent with democratic and human rights values.

Convergence of ethical principles

A relevant finding in recent literature and comparative analyses is the substantive convergence of ethical principles in the different frameworks promoted by actors in the global AI ecosystem. —Technology companies (Google, IBM, Meta, Microsoft), international organizations (OECD, the Responsible AI Institute, and UNESCO), and consulting firms (NTT DATA) all agree on the need for human-centered AI, characterized by the following normative principles:

1. **Equity and non-discrimination:** preventing AI systems from reproducing or amplifying social, cultural, or gender biases.
2. **Transparency and explainability:** ensuring that automated decisions are understandable and auditable by users and competent authorities.
3. **Privacy and data protection:** guarantee that the use of sensitive information respects individual rights and current regulations.
4. **Security and robustness:** developing technically reliable systems that are resilient to failures or attacks and operate within verifiable limits.
5. **Accountability and human oversight:** establish clear responsibilities throughout the life cycle of systems, maintaining effective human control mechanisms.
6. **Well-being and social benefit:** orient technological innovation toward sustainable human development and the reduction of structural inequalities.

Table 3: Comparison of responsible AI principle frameworks

Google	IBM	Meta	Microsoft	NTT DATA	OECD	AI Responsible Artificial Intelligence Institute
• Ser socialmente beneficioso • Evitar crear o reforzar prejuicios injustos • Construirse y someterse a pruebas de seguridad • Ser responsables ante las personas • Incorporar principios de privacidad en el diseño • Mantener altos niveles de excelencia científica • Estar disponibles para usos acordes con estos principios.	• Explicabilidad • Equidad • Solidez • Transparencia • Privacidad	• Privacidad y seguridad • Equidad e inclusión • Solidez y seguridad • Transparencia y control • Responsabilidad y gobernanza	• Equidad • Fiabilidad y seguridad • Privacidad y seguridad Inclusión • Transparencia • Rendición de cuentas	• Co-creación de valores • IA justa confiable y explicable • Protección de datos • Difusión de la responsabilidad de la IA • Bienestar y Sostenibilidad Social	• Crecimiento integrador, desarrollo sostenible y bienestar • Valores centrados en el ser humano y equidad • Transparencia y explicabilidad • Solidez, seguridad y protección • Rendición de cuentas	• Solidez • Funcionamiento de datos y sistemas • Sesgo e imparcialidad • Explicabilidad e interpretabilidad • Rendición de cuentas • Protección del consumidor

Table 3 summarizes the convergence observed between the different principles of responsible artificial intelligence (RAI), highlighting how each organization integrates these values into their respective reference frameworks. This alignment process reflects a growing consensus within the international AI ecosystem and among stakeholders—both corporate and institutional—regarding the fundamental values that should guide the development, deployment, and oversight of AI systems throughout their entire life cycle, from the design phase to governance and continuous monitoring. However, the effectiveness of these initiatives and the systematic evaluation of their implementation remain areas for further empirical study.

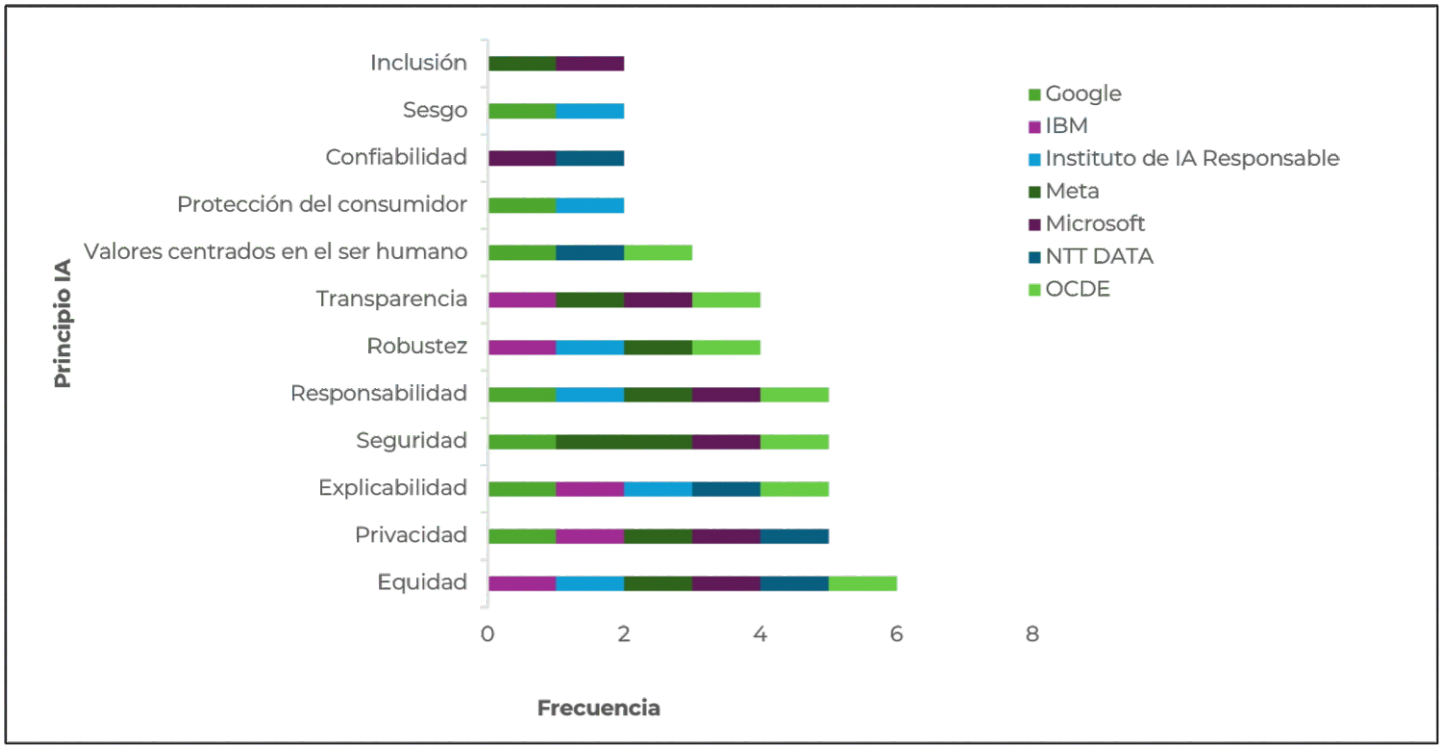
In most of the frameworks analyzed, there is a strong emphasis on accountability and responsible governance, through institutional responsibilities, oversight protocols, and technical and social audit mechanisms. Likewise, a focus on human well-being repeatedly emerges, aimed at promoting AI that expands capabilities, protects fundamental rights, and generates sustainable social benefits.

This progressive convergence among technology organizations, multilateral agencies, and regulatory entities is a sign of the responsible and methodological maturity of the global AI ecosystem. Although the specific formulations differ in scope and terminology, they all share a common commitment to responsible development and transparency.

In this context, fAIr Tech Radar—an initiative promoted by IDB Lab—seeks to establish a common and operational basis of responsible AI (RAI) principles, adapted to the socio-technological particularities of Latin America and the Caribbean. Its purpose is to strengthen institutional and citizen trust in the use of AI, promote its responsible and practical adoption in strategic sectors, and provide a starting point for regional coordination and progressive standardization of governance frameworks.

Figure 1 reinforces this analysis by showing the frequency with which different ethical principles appear in the frameworks examined. Transparency, fairness, and privacy stand out as the most recurrent values, suggesting the existence of a shared ethical core and an emerging consensus on the pillars that underpin trustworthy, secure, and socially beneficial AI.

Figure 1: Frequency of Responsible AI Principles found in different frameworks



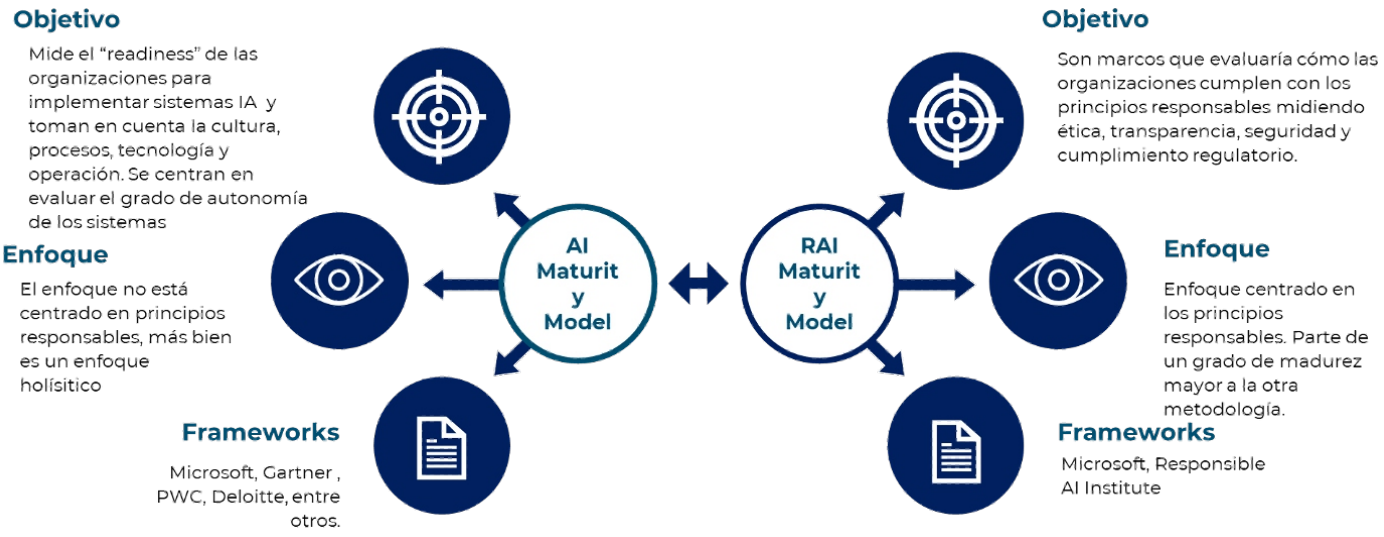
The selection of common principles identified in international frameworks as the structural pillars of the fAIr Tech Radar Research Methodology ensures that the study focuses on the most critical responsible and operational dimensions of the contemporary landscape of responsible artificial intelligence (RAI). This methodological alignment provides a comprehensive and contextualized view of the perceptions, practices, and challenges associated with the responsible adoption of AI in different sectors.

In operational terms, fAIr Tech Radar translates this conceptual basis into a tool applied to the context of startups and SMEs in Latin America and the Caribbean, designed to measure the degree of responsible and institutional maturity in the implementation of AI. Its objective is to establish a minimum operational framework to guide the responsible adoption of technology, facilitating collective action, regional comparability, and progress toward the future standardization of good practices in AI governance.

Types of Maturity Models: General AI vs. Responsible AI

The specialized literature distinguishes two main approaches to measuring maturity in artificial intelligence. Figure 2 shows a fundamental distinction between two types of maturity frameworks related to the implementation of Artificial Intelligence (AI) in organizations.

Figure 2: Comparison of Maturity Methodologies in AI and RAI Implementation



AI Maturity Model

The AI Maturity Model's main objective is to assess the level of readiness of organizations to implement Artificial Intelligence systems. This framework examines key dimensions such as organizational culture, internal processes, available technology, and overall operation, adopting a holistic approach that measures the progressive integration of AI into corporate activities. Its focus is on organizational and technical capacity, without specifically addressing the principles of algorithmic responsibility. Approaches that align with this model include those proposed by Microsoft, Gartner, PwC, and Deloitte, among others.

This approach to artificial intelligence maturity reveals common elements in assessing the integration of AI within

organizations. Studies that apply it show a gradual progression of AI system autonomy, advancing from basic assistance to autonomous decision-making, reflecting the incremental nature of the adoption process. In this progression, human-AI collaboration stands out as an essential element, where technology complements, rather than replaces, human work.

The models define clear levels of interaction between people and AI systems—from initial assistance to advanced collaboration—and emphasize the need for a balance between automation and human judgment, especially in critical decision-making contexts.

Finally, they share a focus on improving organizational performance, driven by productivity optimization and informed decision-making through the use of AI, identifying these components as essential elements for understanding and evaluating maturity in technology adoption (Tiryaki, 2025).

Along these lines, the Gartner AI Maturity Model stands out for describing five levels of progression in the adoption of artificial intelligence by organizations:

- **Awareness Level:** companies explore the potential of AI and evaluate possible use cases.
- **Active Level:** Experiments are initiated in specific areas, even without a comprehensive strategy.
- **Operational Level:** AI is implemented in key processes with a formal strategy aimed at improving performance.
- **Systemic Level:** AI is integrated across the organization, generating value and strengthening competitiveness.
- **Transformational Level:** AI becomes a strategic element that transforms the business model, creating new sources of revenue and positioning the organization as an innovative player.

(Google, 2023; Stryker, s.f.; Semsarpour, 2023; Microsoft, 2024)

RAI Maturity Model (Responsible AI Maturity Model)

The RAI Maturity Model focuses on assessing the degree of compliance of organizations with the principles of responsible artificial intelligence, incorporating responsible dimensions such as transparency, security, and regulatory compliance. This model is closely linked to responsible AI frameworks and considers that maturity in this area is a distinct but complementary factor to overall maturity in AI adoption.

Relevant examples of this type of approach include proposals from Microsoft and the Responsible AI Institute.

> Despite their differences in operationalization, the AI Maturity Model and RAI Maturity Model share the purpose of guiding organizations on the path toward ethical, secure, transparent, and responsible AI implementation.

Microsoft's RAI Maturity Model (Microsoft, Microsoft Research, 2023) proposes a structure based on three assessment axes that determine the level of organizational maturity in responsible AI:

1. **Organizational foundations:** evaluates institutional culture, leadership, and governance in AI, with a special focus on the resources needed for responsible implementation.
2. **Team approach:** analyzes how teams conceive, develop, and apply responsible AI, ensuring the integration of responsible principles into technological design and development processes.
3. **RAI policies:** examines the organization's guidelines and protocols on transparency, accountability, security, and privacy, with a particular emphasis on managing risks associated with AI.

Responsible AI Maturity Model from the Responsible AI Institute

The Responsible AI Maturity Model, developed by the Responsible AI Institute (2024), is a framework based on seven years of research aimed at assessing an organization's current status and planning the steps necessary to move toward responsible implementation of artificial intelligence (AI). This model proposes five levels of maturity:

Aware: the organization has scattered and reactive practices in RAI, without formal alignment with international standards or specific regulations.

Active: the organization begins documenting and planning RAI practices in individual projects, albeit in an isolated manner.

Operational: the organization incorporates AI practices and best practices in a structured and consistent manner across the enterprise.

Systemic: responsible AI is integrated into corporate strategic objectives and applied consistently across all processes and business areas.

Transformative: the organization assumes a leadership role in its sector, conducting periodic audits, voluntary certifications, and demonstrating a proactive commitment to continuous improvement in RAI.

The essential difference between the two approaches lies in their analytical focus and operational purpose. While AI maturity models assess the overall capacity of organizations to adopt and deploy artificial intelligence technologies to optimize operations and improve products or services, Responsible AI maturity models focus on integrating ethical and governance principles throughout the entire AI lifecycle.

The latter seek to determine the extent to which an organization ensures that its AI systems are safe, reliable, non-harmful, and transparent. Both types of models are useful for organizations to assess their current status and chart a roadmap that integrates responsibility as a structural part of their innovation and operation strategies. However, the recognition and adoption of these frameworks differs substantially between large corporations and start-ups or SMEs.

The fAIr Tech Radar approach

In this context, fAIr Tech Radar emerges as a practical tool adapted to the environment of startups and SMEs in Latin America and the Caribbean, designed to enable these organizations to comprehensively assess their level of preparedness in terms of operational optimization, technological innovation, and alignment with the principles of Responsible AI. fAIr Tech Radar combines both dimensions with the aim of promoting a balanced adoption of AI that simultaneously contributes to business growth and to the socio-economic sustainability of the region.

Annex III. Methodological framework

This annex details the methodological framework designed for the construction of a practical, scalable, and reliable tool aimed at assessing the level of maturity of responsible artificial intelligence (RAI) technology adoption in organizations. The methodology prioritizes the analysis of the context of startups and small and medium-sized enterprises (SMEs) in Latin America and the Caribbean (LAC).

The methodological approach integrates qualitative and quantitative components, articulated in three complementary axes:

1. A **maturity model**, as a reference structure for classifying adoption levels.
2. A **multi-criteria weighting**, designed to assign relative weights to the questions and dimensions evaluated.
3. A **structured evaluation by dimensions**, which allows for the analysis of institutional capacities from different organizational areas.

Dimensions of analysis

The measurement instrument is organized into four main dimensions, complemented by an additional set of cross-cutting questions.

a) Demographic Dimension (descriptive): Collects basic information about the organization, including name, length of operation, number of employees, annual turnover, geographical location, and economic sector.

b) Society Dimension: Assess social responsibility and institutional awareness regarding the use of AI. Include indicators on knowledge of responsible principles, staff training, the existence of an organizational culture, and the application of tests with vulnerable populations.

c) System Dimension: Analyzes the infrastructure and mechanisms for integrating AI systems. Considers data security and privacy, the incorporation of third-party AI services, and interoperability.

d) Solution Dimension: Examines the practical implementation and use of AI solutions. Evaluates the organization's strategic position on AI, investment in projects, optimization of human capital, and the consistency of initiatives with strategic objectives.

e) Others Questions: These include specific variables linked to the three previous dimensions, weighted individually according to their relevance and impact.

Weighting Procedure

For questions not directly linked to the maturity scale, a systematic multi-criteria weighting method is applied, which allows the relative importance of each item within the assessment tool to be determined.

1. Definition of criteria:

- **Relevance:** degree of importance of the question in relation to the overall objective of the assessment.
- **Impact:** level of influence of the response on understanding the degree of organizational maturity.
- **Complexity:** effort and technical level required to formulate an adequate response.

2. Assignment of weightings:

Each criterion is given a relative weight on a scale of 1 to 5 (1 = low importance; 5 = high importance). Example: Relevance 5, Impact 4, Complexity 3.

3. Question scoring:

Each question is scored according to the above criteria using the same scale. Example: Relevance 4, Impact 5, Complexity 2.

4. Calculation of the total score:

The final score for each question is obtained by multiplying the rating by the weight assigned to each criterion and adding the results:
Relevance (4×5 = 20), Impact (5×4 = 20), Complexity (2×3 = 6); total score: 46.

5. Priorization fo questions:

Questions are ranked according to their total score. Those with the highest value are considered priorities in the analysis, ensuring a balanced approach between relevance, impact, and feasibility.

This procedure guarantees the objectivity and internal consistency of the weighting, allowing questions with greater analytical significance to receive proportional weight in the evaluation.

Principles of Artificial Intelligence adoption evaluated

The development and application of Artificial Intelligence (AI) systems require the incorporation of ethical principles that ensure responsible use. This study examines seven core principles: responsibility, privacy, security, fairness, transparency, and explainability.

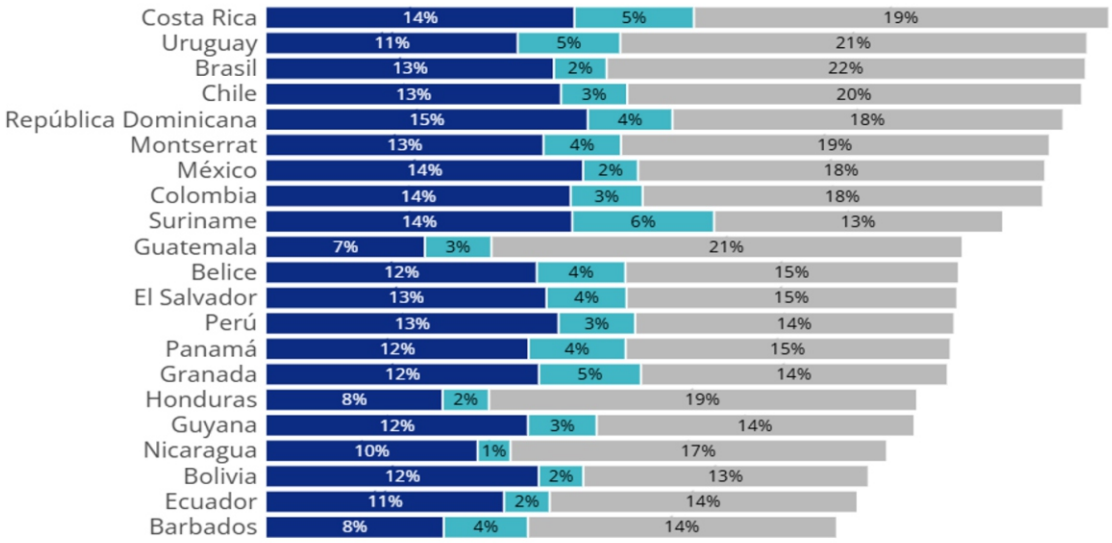
- **Responsability:** Organizations are expected to ensure the proper functioning of AI systems throughout their life cycle, in accordance with applicable regulatory frameworks.
- **Privacy:** This involves protecting personal information from unauthorized access and complying with data protection regulations, ensuring informed consent.
- **Security:** Involves designing systems that are robust against failures, attacks, or vulnerabilities, protecting both the data and the algorithms used.
- **Fairness:** Seeks to prevent bias or discrimination in AI models, promoting equal opportunities and fair treatment.
- **Transparency:** Requires clear reporting on when and how AI is used (in predictions, recommendations, or decisions) and providing understandable information about how it works.
- **Explainability:** Refers to the ability of AI systems to provide clear explanations of the criteria and processes that determine their decisions or results.

Level of organizational maturity

Assessing organizational maturity allows us to measure the degree of adoption of artificial intelligence (AI) in companies. This study proposes a maturity categorization designed for the context of small and medium-sized enterprises (SMEs) in Latin America.The typology ranges from an initial stage of total unfamiliarity to an advanced level of leadership, and incorporates digitally native organizations that have greater capabilities in the use of AI.

This classification responds to the need for an analytical tool adapted to the Latin American business fabric, which facilitates the identification of each organization's degree of progress and the steps required to move toward a more structured integration of AI.

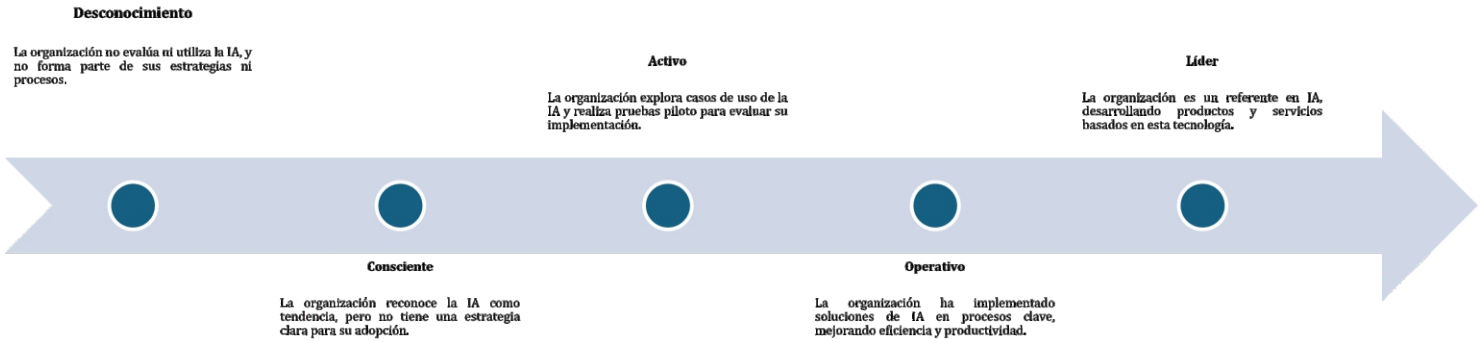
1. **Unaware**: the organization does not evaluate or use AI, nor does it include it in its strategy. It may be unaware of its potential benefits or lack the technical capabilities to explore it.
2. **Aware**: the organization identifies AI as a relevant trend. However, it has not yet defined an adoption strategy. Activity is limited to observation and exploratory research.
3. **Active**:



Fuente: Informe del Banco Mundial y la Organización Internacional del Trabajo.

4. **Operational**: AI is integrated into key processes, generating improvements in efficiency, productivity, and decision-making.
5. **Leader**: the organization incorporates AI as a structural part of its business model, develops products or services based on it, and acts as an industry benchmark.

Annex IV. Evaluation method



The measurement process is based on a five-level ordinal scale (1–5) corresponding to the maturity stages described.

1. Scoring:

- **Unaware:** 1 point
- **Aware:** 2 points
- **Active:** 3 points
- **Operational:** 4 points
- **Leader:** 5 points

2. Calculation of score per question:

Each item is evaluated individually and assigned a value according to the level of maturity achieved.

- **Calculation by dimension:** The values of all questions corresponding to the same dimension are added together.
- **Calculation of total maturity score:** This is obtained by adding the scores for all the dimensions evaluated.

3. Normalization:

The total score is divided by the maximum number of points possible and multiplied by 100, generating an overall maturity percentage.

Example:

- Demographics: 4 + 3 + 5 = 12
- Society: 3 + 4 = 7
- System: 2 + 4 + 5 = 11
- Solution: 3 + 4 + 5 + 2 = 14
  Total = 44 points (Maximum possible = 60 points → (44/60) × 100 = 73.3%)

The result expresses the relative level of maturity of the organization in adopting artificial intelligence.

Presentation of Results

The presentation of results is a critical phase of the analytical process, aimed at synthesizing, visualizing, and comparing the data obtained. There are four main components:

Se distinguen **cuatro componentes principales**:

- Grouping of results by maturity level
- Visualization of data in graphs and comparative tables
- Definition of key performance indicators (KPIs)
- Configuration of KPIs in analytical tools such as Power BI

1. Results grouped by maturity level.

The first step is to organize the results according to the maturity levels achieved by the companies evaluated, in order to identify patterns of progress and areas of lag. This procedure allows comparisons to be made between organizations with similar characteristics and provides a structured view of the distribution of AI adoption levels.

Steps for grouping results:

1. **Definition of maturity levels:** establish clear criteria for each level (Initial, Intermediate, and Advanced).
2. **Classification of companies:** evaluate and classify companies according to the criteria defined for each level.
3. **Analysis of results:** identify and analyze key findings, observing sector trends or common patterns at each maturity level.

2. Data visualization in graphs and comparative tables.

Visualization is an essential component of analysis, as it facilitates understanding and communication of results. The methodology proposes the use of business intelligence tools, such as Power BI, to represent data through graphs and visual comparisons that support decision-making.

Steps for data visualization:

1. **Tool selection:** choose appropriate platforms for data representation (e.g., Power BI).
2. **Creating graphs:** design effective visualizations—such as bar, line, or scatter plots—that clearly show the differences between dimensions or maturity levels.
3. **Preparing comparative tables:** build tables that allow you to compare key results between different maturity levels, sectors, or company sizes. These graphical representations make it easier to identify relevant patterns and correlations, allowing findings to be communicated in a concise and visually accessible way to different technical and non-technical audiences.

3. Types of indicators (KPIs).

KPIs (Key Performance Indicators) are quantitative metrics that allow the progress of companies in their AI adoption trajectory to be evaluated. There are various types of key performance indicators (KPIs), each designed to measure specific dimensions of organizational performance.
In the context of this study, we consider those related to the adoption and integration of artificial intelligence (AI) technologies. Investment in AI: measures the total amount of financial resources allocated to the implementation and development of AI solutions within the organization.

Formula: Total investment in AI / total operating budget × 100.

4. POWER BI.

The configuration of KPIs in Power BI is an essential phase of the methodological process, as it enables the continuous monitoring and evaluation of companies' technological maturity.

1. Based on the defined indicators, the procedure is carried out in two main stages: **Configuration in Power BI:** incorporating KPIs into the tool (Power BI) to facilitate data recording, analysis, and updating.
2. **Continuous monitoring:** periodic tracking of indicators (KPIs) to evaluate progress and make necessary adjustments.

Visualizations and Comparative Tables. To ensure clear communication of results, it is recommended to use interactive visualizations and comparative representations that allow for analysis of variations in different maturity levels. Bar Charts: suitable for comparing discrete categories, such as the percentage of AI adoption by maturity level.

1. **Bar charts**: useful for showing the evolution of indicators over time, such as the evolution of investment in technology.
2. **Line charts**: allow you to represent proportions within a set, for example, the distribution of the budget across different areas.
3. **Pie charts**: allow you to represent proportions within a set, for example, the distribution of the budget across different areas.
4. **Scatter plots**: facilitate the identification of relationships between variables, such as the relationship between investment in technology and business performance..
5. **Comparative tables**: enable a detailed, h y analysis of key results between different maturity levels, sectors, or different periods.

Conclusion

The adoption of artificial intelligence in Latin America presents significant opportunities and structural challenges. It is essential that startups and SMEs integrate responsible AI practices so that the use of technology is geared toward sustainable growth, digital inclusion, and the reduction of social and economic gaps in the region.

Bibliography

EY. (2025). La inteligencia artificial y los desafíos de su implementación en Latinoamérica. Obtenido de https://www.ey.com/es_pe/newsroom/2025/01/ia-desafios-latinoamerica

CESIEP. (2024). Impacto de la IA en América Latina: Un análisis profundo sobre desigualdad y desafíos sociales. Obtenido de https://www.cesiep.cl/impacto-de-la-ia-en-america-latina-un-analisis-profundo-sobre-desigualdad-y-desafios-sociales

Vera Otálvaro, L. M. (2023). Adopción de Tecnologías de Inteligencia Artificial: un estudio para las empresas en Colombia. Universidad EAFIT. Obtenido de https://repository.eafit.edu.co/server/api/core/bitstreams/0ede344b-c741-4e23-880a-f253d8f94ba8/content

NTT. (2025). Global CEOs Name AI Top Technology for Future Profitability and Competitiveness: WSJ Survey. Obtenido de https://group.ntt/en/topics/2025/01/16/wsj_survey.html

McKinsey. (2024). El estado de la IA a principios de 2024: la adopción de la IA generativa aumenta y comienza a generar valor. Obtenido de https://www.mckinsey.com/locations/south-america/latam/hispanoamerica-en-potencia/el-estado-de-la-ia-a-principios-de-2024-la-adopcion-de-la-ia-generativa-aumenta-y-comienza-a-generar-valor/es-CL

AI, G. I. (2024). *global Index ai*. Obtenido de global Index ai: https://www.global-index.ai/

AI, G. I. (2024). *Global Index Responsible AI*. Obtenido de Global Index Responsible AI: https://www.global-index.ai/

DATA, N. (29 de 05 de 2019). Obtenido de https://www.nttdata.com/global/en/about-us/ai-guidelines

Google. (2023). Obtenido de https://ai.google/responsibility/principles/

Institue, R. A. (j08 de 02 de 2024). *responsible.ai*. Obtenido de responsible.ai: https://www.responsible.ai/our-responsible-ai-maturity-model/

Microsoft. (17 de 05 de 2023). *Microsoft Research*. Obtenido de https://www.microsoft.com/en-us/research/wp-content/uploads/2023/05/RAI-MM-for-PDF-printing-PUBLISHED-May17.pdf

Microsoft. (05 de 2024). *Microsoft AI*. Obtenido de https://www.microsoft.com/en-us/ai/principles-and-approach

Microsoft. (19 de 12 de 2024). *news microsoft*. Obtenido de https://news.microsoft.com/es-xl/nueva-era-digital-como-las-pymes-sudamericanas-estan-revolucionando-sus-industrias-con-ia-y-nube/

NTT DATA, H. B. (2023). *Capitalizar la evolución de las tecnologías emergentes en América Latina.*

OECDE. (2024). *OECD*. Obtenido de https://www.oecd.org/en/topics/sub-issues/ai-principles.html

Bibliography

Semsarpour, M. (29 de 03 de 2023). *Medium*. Obtenido de Medium: https://medium.com/@mohsen.semsarpour/gartner-ai-maturity-model-2c01fab629b6

Stryker, C. (s.f.). *IBM*. Obtenido de https://www.ibm.com/think/topics/responsible-ai

Tiryaki, T. T. (02 de 2025). *Linkedin*. Obtenido de Linkedin: https://www.linkedin.com/posts/timtiryaki_ai-strategy-transformation-activity-7290745372740567040-m4uF/?utm_source=share&utm_medium=member_desktop

PwC (7/05/2025). Obtenido de: https://www.pwc.es/es/sala-prensa/notas-prensa/2025/adopcion-ia-impulso-pib-mundial.html

Microsoft. "El Impacto Global de la IA en las diferentes industrias". Obtenido de: https://news.microsoft.com/es-xl/features/el-impacto-global-de-ia-en-las-diferentes-industrias/

Kristalina Georgieva. *IMF.org* (2024). Obtenido de: https://www.imf.org/es/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity

ag-robotsx (*s.f.*). Obtenido de: https://www.ag-robotx.com/inteligencia-artificial-sector-industrial/

UNESCO (*s.f.*). "Ética de la inteligencia artificial" Obtenido de: https://www.unesco.org/es/artificial-intelligence/recommendation-ethics

UNESCO (2023) "Metodología de evaluación del estadio de preparación: una herramienta de la Recomendación sobre la Ética de la Inteligencia Artificial". Obtenido de: https://unesdoc.unesco.org/ark:/48223/pf0000385198_spa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