

Technological Transformation of Censuses:
A Socio-Political History of Colombia and Ecuador

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Abstract

This article examines the technological transformation of national censuses in Latin America through a comparative analysis of Colombia and Ecuador. It argues that modernization in official statistics is not a linear or endogenous process but the outcome of interactions between global standards, domestic institutional logics, and political struggles over recognition. Drawing on archival research, policy documents, and institutional histories, the study situates technological adoption—mechanization, computerization, and digitalization—within changing regimes of governmentality: administrative, developmental, and managerial. While Colombia’s statistical modernization reflects incremental domestication of imported templates, Ecuador’s experience demonstrates the fragility of accelerated adoption amid limited capacity and external dependency. By foregrounding translation rather than diffusion, the article illuminates how digital reforms reproduce inequalities in visibility and governance. The findings contribute to a broader understanding of how states in the Global South use technology to know—and govern—the populations they enumerate.

Keywords: census modernization, Latin America, Colombia, Ecuador, digitalization, governmentality, data politics

List of Acronyms and Abbreviations

CAF – Corporación Andina de Fomento (Development Bank of Latin America and the Caribbean)
CAPI – Computer-Assisted Personal Interviewing
CAWI – Computer-Assisted Web Interviewing
CEPAL / ECLAC – Comisión Económica para América Latina y el Caribe / Economic Commission for Latin America and the Caribbean
CONAIE – Confederación de Nacionalidades Indígenas del Ecuador (Confederation of Indigenous Nationalities of Ecuador)
DANE – Departamento Administrativo Nacional de Estadística (National Administrative Department of Statistics, Colombia)
GIS – Geographic Information Systems
IASI – Inter-American Statistical Institute
IBM – International Business Machines Corporation
IDB / IADB – Inter-American Development Bank
INEC – Instituto Nacional de Estadística y Censos (National Institute of Statistics and Censuses, Ecuador)
MCD – Mobile Capture Device
MINTEL – Ministerio de Telecomunicaciones y de la Sociedad de la Información (Ministry of Telecommunications and Information Society, Ecuador)
OECD – Organisation for Economic Co-operation and Development
PAPI – Paper-and-Pencil Interviewing
SIPE – Sistema Integrado de Planificación Estadística (Integrated Statistical Planning System, Ecuador)
SUSO – Sistema Unificado de Supervisión y Observación (Unified Supervision and Observation System, Ecuador)
UN – United Nations
UNFPA – United Nations Population Fund
UNSD – United Nations Statistics Division
WB – World Bank

1. Introduction

Over the past century, census modernization has been narrated as a story of progress—from manual enumeration to mechanical tabulation, to electronic processing, and most recently, to online self-registration (Otero, 2018). Yet such narratives conceal uneven institutional geographies and the politics of translation that mediate technological adoption. In Latin America, modernization has not been simply a technical shift but a political and bureaucratic process, shaped by external financing, regional cooperation, and social mobilization (CEPAL, 2005; Villalón-García, 2016).

This paper examines how technological modernization has unfolded in Colombia and Ecuador, two Andean states that share geographic proximity, historical ties, and regional coordination but display divergent institutional trajectories. The analysis explores three interrelated questions: (1) How have global models and standards of census modernization been translated into national practices? (2) What political and institutional conditions have shaped adoption and consolidation? (3) How do digital transformations reconfigure the relationship between statistics, citizenship, and governance?

International and regional guidance often presents “modernization” as a staged pathway—PAPI to CAPI/CAWI, end-to-end ICT workflows, and quality-assurance models—particularly during the 2020 census round (UNSD, 2017, 2019, 2021; ECLAC, 2021). This script helps explain the timing of reforms in both countries but risks flattening their distinctive trajectories. In Latin America, modernization has long mirrored state formation and regional brokerage (Torrado, 2004; Villalón-García, 2016), while in the Andean cases it has been refracted through constitutional reform, Indigenous mobilization, and transnational financing (Martínez Novo, 2021; Ramírez, 2021; DANE, 2020; INEC, 2015). Rather than a linear diffusion story, this article traces how international scripts meet domestic institutions, producing distinct patterns of adoption, consolidation, and contestation.

To address these questions, the remainder of the paper proceeds in five steps. Section 2 develops the analytical framework by linking technological change to shifting regimes of governmentality and their implications for how populations are rendered visible. Section 3 traces the historical emergence of mechanization and institutionalization in Colombia and Ecuador, situating these trajectories within broader regional and developmental reforms. Section 4 examines how multicultural politics reshaped census categories and the politics of recognition at the turn of the twenty-first century. Section 5 analyzes the managerial turn and the uneven digitalization of census operations in both countries, highlighting the tensions between efficiency, inclusion, and institutional capacity. Section 6 then situates these national experiences within a transnational field of standards,

financing, and technical assistance, followed by comparative insights in Section 7 and concluding reflections in Section 8. Together, these sections show how modernization is best understood not as linear diffusion but as contested translation across institutional, political, and global domains.

2. Theoretical Framework: Governmentality and Statistical Regimes

The history of statistics is the history of the governing imaginaries that sustain it (Desrosières 2015). Statistical technologies—from punch cards to online portals—materialize specific visions of the state: administrative, developmental, and managerial. Each regime defines what counts as legitimate knowledge and how populations are made visible.

In the Global South, the administrative regimes of the nineteenth and early twentieth centuries utilized statistics to support fiscal, military, and territorial control. Early censuses in Colombia (1905, 1912, 1918) and Ecuador (1835, 1950) privileged male, literate, and urban populations while marginalizing Indigenous and Afro-descendant groups (Estrada Orrego, 2017). Enumeration was tied to civic order, literacy, and the moral economy of citizenship (Loveman, 2014).

The developmentalist regime of the mid-twentieth century, emerging under the aegis of the United Nations and the Inter-American Statistical Institute's *Census of the Americas* program, reframed modernization as an index of progress and a tool for planning (IASI/UN, 1950; Otero, 2018). Mechanization and computerization were pursued as instruments of developmental governance, aligning statistical reform with state-building and modernization theory.

By the late twentieth century, a managerial regime took shape, where digitalization reimaged censuses as real-time management systems. Data production became aligned with efficiency, traceability, and accountability metrics (Le Texier, 2011, 2016). The managerial rationality privileged interoperability and performance dashboards, yet often at the expense of representational inclusivity and reflexivity. Within Latin America, scholarship has shown how states have used statistics to construct national imaginaries and regulate diversity (Daniel et al., 2022; Loveman, 2014). Colombia and Ecuador provide complementary vantage points to examine how these rationalities travel, are localized, and contested within unequal institutional contexts.

3. Mechanization and Institutionalization

Technological modernization in Latin American censuses emerged within broader state-building projects. Colombia and Ecuador illuminate two distinct yet intertwined

trajectories of mechanization and institutionalization. In Colombia, the 1938 National Census used Hollerith tabulating machines under an IBM contract – a regional milestone that paralleled Brazil’s 1920s experiments and anticipated Argentina’s 1947 mechanization (Estrada Orrego, 2017). This step reduced processing times and enhanced the state’s claim to bureaucratic modernity. Yet consolidation was gradual: only in the 1970s did DANE (Departamento Administrativo Nacional de Estadística) expand its capacity and institutionalize mechanization as routine. A chronology for Colombia appears in Table 1, highlighting the early leap to mechanization in 1938 and the slower organizational routinization during the 1970s. This periodization supports the claim that technology followed institutional maturation rather than causing it.

Table 1. History of Population and Housing Censuses in Colombia

Year of the census	Technological Innovation	Estimated Population	Notes
1778	Manual registration in parishes	NA	First colonial census; it classified the white, indigenous, and slave populations by parish.
1825	Detailed manual registration	NA	The only census in Greater Colombia; it included age, sex, and marital status.
1835	Manual registration	NA	Oriented to the electoral register after independence.
1843	Extended manual registration	NA	It incorporated institutional population, indigenous people, slaves and foreigners.
1851	Manual registration with training	NA	New demographic variables were introduced; census takers were trained.
1864	Manual registration	NA	Beginning of methodological advances towards modern statistics.
1870	Manual registration with social classification	NA	It was organized by marital status, occupation and social stratum.
1905	Manual registration	4,533,777	Used to create the neighborhood card; civil focus.
1912	Improved manual registration	5,855,077	Considered the first modern census; logistical and organizational improvements.
1918	Manual housing registration	NA	Housing infrastructure census prior to the population census.
1928	Manual ecclesiastical registry	8,851,200	Registration led by parish priests in rural areas.

1938	Hollerith tabulating machines (IBM)	8,701,816	Introduction of punch cards; the first technologically modern census.
1951	International standardization	11,548,843	Part of the “Census of the Americas” program promoted by the UN.
1964	IBM computer and post-census survey	17,484,508	Use of post-census surveys; international technical assistance.
1973	Urban immobilization strategy	22,587,665	Census coverage was facilitated with mobility restrictions.
1985	Computerized systems and differentiated forms	27,746,000	Questionnaires tailored to the type of housing; more segmented analysis.
1993	GIS and integrated databases	33,109,840	Introduction of Geographic Information Systems; digitization of the census framework.
2005	DMC and digital mapping	41,468,384	Use of mobile capture devices; extended collection
2018	Online Self-Enumeration	49,020,000	MCDs and Geospatial Intelligence

Source: Author’s elaboration from DANE historical materials and secondary literature (DANE, 2020; Estrada Orrego, 2017).

Ecuador mechanized later, in 1950, and only consolidated an institutional architecture with the 1976 creation of INEC (Instituto Nacional de Estadística y Censos) and the National Statistical System (Decree 323). Table 2 lists the country’s population and housing censuses since the republican period, with notes on method and institutional setting. The sequence makes visible the gap between the first mechanized operation (1950) and the subsequent legal-organizational consolidation in 1976.

Table 2: Table X. History of Population and Housing Censuses in Ecuador

Year of the Census	Technological Innovation	Estimated Population	Notes
1778	Manual registration in parishes	~400,000	First systematic count of parishioners in the Royal Audience of Quito; proto-statistical.
1835	Paper registration	~600,000	First Republican census under Vicente Rocafuerte; entirely manual operation.

1890	Organized census books	~1,270,000	Greater territorial coverage and clearer demographic classifications.
1950	Punched cards and mechanical tabulation	3,203,000	First modern census in Ecuador; organized by the Ministry of Economy and Finance.
1962	First Electronic computers	4,564,080	Improved data processing; introduction of more structured questionnaires.
1974	Databases and advanced categorization	6,521,710	Inclusion of urban/rural variables and improvements in statistical sampling.
1982	Partial digitization and updated cartography	8,060,000	More systematic use of databases; improved coverage and accuracy.
1990	Specialized statistical software	9,697,979	Incorporation of multivariate analysis tools; advances in data quality.
2001	GIS and digital georeferencing	12,156,608	First integration of Geographic Information Systems (GIS) and territorial segmentation.
2010	Escáneres ópticos y validación automatizada	14,483,499	Optical scanners and automated validation
2022	Online census (eCensus) and DMC in the field (fail census according to State Comptroller General's Office	17,798,842	First hybrid census (virtual and in-person); cybersecurity and new variables.

Source: Author's elaboration from INEC institutional histories and census reports (INEC, 1976, 2015, 2022, 2024).

In regional perspective, Ecuador was a late adopter, reflecting fragmented bureaucratic development and constrained fiscal resources (INEC, 1976, 2015). The UN-backed *Census of the Americas* standardized definitions and procedures, embedding the region in a transnational regime of statistical knowledge (IASI/United Nations, 1950; CEPAL, 2005). Set against the Global North—where the United States had used mechanical tabulation since 1890—both Andean cases appear as late consolidators. The lag, however, reflected political economy more than technical incapacity: modernization depended on international cooperation, imported technologies, and the gradual maturation of planning institutions (DANE, 2020; Otero, 2018).

Mid-century mechanization thus mapped onto developmentalist governmentality: adoption conferred legitimacy and planning capacity but hinged on exogenous impulses and geopolitical alignment rather than endogenous innovation alone.

4. Multiculturalism and Visibility

By the late twentieth century, political transformations reshaped the relationship between statistics and citizenship. The turn toward multiculturalism—rooted in constitutional reforms and global rights discourses—reconfigured both census categories and technologies. In both Colombia and Ecuador, political elites historically associated “knowing the nation” with projects of civic order and homogenization (Loveman, 2014; Estrada Orrego, 2017). Thus, enumeration was seen as an opportunity for integration as much as a measurement.

In Colombia, early twentieth-century censuses codified racial hierarchies, prioritizing eligible male citizens and urban populations, while marginalizing rural, Indigenous, and Afro-descendant peoples (Estrada Orrego, 2017). The constitutional recognition of multiculturalism in the 1990s catalyzed DANE’s adoption of self-identification categories, reflecting pressure from Afro-descendant and Indigenous movements as well as alignment with international norms (Otero, 2018; Daniel et al., 2022). Enumeration became a mechanism of recognition, yet one that translated identity into standardized codes.

In Ecuador, republican censuses similarly prioritized administrative control and undercounted rural and Indigenous populations, a pattern challenged by late-twentieth-century mobilization (Martínez Novo, 2021; Ramírez, 2021). The 2001 census incorporated ethnic self-identification within a new constitutional framework recognizing a plurinational and intercultural state. This reform followed sustained advocacy by the Confederación de Nacionalidades Indígenas del Ecuador (CONAIE) and Afro-Ecuadorian organizations, linking visibility to demands for rights, resources, and territorial autonomy (Becker, 2012; Lucero, 2008). Visibility thus entailed both a political shift—the right to be recognized—and a technical shift—the capacity to code, store, and analyze diversity. The multicultural turn marked a movement from a homogenizing to a representational regime, where identities became legible through standardized classifications that both enabled and constrained collective claims (Loveman, 2014; Otero, 2018).

5. Digitalization and the Managerial Turn

The twenty-first century reconfigured census-taking. Digital platforms promised efficiency, lower costs, and real-time supervision, but in Colombia and Ecuador—as across much of the Global South—digitalization also exposed deep asymmetries in infrastructure, governance, and participation.

In Colombia, the 2018 eCenso enabled online self-enumeration, supported by GIS-based cartography, dashboards, and centralized supervision (DANE, 2018, 2019, 2021). Roughly

5 million people—about 10.5 percent of the population—participated, with uptake concentrated in urban, higher-income areas. This pattern mirrored broader digital divides identified in the *OECD Digital Economy Outlook* (OECD, 2022). Operationally, the eCenso represented a milestone of managerial rationality: centralized monitoring, remote validation, and efficiency metrics. Yet analytically, it raised questions about whether speed and coverage had displaced inclusion as measures of success. Observers praised the transparency of real-time dashboards but warned that digital participation remained socially stratified (Open Data Watch, 2022).

Ecuador's 2022 hybrid census adopted a dual model that combined online self-enumeration with in-person interviews conducted on mobile capture devices (MCDs), supported by the SIPE (planning) and SUSO (monitoring) systems (INEC, 2022, 2024). The operation was financed and methodologically influenced by the World Bank (World Bank Inspection Panel, 2023). Although ambitious in scope, the operation faced low online participation in rural and Indigenous zones, interoperability problems, and coordination failures. Post-hoc audits recommended caution in using the results for official planning. These challenges pointed beyond technical difficulties to a deeper managerial fragility: imported models of data governance resting on institutional foundations too thin to sustain them (MINTEL, 2021; ECLAC, 2021).

Both countries' experiences demonstrate that the digital turn unfolded within a transnational ecosystem of standards, financing, and technical assistance. Since the mid-twentieth century, international organizations such as the UN, ECLAC, UNFPA, WB, IDB, CAF, and IASI have shaped modernization templates—metadata standards, quality frameworks, operational manuals—transmitting managerial assumptions about optimization, traceability, and auditability (IASI/UN, 1950; UNSD, 2017, 2021; Otero, 2018; Daniel et al., 2022). Where institutional capacity was robust—marked by stable funding, professionalized cadres, and inter-agency coordination—these templates were domesticated, as in Colombia's incremental consolidation. Where capacity was fragile or politicization acute, technologies became symbols of modernity without becoming infrastructures of trust, as illustrated by Ecuador's 2022 experience. The managerial regime is therefore imported, but its local effects depend on path-dependent institutions and the social legitimacy of enumeration.

6. Transnational Translation and Global Templates

Modernization in Latin American censuses has long been closely tied to transnational standardization. The *Census of the Americas* (circa 1950) coordinated definitions and classifications, while later decades saw the proliferation of UN guidelines, ECLAC working groups, and UNFPA/IDB/WB financing. These institutions acted as statistical brokers, translating global standards into national projects and aligning funding, procurement, and training to accelerate adoption (CEPAL, 2005; ECLAC, 2021).

Colombia's early mechanization in 1938 reflected both ties to U.S. industry (IBM) and later engagement with UN and ECLAC methodologies (Estrada Orrego, 2017; DANE, 2020). Ecuador's consolidations (1976; 2010–2022) leaned more heavily on external support and policy borrowing, especially for digital platforms and hybrid designs (INEC, 2015, 2022). Diffusion operated through technical missions, procurement frameworks, and peer-learning networks that embodied managerial norms of performance, risk management, and auditability.

Recent scholarship clarifies that diffusion is not a uniform process of copying but one of translation. These processes are mediated by international financing, commercial brokerage, institutional mediation, and domestic professional initiative, which together shape how “models” are reworked and stabilized (Villacís et al., 2022). Latin American statistical offices act as translators, selectively appropriating external designs to fit domestic priorities, budgets, and politics. Where bureaucratic autonomy and professionalization are sustained, imported templates become durable infrastructures; where they are episodic or donor-driven, they remain projectized and brittle (Villacís et al., 2022; Otero, 2018).

Alongside process templates, spatial infrastructures also became vehicles of translation. The diffusion of GIS and digital cartography—initially framed as neutral tools of modernization—redefined fieldwork segmentation, route optimization, and supervisory oversight (Esri, 2021; DANE, 2021). These technologies embodied managerial rationalities of visibility and control, yet they also created new dependencies on software vendors, data formats, and cybersecurity regimes. In both countries, modernization thus unfolded through asymmetrical partnerships where sovereignty over methods coexisted with reliance on external expertise.

7. Comparative Insights

Placed side by side, Colombia and Ecuador reveal how similar technologies have traveled through distinct institutional pathways. In timing and consolidation, Colombia moved early but slowly. The 1938 leap to Hollerith tabulation signaled ambition, yet it took until the 1970s for DANE to routinize mechanization within a durable organizational structure (Estrada Orrego, 2017). Ecuador entered later—mechanizing in 1950—and consolidated only after 1976 with the creation of INEC and the National Statistical System, reflecting both bureaucratic fragmentation and dependency on international advice (INEC, 2015, 1976). In both cases, technology followed institutional maturation rather than driving it.

A second parallel lies in multiculturalism as a design driver. Constitutional change, international norms, and social mobilization reframed what censuses should make visible. In Colombia, multiculturalism and rights-based mobilization reshaped DANE's categories from the 1990s onward (Otero, 2018; Daniel et al., 2022). In Ecuador, the

introduction of self-identification in 2001 and the redefinition of the census under a plurinational framework resulted from sustained activism by CONAIE and Afro-Ecuadorian organizations (Becker, 2012; Lucero, 2008; Martínez Novo, 2021; Ramírez, 2021). In both, visibility expanded—but under standardized classifications that simultaneously enable and constrain identity claims (Loveman, 2014).

A third pattern concerns the managerial turn and its limits. The 2018 and 2022 operations embody managerial rationalities—online modes, dashboards, interoperability. Colombia's incremental approach domesticated these templates within stable institutions; Ecuador's accelerated path exposed capacity gaps and governance fragility. Managerial logic proved necessary but insufficient: without trust, inclusion, and stable capacity, efficiency metrics could not substitute for legitimacy (Villacís et al., 2022; Otero, 2018).

These comparative patterns are summarized in Table 3. The table condenses six analytical dimensions: chronology, institutionalization, multicultural reform, digitalization, transnational influence, and managerial embedding. By juxtaposing them, it highlights that modernization is neither uniform nor self-sustaining—it depends on how institutions translate, negotiate, and sustain imported technologies over time.

Table 3. Comparative Trajectories of Census Modernization in Colombia and Ecuador

Dimension	Colombia	Ecuador
Initial mechanization	1938 (IBM/Hollerith) - early regional adopter (Estrada Orrego, 2017)	1950 - late regional adopter (Otero, 2018)
Institutional consolidation	1970s within DANE routines and standards	1976 legal consolidation with INEC and National Statistical System
Multicultural reframing	1990s constitutional multiculturalism; ethnic self-identification categories (Otero, 2018)	2001 self-identification under plurinational framework; mobilization by CONAIE and Afro-Ecuadorian groups (Becker, 2012; Lucero, 2008)
Digital turn	2018 eCenso; strong monitoring; digital divide visible (DANE, 2018–2021)	2022 hybrid census; interoperability and governance shortfalls (INEC, 2022, 2024)
Role of IFIs	Domesticated UN/ECLAC standards; gradual internalization	Strong external steering: IDB (2001) and World Bank (2022) shaped design and funding
Managerial rationality	Embedded in existing capacity	Imported templates under fragile capacity

Source. Author's elaboration based on DANE (2018–2021); INEC (1976, 2015, 2022, 2024); UNSD (2017, 2021); ECLAC (2021); CEPAL (2005, 2022); Becker (2012); Lucero (2008); Martínez Novo (2021); Ramírez (2021); OECD (2022); World Bank Inspection Panel (2023).

8. Conclusion

This comparative history shows that technological change in census-taking is neither a neutral march toward efficiency nor a purely domestic choice. It emerges from the intersection of transnational templates, institutional trajectories, and political contests over recognition. Colombia's trajectory demonstrates how imported models can be translated and domesticated when bureaucratic routines, professional cadres, and stable funding converge (DANE, 2020; ECLAC, 2021). Ecuador's experience reveals the vulnerabilities of accelerated adoption under externally driven timelines, where technologies become symbols of modernity faster than they become infrastructures of trust (INEC, 2022, 2024; World Bank Inspection Panel, 2023). In both cases, digitalization has consolidated managerial rationalities but reproduced structural inequalities where connectivity, capacity, and legitimacy remain uneven (OECD, 2022; Open Data Watch, 2022).

Read through Desrosières' lens, technological waves correspond to shifting regimes of governmentality—from administrative enumeration to developmental planning to managerial optimization—each redefining what counts as knowledge, who counts as a subject, and how counting itself is made credible. The Andean cases underscore that diffusion operates through mechanisms of translation: international financing, commercial and institutional brokerage, and local professional initiative rework global models into situated practices. The analytical question is not whether countries adopt innovation but how they translate it—and with what consequences for representation and power.

A credible digital census requires more than new platforms; it demands governance. Sustainable innovation will depend on selective alignment with global guidance while resisting mimicry detached from territorial realities; long-term institutional investments in professionalization, stable budgets, and interoperable infrastructure; inclusive co-design with communities whose recognition is at stake; and prudent engagement with international financiers to ensure that modernization projects consolidate rather than replace domestic capacity (UNSD, 2017, 2021; ECLAC, 2021; CEPAL, 2022). Ultimately, digital tools are means, not ends. Their public value lies in whether states can align technological ambition with the slow work of institutional credibility and democratic accountability—whether the infrastructures that make populations legible also make governments answerable to those they measure.

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Appendix

Comparative Table of Census Financing Sources

Year	Colombia	Ecuador
1982	No national population and housing census in 1982. The previous census was 1973, and the next was 1985 (XV Population Census and IV Housing Census), organized by DANE and financed through the National General Budget (PGN). There is no record of any 1982 nationwide census operation in Colombia with financing from international organizations.	IV Population Census and III Housing Census (1982). Organized by INEC. Available evidence shows it was financed primarily through the General State Budget. No specific loan from the World Bank or IDB is identified; possible international participation is limited to technical support (UN, CEPAL, etc.) without clear financial involvement.
1985	XV National Population Census and IV Housing Census (1985). Approved in CONPES 2005 (1983). Financing is described as coming from the National General Budget, executed by DANE as a public investment project. No authorization of external loans for the census operation appears. Technical cooperation from UN agencies (UNFPA) for analytical studies is possible, but the census's main funding came from the Colombian State.	
1990		V Population Census and IV Housing Census (1990). Organized by INEC and financed primarily through the General State Budget. No evidence of a dedicated external loan for the census. Technical cooperation from international organizations may have occurred, but not as a main funding source.
1993	XVI National Population Census and V Housing Census (1993). Linked to CONPES 2525, which defines the tentative budget funded by the National General Budget. No loan	

	contracting with multilateral banks is mentioned for financing the census. However, UNFPA funded or co-funded specific studies and projects associated with the census (e.g., Wayuu Census, demographic analyses), which represents targeted technical and financial cooperation, but not funding of the main census operation.	
2001		VI Population Census and V Housing Census (2001). Organized by INEC. Available documentation shows it was financed by IDB loans and standard technical cooperation (UN, CEPAL) is likely.
2005	General Census 2005 (XVII Population Census, VI Housing Census, plus economic and agricultural components). A large project executed by DANE. Financing combines: (1) National General Budget, and (2) an external loan from multilateral banks, authorized under CONPES 3345, allowing up to US\$48 million with the IDB (loan 1671/OC-CO) to partially finance the census. Congressional reports detail execution by financing source tied to the IDB loan. There was also international technical cooperation (methodological and operational support).	
2010		VII Population Census and VI Housing Census (2010). Conducted by INEC. Presented as a State-funded operation, financed by the General State Budget. No multilateral loans. Technical cooperation from UN agencies may have occurred, but main funding was domestic.
2018	National Population and Housing Census 2018 (CNPV 2018). Ordered by	

	Law 1753 (2015). Financed primarily through the National General Budget, using budget appropriations and future-year commitments, because initial 2017–2018 budget allocations were insufficient. Some operational execution was carried out via FONADE. No dedicated external loan (unlike 2005). Documented technical cooperation from IDB, World Bank, UNFPA, CELADE/CEPAL, mainly for methodologies and post-census studies.	
2022		VIII Population Census and VII Housing Census (2022). Conducted by INEC. Unlike earlier Ecuadorian censuses, this one clearly had mixed financing: (1) the General State Budget, and (2) a World Bank external loan, arranged starting in 2021, totaling approximately USD 56.9 million for the 2022–2024 census project. The World Bank supported modernization (digital data collection, systems, etc.), complemented by national co-financing. Summary: Ecuadorian State + World Bank loan, with additional technical cooperation.

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Census Digitalization in the Global South: The Case of Colombia and Ecuador

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SSHA

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Disclaimer regarding the paper vs this presentation

The current version of the paper includes empirical elements about the evolution of censuses in Colombia and Ecuador. However, the guiding questions and arguments remain unclear. This presentation aims to focus on that.

Research Questions (1)

What specific types of political regimes in the Global South give rise to different kinds of technological innovation in population censuses?

Research Questions (2)

When specific technologies were adopted in censuses, which played a more important role: centrifugal forces or centripetal forces?

Main Argument for Research Questions (1)

What specific types of political regimes in the Global South give rise to different kinds of technological innovation in population censuses?

1. Administrative regimes (19th–early 20th c.): fiscally and militarily oriented states using manual censuses for territorial control.
2. Developmentalist regimes (mid-20th c.): planning-oriented states that adopt mechanization and early computers as tools of developmental governance.
3. Managerial regimes (late 20th–21st c.): neoliberal/managerial states, heavily shaped by IFIs and global standards, that introduce digital, online, GIS-based and dashboarded censuses to optimize efficiency, traceability, and performance.

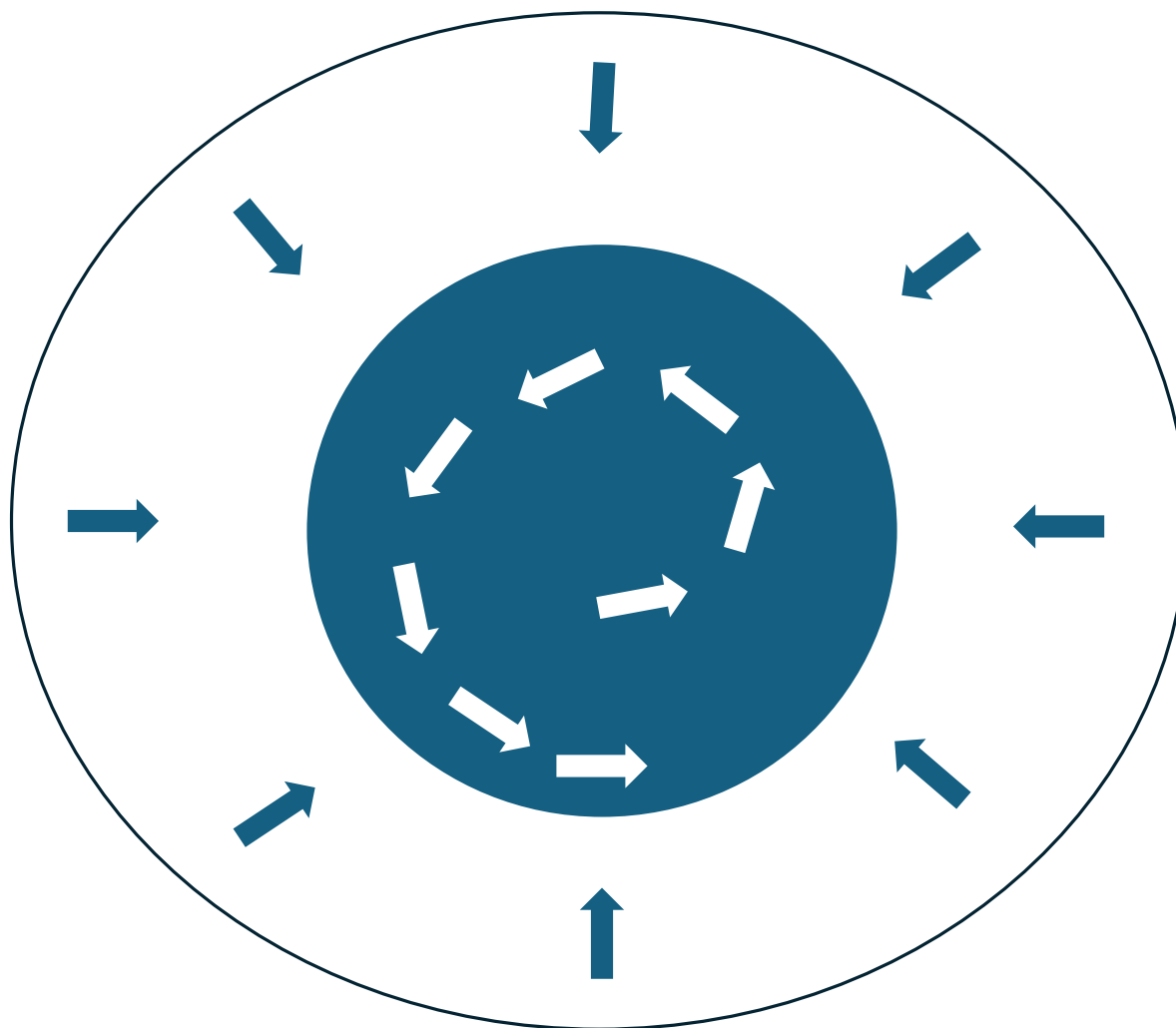
Research Questions (2)

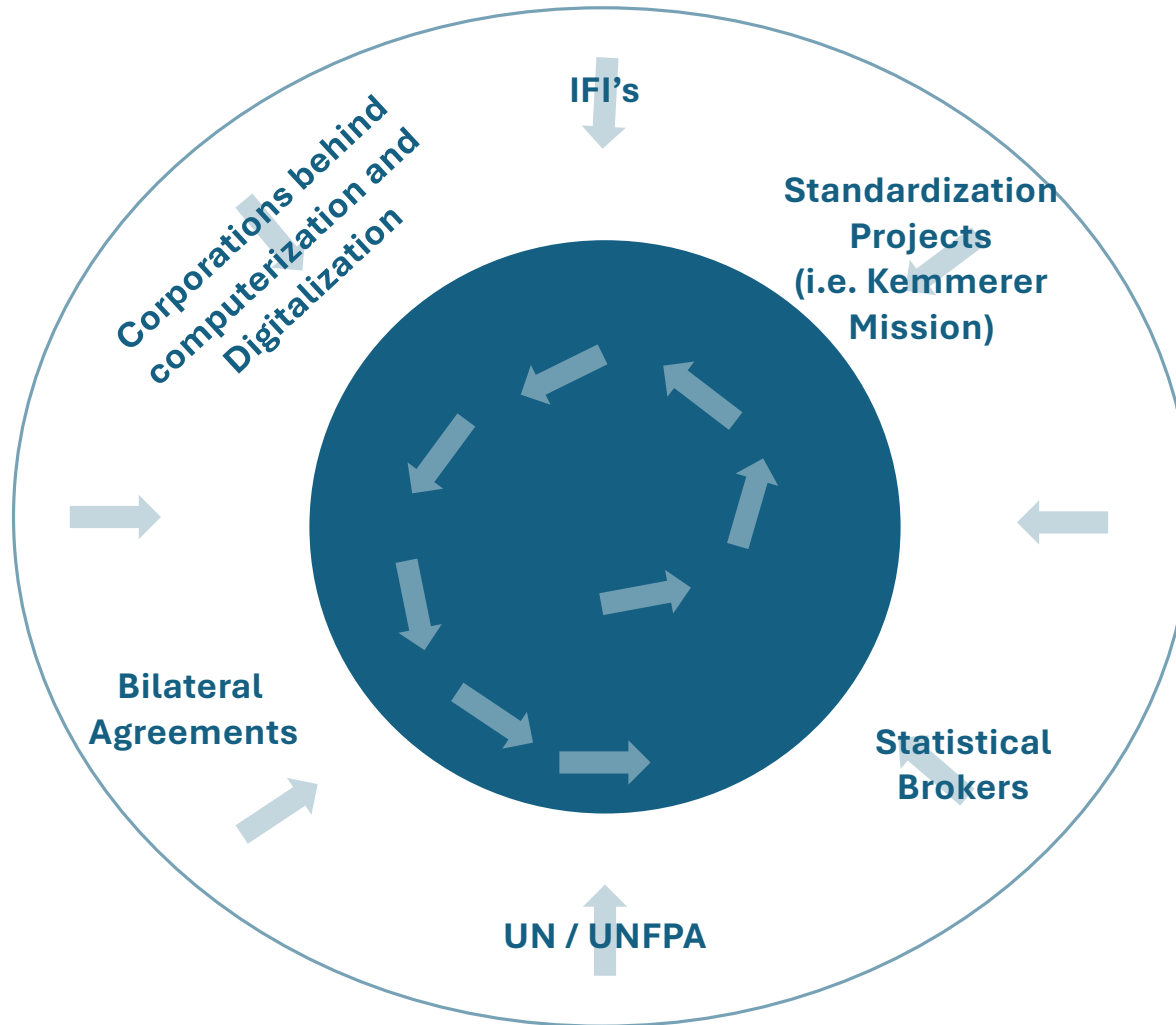
When specific technologies were adopted in censuses, which played a more important role: centrifugal forces or centripetal forces?

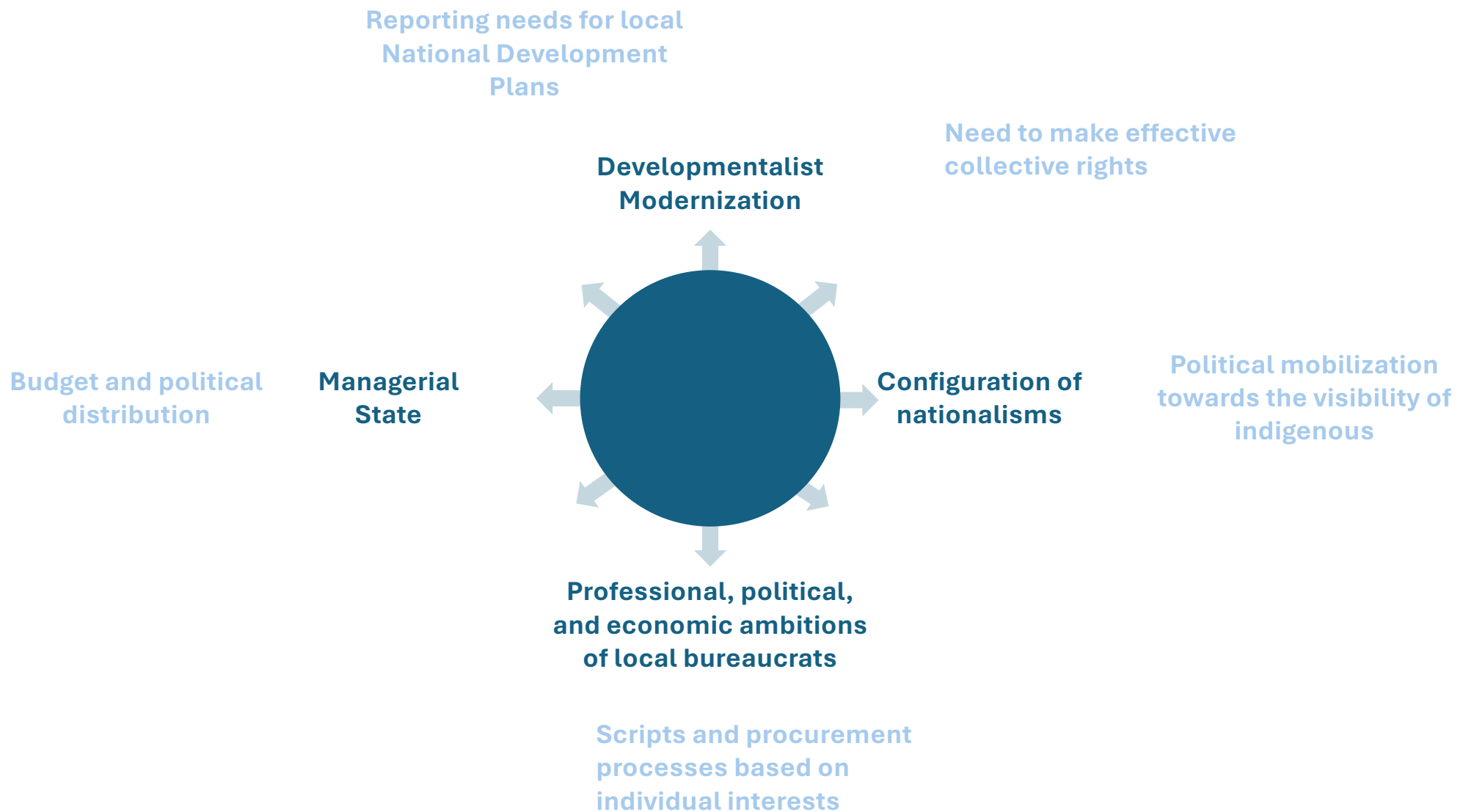
Centrifugal forces (**global scripts, donors, IFIs, regional agencies**) are crucial for launching specific technologies—mechanization, computers, digital platforms—by supplying models, funding, and timelines. But centripetal forces (**state-building projects, bureaucratic consolidation, domestic politics over recognition and legitimacy**) are more important for shaping and stabilizing those technologies: they determine whether imported tools become **routine infrastructures** (as in Colombia) or remain **fragile, projectized experiments** (as in Ecuador).

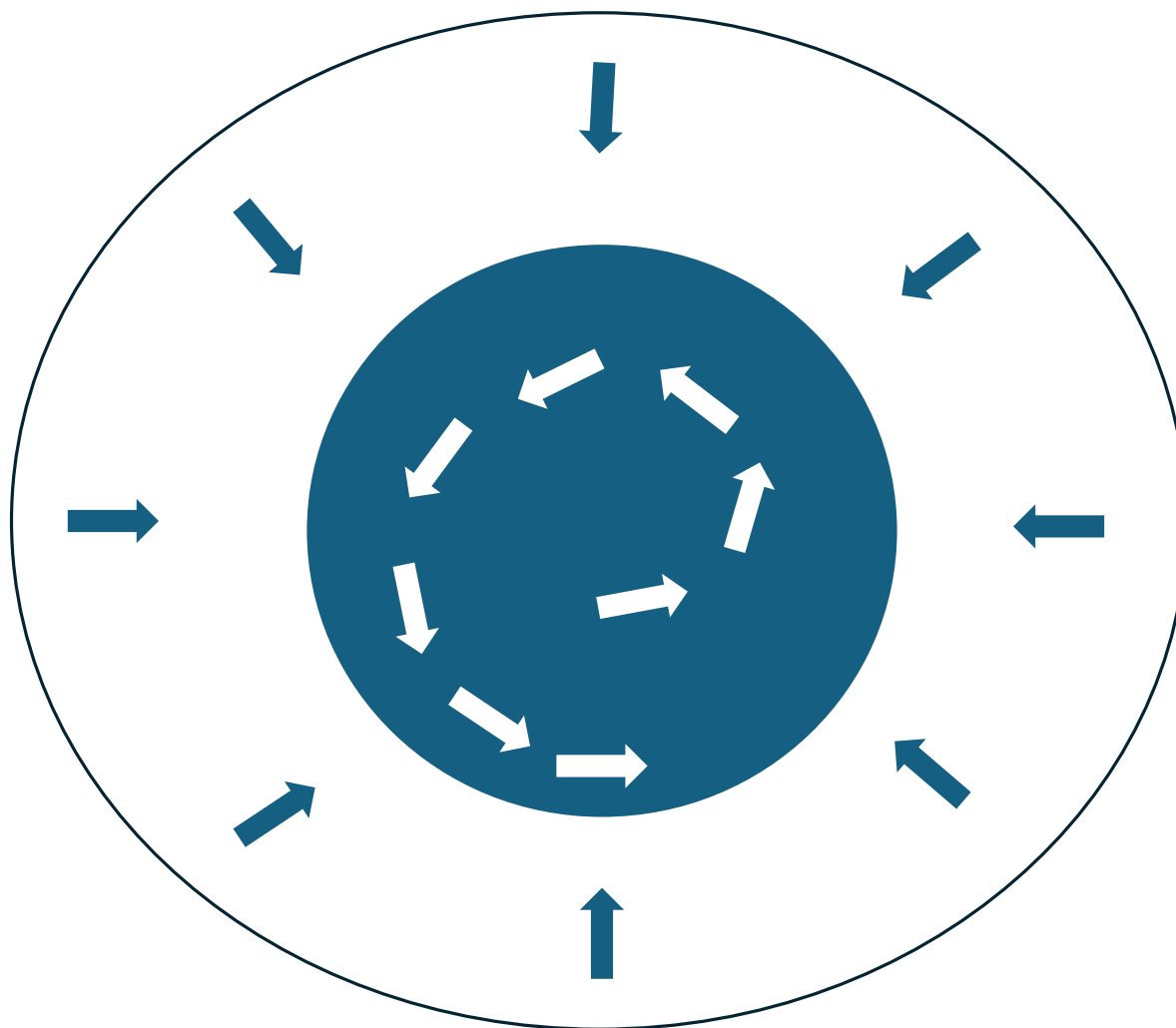
The paper does not merely distinguish between centripetal and centrifugal forces; it examines their specific configurations in Ecuador and Colombia, showing that **these forces are neither linear nor homogeneous, but historically contingent and context-dependent.**

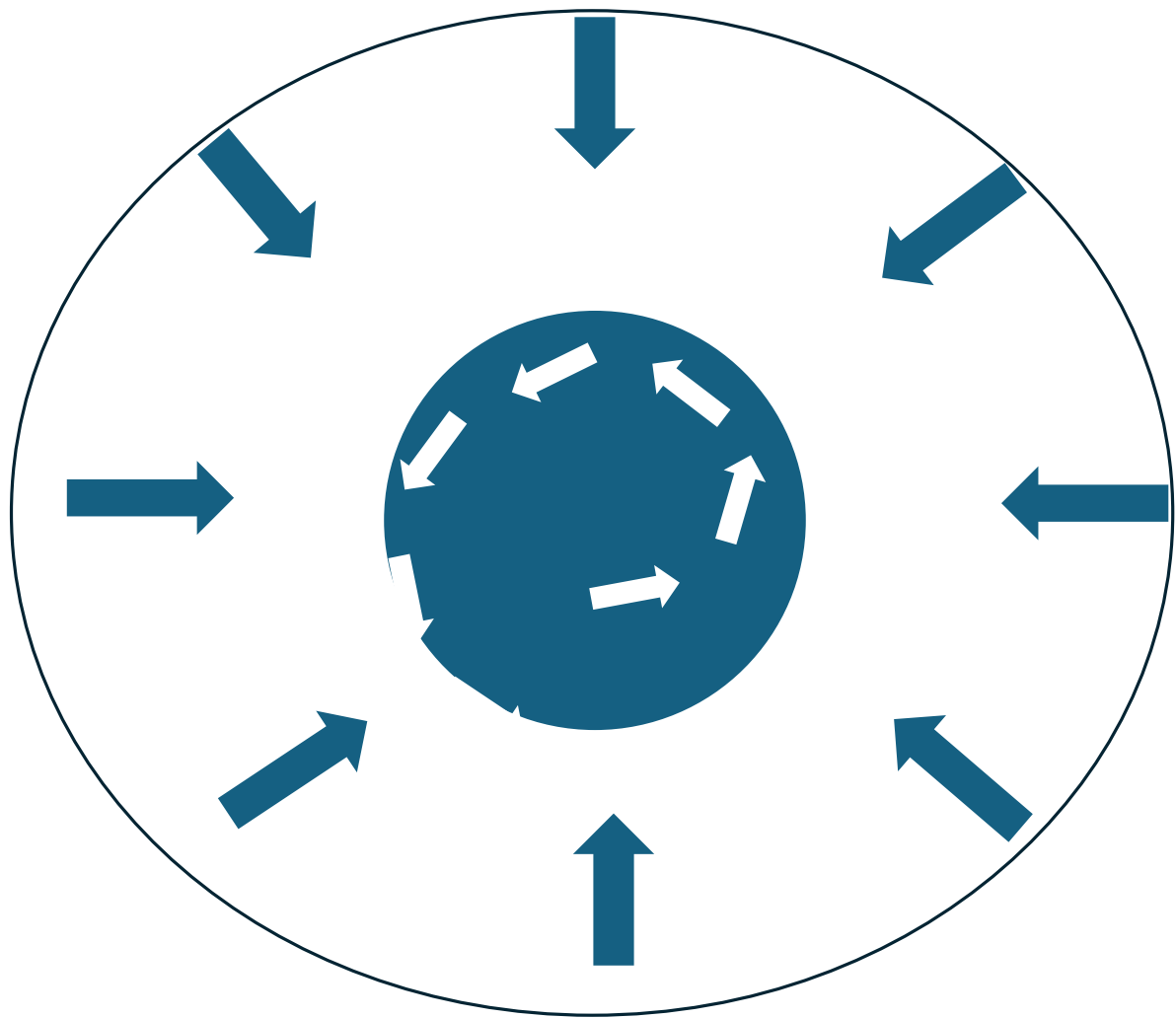
At the same time, it **points to an emergent tendency in both cases whereby external (centrifugal) actors progressively gain greater control over technological adoption**, as well as over questionnaire design, classificatory schemes, budgets, and the overall administration of censuses.

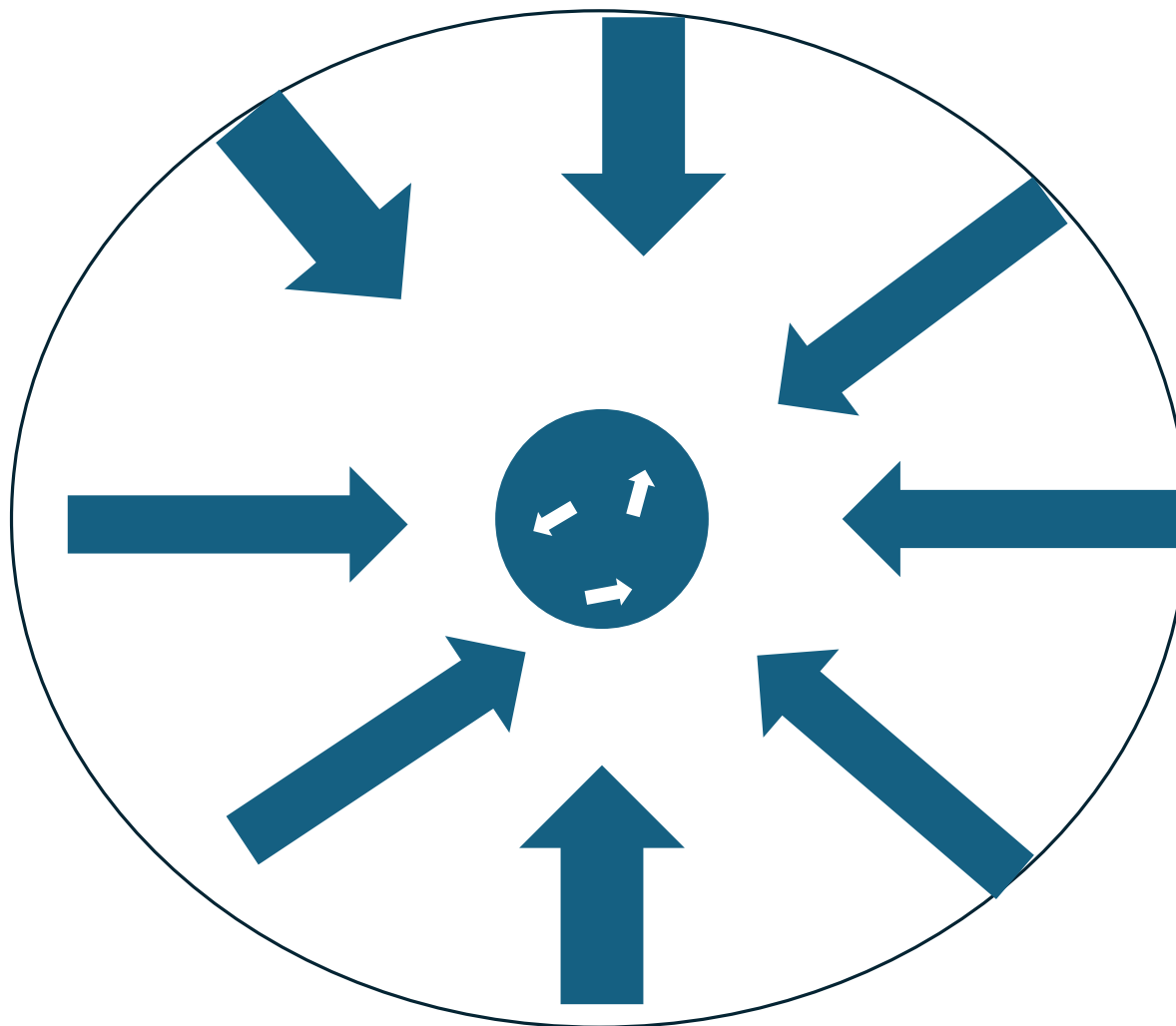


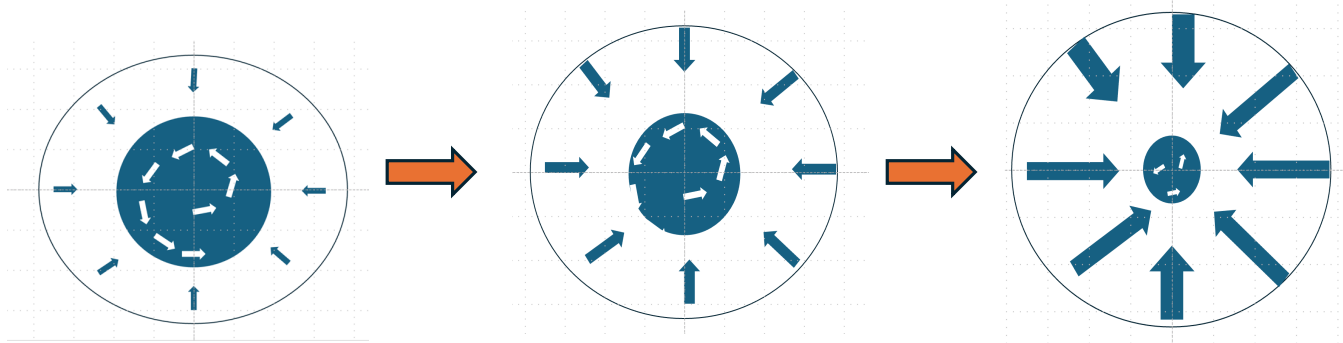






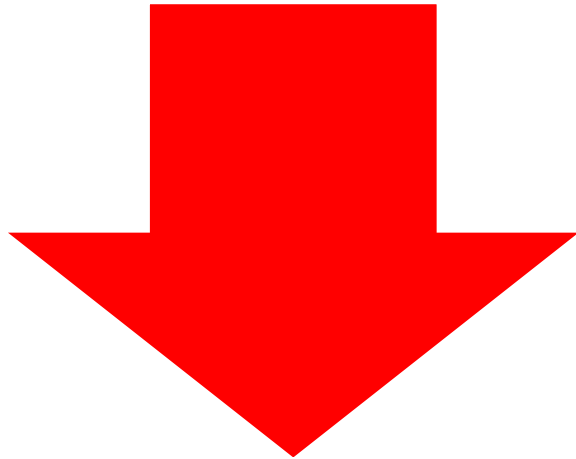








Financial dependency
Brokers
Global Scripts
Professional Transnational Networks



Developmentalist models
Weakened economic nationalisms
Financial autonomy

Context:

Why Talk About “Technological Transformation of Censuses”?

- Over the last century, censuses moved from **manual counts** to **mechanical tabulation, computers**, and now **digital / online** systems
- Global organizations (UN, ECLAC, World Bank, IDB, etc.) have promoted a “**modernization script**”: PAPI → CAPI/CAWI, digital workflows, quality standards
- This script often assumes modernization is **linear, technical, and inevitable**
- In practice, especially in the Global South, census modernization is deeply **political and uneven**
- The paper situates Colombia and Ecuador inside these global pressures and asks **how technology, politics, and institutions interact** in their censuses

Latin America and the Andean Context

- In Latin America, census reform is tied to state-building, development planning, and international cooperation, not just to new devices
- The region's modernization has been shaped by external financing and regional coordination (UN, ECLAC, IASI, UNFPA, WB, IDB, CAF)
- Colombia and Ecuador are neighboring Andean states with:
 - Shared regional guidance and similar timing of census rounds
 - But different institutional capacities and degrees of dependence on external actors
- They provide a comparative window to see:
 - When imported models are domesticated and consolidated (Colombia)
 - When accelerated adoption exposes fragile institutions and dependency (Ecuador)

Methods & Materials

- Comparative historical analysis of **Colombia** and **Ecuador**.
- Sources:
 - Archival documents
 - Institutional histories and legal frameworks
 - Census reports and operational evaluations
 - Regional and UN guidance on census modernization
- Focus on **technological waves**:
 - Mechanization
 - Computerization
 - Digitalization

Colombia: Historical Evolution of Census Technology

- Colonial & 19th c. – Manual, paper-based censuses in parishes and municipalities (1778–1918); gradual methodological improvements and training of enumerators.
- 1938 – First technologically “modern” census with Hollerith punch cards and IBM tabulating machines, a pioneering move in mechanization.
- 1951–1964 – Integration into the UN “Census of the Americas” and introduction of electronic computers and post-census surveys under strong international technical assistance.
- 1970s–1980s – Mechanization and computerized systems become institutionalized within DANE, with differentiated forms and more complex processing.
- 1993 – Adoption of GIS and integrated databases, enabling digital cartography and geospatial analysis of census data.
- 2005 – Use of mobile capture devices (MCDs) and digital mapping, extending digital workflows in the field.
- 2018 – eCenso: online self-enumeration combined with MCDs and geospatial intelligence, consolidating a managerial, digital census model within relatively strong institutional capacity.

Ecuador: Historical Evolution of Census Technology

- Colonial & early Republican period – Manual parish registers and paper-based censuses (1778, 1835, 1890) with increasing territorial coverage and basic demographic classification.
- 1950 – First modern census using punched cards and mechanical tabulation, still organized outside a fully consolidated statistical office.
- 1962–1974 – Early use of electronic computers and databases, with more advanced categorizations and improved sampling and urban/rural distinctions.
- 1982–1990 – Partial digitization, updated cartography, and specialized statistical software, improving coverage and multivariate analysis.
- 1976 onward – Creation of INEC and the National Statistical System, belatedly stabilizing technological and organizational change.
- 2001 – Integration of GIS and digital georeferencing, aligning with regional digital cartography trends.
- 2010 – Introduction of optical scanners and automated validation for processing paper questionnaires.
- 2022 – Hybrid digital census: online eCensus plus MCDs in the field, orchestrated through SIPE and SUSO systems, but revealing governance and interoperability problems under strong World Bank steering.

Growing Influence of External Actors in Census **Digitalization**

- In both Colombia and Ecuador, recent waves of census “modernization” follow transnational scripts (UNSD, ECLAC, OECD) that define what counts as an acceptable technological pathway (PAPI → CAPI/CAWI, online self-enumeration, GIS, real-time supervision).
- Financing and conditionalities increasingly come from international financial institutions and regional banks, which shape not only whether digital platforms are adopted, but also their pace, scope, and risk tolerance (e.g. loans, project logics, performance indicators).
- External actors now influence questionnaire design and classification systems, promoting standardized categories (especially on ethnicity, migration, and housing) to align with global agendas and comparability, rather than purely domestic debates.
- The Andean cases thus illustrate a broader pattern: digital censuses are less the product of autonomous national innovation than of externally steered projects that reorganize technology choices, budgets, and even the internal governance of statistical offices.

Tentative Conclusions

- Census modernization in Colombia and Ecuador is not a linear, endogenous path, but the outcome of how global templates are translated through domestic institutions, financing, and political struggles over recognition.
- Waves of mechanization, computerization, and digitalization align with administrative, developmental, and managerial regimes of governmentality, showing that technology follows institutional maturation rather than driving it on its own.
- Tech innovation in population censuses in the GS runs the risk of becoming self-generated and based on impulses of financialization.
- The adoptions are increasingly tied to external dynamics and less tied to local needs.

Implications

- Theoretical: Statistical innovation in the Global South should be studied as contested translation, where international standards, financing, and professional fields interact with path-dependent institutions and multicultural politics, rather than as neutral “best practices.”
- Policy: Credible digital censuses require governance, not just platforms—that is, long-term investment in professionalization, stable budgets, interoperable infrastructure, and inclusive category design that reflects the claims of affected communities.
- Global governance: UN agencies, ECLAC, and IFIs should shift from diffusionist models to co-produced modernization agendas, aligning funding with institutional strengthening and allowing countries to adapt templates to their own political economies and recognition conflicts.
- Democracy and rights: Because technologies of counting shape who becomes visible and governable, debates on census reform must be treated as debates about citizenship, territorial rights, and accountability, not only about efficiency or cost.

Thank you!
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Consequences

- Less national autonomy and relevance: census technologies, categories, and questionnaires tend to reflect global comparability and donor agendas more than locally debated priorities or ways of seeing the population.
- Greater dependency and fragility: when digital infrastructures are projectized and externally steered, they are harder to maintain, more vulnerable to governance failures, and can undermine trust when things go wrong.
- Shifted accountability: statistical offices become increasingly accountable “upwards” to international agencies and lenders, rather than “downwards” to citizens and communities whose realities the census is supposed to represent.