BRIDGING THE DIGITAL DIVIDE:

GOVERNANCE, INNOVATION, AND DEVELOPMENT

EDITOR

Saeed Ahmad Zaman

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EDITOR
Saeed Ahmad Zaman

AUTHORS
Assoc. Prof. Dr. Neha VERMA
Dr. María Cruz Cuevas ÁLVAREZ
Dr. Marcos Pérez MENDOZA
Daniel Sánchez OVANDO
Mario Sánchez SANTANA

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PREFACE

Bridging the Digital Divide: Governance, Innovation, and Development brings together a collection of scholarly contributions that examine the challenges and opportunities associated with digital transformation in contemporary societies. As digital technologies continue to reshape governance, economies, and everyday life, disparities in access, capacity, and infrastructure remain critical issues that influence global development.

The chapters in this volume address key themes such as the transformation of public administration through GovTech initiatives, the importance of inclusive connectivity in reducing digital inequalities, and the structural barriers that hinder digitalization processes in developing economies. These contributions highlight how technological innovation can both enable progress and deepen existing gaps if not supported by inclusive and sustainable policies.

By adopting an interdisciplinary perspective, this volume integrates insights from public administration, development studies, and technology policy. It provides a comprehensive understanding of how governance, innovation, and institutional capacity interact in shaping digital transformation processes across different contexts.

It is hoped that this book will serve as a valuable resource for researchers, policymakers, and practitioners interested in digital governance, development, and innovation, while encouraging further efforts to build more inclusive and equitable digital futures.

Editorial Team
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CHAPTER 1
GOVTECH AND PUBLIC SECTOR TRANSFORMATION: REIMAGINING GOVERNANCE IN THE DIGITAL STATE

[1]Assoc. Prof. Dr. Neha VERMA

[1]Swami Vivekanand Subharti University, NH-58, Subhartipuram, Meerut, 250005, India, dr.neha2917@gmail.com, ORCID ID: 0000-0003-2540-9876

INTRODUCTION

The 21st century has witnessed a profound digital revolution in governance, fundamentally reshaping how states design policies, deliver services, and interact with citizens (Dunleavy et al., 2006; Margetts & Dunleavy, 2013). Rapid advances in digital technologies—particularly artificial intelligence (AI), big data analytics, cloud computing, blockchain, mobile platforms, and digital identification systems—are transforming the operational foundations of public administration (OECD, 2020; World Bank, 2021). This shift marks a transition from conventional bureaucratic systems toward what is increasingly described as digital governance, where data, automation, and interconnected platforms play a central role in decision-making and service provision (UN DESA, 2022). Governments across developed and developing nations are integrating these technologies not only to modernize administrative procedures but also to address long-standing structural inefficiencies within the public sector (World Bank, 2021). Traditionally, public administration has relied on hierarchical bureaucratic structures characterized by rule-bound procedures, paper-based records, and compartmentalized decision-making processes (Weber, 1978). While such systems ensured procedural accountability, they often resulted in slow service delivery, high transaction costs, and limited adaptability to rapidly changing societal needs (Hood, 1991). In many contexts, bureaucratic complexity has also been associated with corruption, information asymmetry, and exclusion of marginalized populations (Acemoglu & Robinson, 2012).

As citizens increasingly demand faster, more transparent, and accessible services—mirroring the efficiency of private digital platforms—the limitations of traditional governance models have become more visible (Margetts & Dunleavy, 2013). This has created strong pressure on governments to adopt innovative technological solutions that can enhance performance, responsiveness, and public trust (OECD, 2020). Within this context, the emergence of Government Technology (GovTech) represents a new phase in the evolution of digital governance.

Unlike earlier e-governance initiatives that primarily focused on digitizing existing processes, GovTech encompasses the use of advanced and integrated technologies such as AI-driven analytics, blockchain-based verification systems, cloud infrastructure, interoperable digital platforms, and biometric digital identity frameworks (World Bank, 2021). These tools enable governments to move beyond mere automation toward predictive governance, real-time monitoring, and data-driven policy formulation (Eggers et al., 2020). Digital ID systems facilitate targeted welfare distribution, AI supports fraud detection and risk assessment, cloud technologies enhance scalability and cost efficiency, and blockchain offers secure and transparent record-keeping (OECD, 2020). Together, these innovations are redefining the architecture of the modern state. Public sector transformation through GovTech is not solely a matter of technological adoption; it reflects deeper institutional and political-economic shifts (Rodrik, 2018). Governments face increasing fiscal constraints, urbanization pressures, complex social welfare demands, and global crises such as pandemics and climate change (UN DESA, 2022). Traditional governance mechanisms often lack the agility and analytical capacity required to manage such multidimensional challenges (World Bank, 2021). GovTech solutions promise to bridge these gaps by enabling evidence-based decision-making, integrated service delivery, and improved coordination across agencies (OECD, 2020). At the same time, digital platforms provide new avenues for citizen engagement, participatory governance, and feedback-driven policy refinement (Fung, 2015). However, the transformation of governance through technology also introduces new questions regarding accountability, power distribution, and equity. As states rely more heavily on algorithmic systems and data infrastructures, concerns arise about transparency, digital exclusion, privacy protection, and the growing influence of private technology providers in public decision-making (Zuboff, 2019; UN DESA, 2022). Thus, while GovTech offers opportunities to overcome inefficiency, corruption, and administrative delays, it also reshapes the relationship between the state, markets, and citizens.

The rapid expansion of digital technologies is reshaping the architecture of governance across the world, giving rise to what is commonly termed Government Technology (GovTech) the use of advanced digital tools such as artificial intelligence (AI), big data analytics, cloud computing, blockchain, and digital platforms to transform public sector operations (World Bank, 2021). Governments are increasingly adopting GovTech solutions in response to mounting pressures for efficiency, transparency, fiscal sustainability, and citizen-centric service delivery (OECD, 2020). GovTech thus represents not merely digitization of services but a broader institutional transformation toward data-driven, platform-based, and automated public administration. This paper examines GovTech as a driver of public sector transformation, analyzing how digital technologies are reconfiguring governance structures, administrative processes, and state–citizen interactions, while also highlighting implications for efficiency, accountability, and inclusive development.

GovTech

Government Technology (GovTech) refers to the integration and application of advanced digital technologies—such as artificial intelligence (AI), big data analytics, cloud computing, blockchain, and interoperable digital platforms—to modernize public sector operations, service delivery, and citizen engagement (World Bank, 2021). The World Bank defines GovTech as a whole-of-government approach to public sector modernization that emphasizes citizen-centric services, accessible systems, and digital transformation across government functions (World Bank, 2021). Similarly, the OECD conceptualizes GovTech as collaboration between public agencies and innovators, including start-ups and academic institutions, to develop digital solutions that make government services more agile, efficient, and responsive (OECD, 2020).

GovTech goes beyond placing services online; it involves reconfiguring institutional processes, administrative capacity, and governance architectures through emerging digital tools (Eggers et al., 2020).

E-Governance vs. GovTech (Cited)

- E-Governance refers to the use of information and communication technologies (ICTs) to provide government services to citizens, businesses, and other government entities, primarily focusing on online service delivery and digitization of existing processes (UN DESA, 2014).
- GovTech, by contrast, emphasizes innovation-driven technologies that transform the internal systems, decision-making processes, and institutional infrastructure of government, rather than merely digitizing citizen interfaces (World Bank, 2021; OECD, 2020).

In short, e-governance digitizes services, while GovTech redesigns government systems and institutions through technology.

Role of Technologies:

- AI and Machine Learning: Enable predictive analytics, automate administrative tasks, and support data-driven decision-making.
- Data Analytics: Provide actionable insights from large datasets, improving policy formulation and performance monitoring.
- Cloud Systems: Offer scalable, secure infrastructure for governmental applications and data storage.
- Blockchain: Enhances transparency and security in public records and transactions.

These technologies collectively allow governments to transition from manual, siloed bureaucratic functions to integrated, automated, and data-driven governance systems, improving speed, accuracy, and responsiveness in public service delivery.

1. THEORETICAL FOUNDATIONS

To analyze GovTech's influence on governance and public sector transformation, several theoretical perspectives provide conceptual grounding:

- New Public Management (NPM): This paradigm emerged in the late 20th century, advocating market-oriented and performance-driven approaches to public administration, emphasizing efficiency, decentralization, and results-oriented management similar to private sector practices .

NPM's focus on efficiency and performance resonates with GovTech's objectives (e.g., data-driven performance indicators), but GovTech extends beyond efficiency to structural transformation of governance.

- Digital Governance Theory: Digital governance theory highlights how digital technologies enable new forms of control, coordination, and trust mechanisms within governance processes, creating opportunities for automated and augmented governance tools that reshape institutional practices and citizen interactions . It situates technology as a core feature of governance rather than a peripheral tool.
- Public Value Theory: Public value theory emphasizes that public sector initiatives should aim to create value for society beyond internal efficiency improvements, focusing on societal outcomes, legitimacy, and citizen satisfaction. In the context of GovTech, this theory helps evaluate whether digital transformations truly enhance public value—such as inclusion, transparency, and democratic engagement—rather than only optimize bureaucratic processes .
- Political Economy of Technology: This perspective examines how technological adoption interacts with political, economic, and institutional forces, influencing power distribution within and between institutions. It helps explain how reliance on digital systems can centralize authority, alter accountability mechanisms, and redistribute influence (e.g., between public institutions and private tech firms), making it a valuable lens for understanding the broader implications of GovTech adoption beyond operational efficiency .

2. EVOLUTION OF GOVTECH

The evolution of GovTech can be understood as a progressive transformation of government operations from basic digitization to integrated, AI-driven governance platforms. This evolution occurs in multiple phases, reflecting both technological advancements and shifts in administrative priorities (OECD, 2024; World Bank, 2023).

2.1 Early Phase: E-Governance (Digitization of Records)

In the early phase, the focus was on digitizing government records and making administrative processes more efficient. Paper-based filing systems, manual record-keeping, and bureaucratic workflows were gradually replaced with computerized databases and electronic documentation (Heeks, 2006). This period emphasized internal efficiency, reducing errors and storage burdens, and establishing the foundation for subsequent digital innovation in public administration. E-governance initiatives typically included electronic tax filing, digital registries, and basic online portals for citizen interaction (Ndou, 2004).

2.2 Middle Phase: Online Services and Portals

The middle phase of GovTech marked a shift toward citizen-facing digital services, including comprehensive online portals and web-based platforms that enabled interaction with government services. This phase focused on accessibility and service delivery, allowing citizens to perform tasks such as license applications, utility payments, and service requests online (United Nations, 2020). Governments increasingly adopted centralized portals to integrate multiple services, reduce bureaucratic bottlenecks, and provide a more user-friendly interface for citizens (Dunleavy et al., 2006).

2.3 Current Phase: AI-Driven Decision Systems and Predictive Governance

In the current phase, GovTech is characterized by the integration of advanced technologies such as AI, machine learning, predictive analytics, cloud computing, and interoperable digital platforms. Governments are moving beyond service digitization to data-driven, predictive, and platform-based governance, enabling evidence-based policy design, real-time monitoring, and automated administrative decision-making (OECD, 2024; World Bank, 2023). AI-enabled systems now assist in welfare targeting, risk assessment, urban planning, and resource allocation, creating a more responsive and proactive public administration (Mergel et al., 2019).

2.4 Role of Startups and Public-Private Partnerships

The evolution of GovTech has also been accelerated by startups and public-private partnerships (PPPs). Governments increasingly collaborate with private technology firms, startups, and research institutions to co-develop innovative solutions for digital governance challenges (OECD, 2024). These collaborations have introduced agility, technical expertise, and innovation capacity into the public sector, enabling rapid deployment of digital platforms, AI tools, and blockchain-based systems. While PPPs offer opportunities for efficiency and technological advancement, they also create new governance and accountability considerations, such as vendor dependency, data sovereignty, and regulatory oversight (World Bank, 2023).

Overall, the evolution of GovTech reflects a progressive trajectory from internal digitization to integrated, AI-driven governance, highlighting the increasing complexity of digital transformation in the public sector. Each phase builds upon the previous, demonstrating that modern GovTech is not only a technological upgrade but a structural reconfiguration of governance systems with implications for efficiency, accountability, and citizen engagement.

3. REVIEW OF LITERATURE

The concept of GovTech has emerged as a central focus in recent scholarship on digital governance and public sector modernization. GovTech goes beyond traditional e-governance—entailing not only the mere digitization of services, but the systemic integration of advanced digital tools and innovation ecosystems to transform how governments operate, collaborate, and deliver public value. According to the OECD, GovTech is understood as a collaborative approach involving the public sector, start-ups, academia, and internal innovators to co-create digital solutions that enhance government capabilities and outcomes, rather than simply applying technology within government structures (OECD, 2024).

This literature distinguishes GovTech from earlier e-government paradigms: while e-governance focused primarily on online access and service automation, GovTech emphasizes innovation capacity, agile adoption, and systemic modernization (OECD, 2024).

The World Bank likewise frames GovTech as a whole-of-government approach that prioritizes citizen-centric services, accessibility, and transparency while leveraging disruptive technologies such as AI, cloud computing, and data platforms to improve institutional efficiency and curb corruption.

Digital transformation in public administration has been conceptualized as a socio-technical process, involving cultural, organizational, and technology shifts simultaneously, with data at its core. Studies highlight that successful transformation requires not only ICT adoption but also changes in organizational processes, skill development, and agile procedures to support innovation and responsiveness to citizen needs.

Artificial Intelligence (AI) is one of the most influential components of GovTech, with research showing its potential to improve administrative efficiency, decision quality, and service responsiveness. Systematic reviews of AI adoption in governance indicate that AI supports automation of routine tasks and enhances evidence-based policy design, yet institutional readiness and data governance remain persistent constraints. Furthermore, challenges related to responsible AI—such as fairness, accountability, data quality, and governance structures—have been highlighted, underscoring the need for frameworks that ensure ethical and transparent deployment in the public sector.

Studies focusing on specific digital government use cases have found that AI-powered systems can significantly improve responsiveness and accuracy of service delivery for example, by analyzing citizen-submitted data to accelerate municipal action suggesting a concrete link between AI integration and enhanced governance outcomes.

A growing body of empirical work examines the outcomes associated with GovTech adoption. Evidence suggests that GovTech can increase efficiency—by reducing administrative delays, redundancy, and cost of service delivery—and foster transparency through real-time data and digital traceability. The World Bank highlights GovTech's role in optimizing public resource allocation and improving transparency, enhancing trust in government performance. Importantly, some studies also emphasize the role of stakeholder trust and participation in mediating the effects of digital transformation.

For instance, research in a developing country context found that both AI-enabled automation and decision support systems enhanced stakeholder trust, which in turn influenced the overall success of digital governance reforms. Such findings surface citizen engagement as a crucial determinant of GovTech impact—linking technology adoption not only to efficiency metrics but to broader sociopolitical outcomes.

Despite these valuable contributions, important gaps remain. First, much of the literature addresses the technical and operational aspects of GovTech or isolated case studies of specific technology deployments, but there is limited integration of political economy perspectives that analyze how GovTech reshapes state power structures, public accountability, and institutional design. Second, while ethical concerns—such as AI governance frameworks and data protection—have been discussed, research rarely situates these issues within larger debates on democratic governance and power dynamics. Third, cross-national comparative studies are still sparse, especially those that contextualize GovTech trajectories within varying political and institutional regimes.

3.1 Research Gap

Existing scholarship has extensively examined e-governance in terms of digitization of public services, administrative efficiency, and online citizen interfaces. Much of this literature focuses on technical implementation, service delivery outcomes, and information systems management. While these contributions are valuable, they often treat digital technologies as neutral administrative tools rather than as forces that reshape political and institutional power relations. As a result, there remains a significant gap in understanding GovTech through a broader political economy lens.

First, limited research systematically explores how GovTech reconfigures state power. The integration of AI, big data, and digital infrastructures enhances the state's capacity for surveillance, predictive governance, and centralized data control. These developments may strengthen state authority and administrative reach, but they can also alter the balance between democratic oversight and technocratic decision-making.

Existing studies rarely analyze how data ownership, algorithmic control, and dependence on private technology providers reshape sovereignty and governance autonomy.

Second, there is insufficient attention to the implications of GovTech for public accountability. Although digital platforms are often associated with greater transparency, the increasing reliance on algorithmic systems introduces opacity in decision-making processes. Automated systems used in welfare distribution, law enforcement, or risk profiling may limit explainability and citizen recourse. The tension between transparency of outcomes and opacity of algorithms remains underexplored in governance studies, particularly in developing country contexts.

Third, the literature provides only limited insight into how GovTech transforms institutional structures within the public sector. Digital transformation is not merely an operational upgrade; it restructures bureaucratic hierarchies, redistributes authority across agencies, and fosters new forms of public–private collaboration. Traditional lines between policy formulation, implementation, and regulation become blurred in platform-based governance models. However, few studies examine these institutional shifts or their long-term implications for administrative norms, capacity, and public value creation.

Therefore, this paper addresses this gap by analyzing GovTech not simply as a technological innovation but as a structural transformation of governance, with significant consequences for state authority, accountability mechanisms, and institutional organization. By situating GovTech within political economy debates, the study contributes to a deeper understanding of how digital technologies are reshaping the nature of the modern state.

3.2 Research Objectives

The primary aim of this study is to examine the transformative role of Government Technology (GovTech) in contemporary public administration. Specifically, the study seeks to achieve the following objectives:

- To study the GovTech reshapes public sector functioning by examining changes in administrative processes, decision-making structures, and inter-agency coordination resulting from the integration of digital technologies such as artificial intelligence, big data analytics, cloud systems, and digital platforms.
- To assess the impact of GovTech on governance efficiency, transparency, and citizen engagement, with particular attention to improvements in service delivery speed, reduction of bureaucratic discretion, enhanced accountability through digital records, and the expansion of participatory mechanisms enabled by digital interfaces.
- To identify the key challenges and risks associated with digital transformation in the public sector, including institutional capacity constraints, digital exclusion, data privacy concerns, algorithmic bias, cyber security vulnerabilities, and the growing dependence on private technology providers.

Together, these objectives guide the study in evaluating GovTech as both an enabler of public sector modernization and a source of emerging governance complexities.

4. RESEARCH METHODOLOGY

This study adopts a qualitative research design with complementary elements of comparative case analysis and thematic policy interpretation. Given the multifaceted nature of GovTech and its evolving impacts on governance structures, a qualitative approach is best suited to capture both contextual nuances and political-institutional dynamics inherent in digital transformation processes (Creswell & Poth, 2018). The methodology draws on established methods in public policy research and digital governance studies to ensure rigor, reliability, and analytical depth. The research follows a multiple case study design, a widely accepted approach for studying complex phenomena within their real-world contexts (Yin, 2018). GovTech implementation varies significantly across political systems, administrative capacities, and socio-economic environments. Hence, multiple cases facilitate comparative analysis and help identify patterns as well as divergences in how GovTech reshapes public sector functioning, accountability, and institutional structures.

Two countries with differing governance models and digital maturity levels are included as primary cases:

- Case A: A developed digital governance leader (e.g., Estonia)
- Case B: A large developing country with major GovTech initiatives (e.g., India)

These selections enable cross-contextual insights into technological adoption and governance outcomes at both advanced and emerging digital transformation stages. Data for this research are collected using multiple sources and techniques to strengthen validity through method triangulation (Denzin, 1978; Patton, 2015). The principal methods include:

Documentary Analysis

Primary policy documents, strategic frameworks, white papers, and government reports related to GovTech initiatives are analyzed to capture official rationales, implementation pathways, and stated objectives of digital transformation programs (Bowen, 2009). Relevant reports from international organizations such as the World Bank, OECD, and UN E-Government surveys provide baseline comparative insights (OECD, 2024; World Bank, 2023).

Academic and Gray Literature Review

Peer-reviewed journal articles, conference proceedings, and reputable think-tank publications that examine GovTech, digital governance, AI adoption, and public sector transformation are systematically reviewed to contextualize empirical findings and theoretical debates (Webster & Watson, 2002).

4.1 Public Sector Transformation

GovTech-driven digital transformation reshapes multiple dimensions of public administration, extending beyond service digitization into institutional restructuring and governance innovation. The integration of digital technologies such as AI, data analytics, cloud platforms, and interoperable systems is redefining how governments deliver services, manage resources, ensure accountability, engage citizens, and design policies (OECD, 2024; World Bank, 2023).

4.1.1 Service Delivery

One of the most visible areas of transformation is public service delivery. Digital identification systems enable governments to uniquely authenticate citizens and provide targeted access to services such as healthcare, education, and social protection programs. E-health platforms facilitate telemedicine, digital health records, and real-time monitoring of health systems, while e-education systems expand access to learning resources and administrative services. In welfare governance, digital platforms and direct benefit transfer mechanisms reduce leakages, minimize intermediary roles, and improve timeliness of assistance. These systems significantly reduce bureaucratic red tape, processing delays, and transaction costs, aligning service provision with citizen-centric governance models (United Nations, 2020; World Bank, 2023).

4.1.2 Administrative Efficiency

GovTech enhances administrative efficiency by automating routine procedures such as document verification, compliance checks, and record management. Automation reduces human error and discretionary decision-making, streamlining workflows across departments. Data-driven decision-making further improves efficiency by enabling administrators to use real-time data and performance indicators to allocate resources more effectively. Smart budgeting tools and digital procurement systems increase transparency in financial management, reduce procurement fraud, and ensure better value for public expenditure. Such practices reflect the extension of performance-oriented governance associated with digital public management reforms (Dunleavy et al., 2006; OECD, 2024).

4.1.3 Transparency and Accountability

Digital governance platforms play a crucial role in strengthening transparency and accountability. Electronic record systems create traceable audit trails that reduce opportunities for corruption and manipulation of information. Open data initiatives make government datasets publicly accessible, enabling civil society and media to scrutinize public spending and policy outcomes.

Real-time monitoring dashboards used in sectors such as health, infrastructure, and welfare programs enhance oversight and allow quicker corrective actions. These developments demonstrate how GovTech can institutionalize accountability mechanisms within administrative systems (World Bank, 2023).

4.1.4 Citizen Engagement

GovTech also transforms state–citizen interaction by providing digital channels for participation and feedback. Online grievance redressal systems allow citizens to report issues and track responses, increasing administrative responsiveness. Participatory platforms enable consultation in policymaking processes, fostering collaborative governance. Governments increasingly use social media as a tool for information dissemination, crisis communication, and public engagement, creating more direct and dynamic communication channels between citizens and institutions. These tools support the development of more inclusive and interactive governance structures (OECD, 2024).

4.1.5 Policy Design and Implementation

Digital transformation enhances policy design and implementation through the use of AI and advanced analytics. Predictive models help forecast social and economic trends, enabling proactive policy interventions in areas such as public health, urban planning, and social welfare. Evidence-based governance is strengthened as policymakers can draw upon large datasets and real-time analytics to evaluate program performance and adjust strategies accordingly. This marks a shift from reactive policymaking toward anticipatory and adaptive governance models (Mergel et al., 2019).

4.1.6 Political Economy Implications

The expansion of GovTech represents not only administrative modernization but also a reconfiguration of power relations within the state, between governments and private actors, and among citizens themselves.

Digital transformation alters how authority is exercised, how resources are controlled, and how governance outcomes are distributed, making GovTech a central subject in the political economy of contemporary governance (Kattel & Mazzucato, 2018; World Bank, 2023).

4.1.7 Changing Role of the State

GovTech reshapes the traditional role of the state from a bureaucratic service provider to a data-driven, platform-based coordinator of governance. Decision-making increasingly relies on algorithmic systems, real-time data dashboards, and predictive analytics, shifting authority from individual administrators to technological infrastructures. This creates a more centralized yet automated form of governance, where states operate through digital platforms that integrate multiple services. While this can enhance efficiency, it also raises questions about democratic oversight when policy choices become embedded in technical systems rather than deliberative processes (Margetts & Naumann, 2017).

4.1.8 Power of Technology Firms in Governance

The political economy of GovTech is strongly influenced by the growing role of private technology companies. Governments often depend on external vendors for cloud infrastructure, AI tools, cybersecurity systems, and digital platforms. This dependence can create asymmetrical power relationships, where large tech firms gain influence over public sector operations and data governance frameworks. Public-private partnerships may accelerate innovation but also risk vendor lock-in, reduced state autonomy, and commercialization of public functions (Kattel & Mazzucato, 2018).

4.1.9 Data as a Governance Resource

In digital governance, data becomes a strategic public resource. Governments collect, process, and analyze vast volumes of citizen data to design policies, monitor programs, and predict trends. Control over data infrastructures enhances the state's capacity to intervene in social and economic life. However, data concentration also creates issues of ownership, security, and rights, particularly when datasets are shared with private actors.

The political economy dimension lies in how access to and control over data can shape policy priorities and distributional outcomes (World Bank, 2023).

4.1.10 Digital Divide and Inequality

Although GovTech aims to make governance more inclusive, it can also deepen digital inequalities. Populations lacking internet access, digital literacy, or access to devices may be excluded from essential services. Rural communities, the elderly, and marginalized groups are particularly vulnerable to exclusion in highly digitized governance systems. Thus, GovTech may inadvertently reinforce socio-economic disparities unless supported by inclusive infrastructure and capacity-building measures (OECD, 2024).

4.1.11 Surveillance and Democratic Concerns

The expansion of digital governance raises concerns about state surveillance and civil liberties. Digital ID systems, biometric databases, and real-time monitoring tools increase the state's ability to track individuals' activities. Without strong legal safeguards, these tools can be used for excessive surveillance, profiling, or political control. The tension between security, efficiency, and privacy represents a core political economy dilemma in GovTech adoption (United Nations, 2020).

This section presents the analysis of findings derived from documentary review, academic literature, and comparative case study evidence. Using thematic content analysis and cross-case comparison (Braun & Clarke, 2006; Miles, Huberman & Saldaña, 2014), the study identifies key patterns regarding how GovTech reshapes public sector functioning, accountability, and institutional structures.

4.1.12 Transformation of Public Institutions and Service Delivery

The data indicate that GovTech initiatives significantly reconfigure administrative processes by replacing manual, paper-based procedures with integrated digital platforms and automated systems. In both advanced digital states and emerging economies, digital identity systems, interoperable databases, and AI-supported platforms have reduced processing time and enhanced coordination across government agencies. This supports arguments that digital governance enables a shift from hierarchical bureaucracies toward platform-based administrative models (OECD, 2024).

Automation of routine administrative tasks such as document verification, benefit eligibility checks, and grievance registration has improved operational efficiency and reduced human discretion, which is often associated with delays and corruption (World Bank, 2023). However, findings also reveal that digital transformation does not eliminate bureaucracy; instead, it restructures institutional roles, creating new digital units, data governance authorities, and technology oversight bodies. This reflects the socio-technical nature of public sector transformation rather than a purely technological shift (Creswell & Poth, 2018).

4.1.13 GovTech and Accountability Mechanisms

Evidence from policy documents and secondary studies suggests that GovTech strengthens procedural transparency through digital record-keeping, audit trails, and open-data platforms. Real-time dashboards and data portals enable performance monitoring and reduce information asymmetry between government agencies and oversight institutions (World Bank, 2023). These tools enhance visibility of public expenditure and service outcomes, aligning with claims that digital governance can improve institutional accountability.

At the same time, the analysis reveals a paradox: while transparency of outputs increases, algorithmic decision-making introduces new forms of opacity. Automated welfare targeting, predictive risk scoring, and AI-supported decision systems may lack explainability, limiting citizen capacity to challenge administrative outcomes.

This aligns with broader concerns about algorithmic governance reducing interpretability and public oversight (Braun & Clarke, 2006). Therefore, GovTech produces a dual effect—enhancing data transparency while complicating procedural accountability.

4.1.14 Institutional Restructuring and Power Dynamics

Cross-case comparison shows that GovTech adoption often leads to the centralization of data governance within executive institutions, strengthening the state's analytical and monitoring capacity. National digital platforms integrate data from multiple agencies, enabling predictive policy design and coordinated responses to social challenges. This supports the political economy view that data becomes a strategic governance resource (OECD, 2024).

However, the analysis also highlights the expanding role of private technology firms in designing and managing public digital infrastructure. Public–private partnerships in cloud services, AI development, and digital platforms shift technical expertise and operational influence toward corporate actors. This reconfiguration of institutional roles alters traditional boundaries between public authority and market actors, raising concerns regarding dependence, vendor lock-in, and sovereignty over digital systems (World Bank, 2023).

4.1.15 Efficiency Gains Versus Digital Exclusion

The data confirm improvements in efficiency, speed of service delivery, and administrative cost reduction following GovTech adoption. Digital platforms streamline citizen–state interactions, minimizing physical visits and reducing transaction time. These findings correspond with NPM-inspired expectations of performance optimization in public administration.

Nevertheless, digital transformation also reveals persistent inequalities. Populations lacking digital literacy, internet access, or identification credentials may be excluded from digital services. This creates a risk of "digital bureaucracy," where access depends on technological capability rather than legal entitlement. Thus, while GovTech enhances system-level efficiency, it may reproduce social disparities if inclusion measures are insufficient (Miles et al., 2014).

4.1.16 Emerging Ethical and Governance Risks

Thematic analysis identifies several cross-cutting risks: data privacy vulnerabilities, cybersecurity threats, algorithmic bias, and reduced human oversight. These concerns illustrate that GovTech transformation extends beyond administrative reform into the domain of rights, ethics, and governance legitimacy. Ethical challenges emerge particularly where regulatory frameworks lag behind technological innovation, reinforcing the need for institutional capacity-building and legal safeguards.

4.1.17 Synthesis of Findings

Overall, the analysis demonstrates that GovTech constitutes a structural transformation rather than incremental modernization. It enhances efficiency and transparency while simultaneously reshaping accountability structures, redistributing institutional power, and introducing new ethical complexities. The findings support the study's central argument that digital governance is a political and institutional shift, not merely a technological upgrade.

5. BENEFITS OF GOVTECH

The adoption of GovTech offers significant advantages for modern public administration by improving efficiency, accountability, and responsiveness. Digital technologies reduce operational costs by automating routine tasks, minimizing paperwork, and streamlining administrative workflows, thereby enhancing cost efficiency in governance (OECD, 2024). Automated systems and integrated platforms also enable faster service delivery, reducing waiting times and improving citizen satisfaction.

GovTech contributes to reduced corruption by creating traceable digital records and minimizing discretionary human intervention in processes such as procurement, licensing, and welfare distribution. Electronic audit trails and real-time monitoring strengthen oversight mechanisms (World Bank, 2023). Additionally, digital platforms have the potential to foster inclusive governance by extending services to remote and underserved populations through mobile and online channels, provided access barriers are addressed (United Nations, 2020).

Another major benefit lies in crisis management. During pandemics and natural disasters, digital tools enable real-time data sharing, contact tracing, resource tracking, and rapid benefit transfers, enhancing the state's capacity to respond to emergencies. Such adaptive governance mechanisms demonstrate the resilience-building potential of GovTech (OECD, 2024).

6. CHALLENGES AND RISKS

Despite its benefits, GovTech adoption presents multidimensional challenges that may limit its effectiveness and raise political and ethical concerns.

6.1 Institutional Challenges

Digital transformation often encounters bureaucratic resistance due to entrenched administrative cultures and fear of job displacement. Public institutions may lack the technical expertise required to manage complex digital systems, resulting in capacity gaps. Without adequate training and institutional reform, technology investments may not translate into improved governance outcomes (Mergel et al., 2019).

6.2 Ethical and Legal Issues

GovTech raises serious data privacy concerns as governments collect and store vast amounts of personal information. Weak legal frameworks can expose citizens to data misuse. Moreover, algorithmic bias in AI systems may reinforce social inequalities if decision-making models are trained on biased datasets. The expansion of digital monitoring tools also raises fears of a surveillance state, where governance efficiency comes at the expense of civil liberties (United Nations, 2020).

6.3 Economic Challenges

The implementation of GovTech systems involves high initial costs related to infrastructure, cybersecurity, and system maintenance. Many governments depend on external vendors for digital infrastructure, creating long-term reliance on private technology firms.

This dependency can weaken state autonomy and raise concerns about data sovereignty and vendor lock-in (Kattel & Mazzucato, 2018).

6.4 Digital Divide

A critical risk is the persistence of the digital divide. Rural–urban disparities in internet connectivity and device access, along with low digital literacy among vulnerable groups, can lead to the exclusion of certain populations from digital services. Without inclusive policies, GovTech may inadvertently deepen socio-economic inequalities (OECD, 2024).

7. CASE STUDY

This section presents findings from the comparative analysis of two GovTech cases representing different governance contexts: Estonia as a digital governance pioneer and India as a large developing economy implementing large-scale GovTech reforms. The cases illustrate how GovTech transforms service delivery, accountability, and institutional structures, while also revealing contextual differences in outcomes and risks.

7.1 Case Study I: Estonia — The Digital State Model

Estonia is widely recognized as one of the most advanced digital states, having integrated digital infrastructure into nearly all aspects of governance. Its GovTech ecosystem is built around digital identity, interoperability platforms (X-Road), blockchain-based data integrity systems, and cloud-enabled public services.

- Service Delivery Transformation: Digital ID enables citizens to access almost all public services online, including healthcare records, taxation, voting, and business registration. Administrative procedures that previously required physical interaction are now automated and platform-based, demonstrating a shift toward paperless governance. This aligns with literature emphasizing GovTech's capacity to streamline processes and reduce transaction costs.
- Accountability and Transparency: Estonia's digital infrastructure ensures traceability of data access, meaning that citizens can see which officials accessed their information.

This digital auditability strengthens institutional accountability and reduces discretionary misuse of information. Open data initiatives further support public oversight and performance evaluation.

- Institutional Change:GovTech in Estonia has led to a restructuring of public administration toward interoperable, data-driven governance. Agencies operate through shared digital infrastructure rather than siloed systems. However, this integration also centralizes data management, increasing the strategic importance of cybersecurity and data protection.
- Risks:Despite success, concerns persist about cyber threats and overreliance on digital infrastructure. The 2007 cyberattacks on Estonia highlighted vulnerabilities associated with digital dependence.

8. CASE STUDY II: INDIA — SCALE AND INCLUSION CHALLENGES

India represents a contrasting case where GovTech is deployed at mass scale within a complex socio-economic environment. Major initiatives include Aadhaar (digital ID), UPI (digital payments infrastructure), Direct Benefit Transfer platforms, CoWIN vaccination system, and digital public service portals.

- Service Delivery Transformation: GovTech has enabled targeted welfare distribution through biometric identity verification, reducing leakages in subsidy systems and improving delivery speed. Digital payment platforms have expanded financial inclusion, enabling direct transfers to beneficiaries and reducing intermediaries.
- Accountability and Transparency: Digital databases and transaction records improve monitoring of welfare schemes and public spending. Real-time dashboards used in health and vaccination programs demonstrate the role of data analytics in governance oversight. However, unlike Estonia, citizen visibility over data access remains limited.
- Institutional Change: India's GovTech ecosystem involves extensive public–private collaboration, with private firms playing a role in infrastructure development. Digital transformation has created new specialized agencies and technology units within government, but also reveals capacity gaps at local administrative levels.

- Risks and Inequality: Digital divide issues are more pronounced in India. Populations lacking digital literacy or reliable internet access face barriers to accessing services. Data privacy concerns and debates over surveillance highlight the tension between efficiency and rights protection in large-scale digital governance.
- Comparative Insights

Dimension	Estonia	India
Digital Maturity	Highly integrated digital state	Rapidly expanding, large-scale system
Service Delivery	Nearly fully digital	Hybrid (digital + physical)
Accountability	Strong digital auditability	Improved monitoring, limited citizen control
Institutional Structure	Interoperable state platforms	Multi-layered with public–private partnerships
Key Risk	Cybersecurity dependence	Digital exclusion, privacy concerns

- Overall Findings: The comparative evidence shows that GovTech transformation is context-dependent. Estonia illustrates how mature digital governance can institutionalize transparency and efficiency, while India demonstrates how GovTech can operate at scale to improve welfare delivery but faces greater challenges related to inclusion and regulatory oversight. Both cases confirm that GovTech reshapes governance structures, strengthens state capacity, and introduces new political and ethical complexities.

9. DISCUSSION

This study set out to examine GovTech as a driver of public sector transformation, focusing on institutional change, accountability, and emerging governance challenges. The findings from the comparative cases demonstrate that GovTech is not merely an administrative modernization tool but represents a structural reconfiguration of governance, aligning with broader debates in digital governance and political economy.

9.1 From Bureaucratic State to Platform State

The evidence shows a clear shift from traditional rule-based bureaucracies toward what can be described as a platform-based state model. Instead of fragmented administrative silos, public institutions increasingly operate through interoperable digital systems that centralize data and automate procedures. This transition reflects principles associated with New Public Management (NPM)—efficiency, performance measurement, and results-oriented governance—but extends further by embedding algorithmic decision systems and predictive analytics into governance processes.

Digital platforms reduce transaction costs and processing time, confirming that GovTech improves operational efficiency. However, rather than eliminating bureaucracy, technology reorganizes it. New digital agencies, data governance bodies, and cybersecurity units emerge, suggesting that transformation is institutional, not merely technical. This supports the view that digital governance is a socio-technical shift involving structures, skills, and norms.

9.2 Transparency Versus Algorithmic Opacity

The second research question examined whether GovTech enhances accountability. Findings indicate that GovTech improves procedural transparency through digital records, audit trails, and real-time monitoring dashboards. These tools reduce opportunities for corruption and information asymmetry, supporting claims that digital systems can strengthen oversight mechanisms.

Yet, the analysis reveals a critical tension: as governance becomes data-driven, decision-making increasingly relies on algorithmic systems that lack transparency. Citizens may see outcomes but not understand the logic behind automated decisions. This creates a form of “algorithmic opacity,” where accountability mechanisms become technically complex and less accessible to public scrutiny. Thus, GovTech simultaneously strengthens and complicates accountability structures.

9.3 Reconfiguration of Power in the Digital State

From a political economy perspective, GovTech redistributes power across institutions. Data becomes a central resource of governance, increasing state capacity for monitoring, coordination, and predictive policymaking. This enhances the state's analytical authority but also centralizes control within executive data infrastructures. At the same time, the growing involvement of private technology firms in developing and maintaining digital platforms shifts influence toward corporate actors. Public–private partnerships create dependencies in critical infrastructure such as cloud services and AI systems. This blurs traditional boundaries between public authority and market power, raising concerns about sovereignty, vendor lock-in, and regulatory capacity.

9.4 Efficiency Gains and Social Inequality

While GovTech improves speed and cost-efficiency, findings show that digital inclusion remains uneven. In contexts with limited connectivity or digital literacy, citizens risk exclusion from essential services. This suggests that GovTech can unintentionally reproduce structural inequalities unless accompanied by inclusive access policies. Efficiency therefore does not automatically translate into equitable governance.

9.5 Ethical Governance in the Age of Automation

The study also highlights emerging ethical challenges—data privacy risks, cybersecurity vulnerabilities, and algorithmic bias. These issues underscore that GovTech operates at the intersection of administration and rights. Without robust legal and institutional safeguards, digital governance may erode trust and democratic legitimacy despite efficiency gains.

9.6 Theoretical Implications

The findings contribute to theory in three ways:

- Extending NPM: GovTech moves beyond managerial efficiency toward algorithmic and data-centric governance.
- Digital Governance Theory: Technology becomes embedded in governance structures, not just service interfaces.

- Political Economy of Technology: GovTech reshapes power relations between state institutions, citizens, and private firms.

10. OVERALL INTERPRETATION

GovTech represents a paradigm shift in state functioning. It enhances efficiency and administrative capacity while introducing new accountability dilemmas, institutional realignments, and ethical complexities. The future of public sector transformation will therefore depend not only on technological innovation but on governance frameworks that balance performance, equity, and democratic oversight.

11. POLICY RECOMMENDATIONS

The findings of this study indicate that GovTech offers substantial potential to enhance efficiency, transparency, and responsiveness in public administration. However, without appropriate safeguards and institutional reforms, digital transformation may deepen inequalities, weaken accountability, and create new governance vulnerabilities. The following policy recommendations aim to ensure that GovTech contributes to inclusive, ethical, and sustainable public sector transformation.

11.1 Strengthen Institutional Digital Capacity

Governments must invest in building digital skills and technical expertise within public institutions. Dependence on external vendors can undermine state autonomy and long-term sustainability of GovTech systems. Capacity-building should include:

- Training civil servants in data literacy and digital governance
- Establishing specialized digital governance units
- Encouraging interdisciplinary collaboration between technologists and policymakers

Institutional readiness ensures that technology adoption becomes a governance reform rather than a superficial modernization effort.

11.2 Establish Robust Data Governance and Privacy Frameworks

As GovTech relies heavily on data, strong legal and regulatory frameworks are essential to protect citizens' rights. Governments should:

- Enact comprehensive data protection laws
- Define clear rules for data access, storage, and sharing
- Ensure independent oversight bodies for data governance
- Mandate transparency in algorithmic decision-making

These measures help balance innovation with individual rights and maintain public trust.

11.3 Promote Algorithmic Transparency and Accountability

AI-driven governance must be subject to explainability standards. Public agencies should:

- Conduct algorithmic impact assessments
- Provide mechanisms for citizens to challenge automated decisions
- Ensure human oversight in critical decision-making areas
- Adopt ethical AI guidelines

Transparency in automated systems prevents the emergence of opaque "black box" governance.

Ensure Inclusive Digital Access

To avoid digital exclusion, GovTech reforms must be accompanied by inclusive access policies, including:

- Expansion of digital infrastructure in rural and underserved regions
- Digital literacy programs for marginalized populations
- Maintaining hybrid service models (digital + physical) during transition periods
- Equity should be a central objective of digital governance strategies.

11.4 Strengthen Cyber security and System Resilience

Digital governance systems are vulnerable to cyber threats. Governments should:

- Invest in national cyber security frameworks
- Conduct regular risk audits and system testing
- Develop contingency plans for digital infrastructure failures

Resilience is critical to maintaining continuity of essential services.

11.5 Regulate Public–Private Partnerships in GovTech

While private firms bring innovation, clear frameworks must guide collaboration:

- Transparent procurement and vendor accountability standards
- Avoidance of vendor lock-in through open standards
- Clear delineation of data ownership and intellectual property

This preserves public interest and prevents excessive corporate influence over governance systems.

11.6 Foster Citizen Participation in Digital Governance

GovTech should enhance democratic engagement, not replace it. Governments should:

- Use digital platforms for participatory policymaking
- Encourage citizen feedback mechanisms
- Promote open-data initiatives

Participation strengthens legitimacy and ensures technology aligns with societal needs.

11.7 Develop Integrated GovTech Strategies

Rather than fragmented digital projects, governments should adopt whole-of-government digital transformation strategies that align technology with long-term development goals and public value creation.

11.8 Overall Policy Direction

GovTech should be guided by the principle of "technology serving governance, not governance serving technology."Sustainable transformation requires balancing efficiency with accountability, innovation with rights protection, and digital advancement with social inclusion.

CONCLUSION

This study has examined the transformative potential of GovTech in modernizing public sector governance, using a comparative analysis of Estonia and India to highlight both opportunities and challenges. The findings indicate that GovTech is not merely a set of digital tools for service delivery; it represents a structural shift in the functioning of the state, reshaping administrative processes, accountability mechanisms, institutional structures, and citizen engagement. GovTech enhances efficiency, transparency, and responsiveness by streamlining administrative procedures, enabling real-time monitoring, and facilitating data-driven decision-making. In Estonia, GovTech has institutionalized nearly paperless governance with high citizen trust and strong audit mechanisms, whereas in India, large-scale deployment has improved welfare distribution and financial inclusion but also exposed digital inequalities and regulatory gaps. These cases demonstrate that the impact of GovTech is context-dependent, influenced by institutional capacity, regulatory frameworks, digital literacy, and socio-economic factors.At the same time, the study identifies significant challenges associated with digital transformation. Algorithmic opacity, data privacy risks, cyber security vulnerabilities, overreliance on private technology providers, and digital exclusion highlight that technology adoption alone cannot guarantee effective governance. Ethical and political considerations must guide GovTech implementation to ensure that technological efficiency does not compromise democratic accountability, equity, or citizen rights. From a theoretical perspective, GovTech extends New Public Management principles by introducing data-driven and automated governance, while also engaging Digital Governance and Public Value frameworks to assess outcomes in societal and ethical terms. The study's political economy lens further emphasizes that GovTech reshapes the

distribution of power between state institutions, citizens, and private actors, requiring careful regulation and inclusive policies.

In conclusion, GovTech represents a paradigm shift in public sector governance, offering substantial opportunities for modernization and citizen-centric service delivery. Its long-term success, however, depends on robust institutional capacity, ethical frameworks, inclusive access policies, and regulatory oversight. Governments seeking to harness the full potential of digital transformation must adopt a holistic approach that balances efficiency, transparency, and innovation with equity, accountability, and democratic legitimacy.

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CHAPTER 2
INCLUSIVE CONNECTIVITY FOR BRIDGING THE DIGITAL DIVIDE
A CASE STUDY IN MEXICO

[1]Daniel Sánchez OVANDO
[2]Dr. María Cruz Cuevas ÁLVAREZ
[3]Dr. Marcos Pérez MENDOZA

[1]Universidad Juárez Autónoma de Tabasco, danisanchezovandopc@gmail.com
[2]Universidad Juárez Autónoma de Tabasco, mariacruz.cuevas.ujat@gmail.com, ORCID ID: 0000-0003-2349-5344
[3]Universidad Juárez Autónoma de Tabasco, marcos77pm@gmail.com, ORCID ID: 0000-0003-4911-4757

INTRODUCTION

Small businesses play a crucial role in achieving wider social and economic objectives, particularly in generating employment, which positions them as a key driver of sustainable development. This term refers to economic growth that simultaneously safeguards the environment and addresses social challenges by maintaining equilibrium among economic, environmental, and social dimensions. Small, and Medium Enterprises [SMEs] are increasingly recognized as pivotal actors in advancing sustainable economic and social progress (Olubiyi, 2022). SMEs play a key role in developing countries but also in their contributions to achieving Sustainable Development Goals [SDGs] that directly benefit poor or vulnerable populated areas (Dasaraju & Tambunan, 2023), becoming the most important segment of any economy for their contribution to national economic growth and employment (Kumar & Suppiah, 2023).

In Mexico, SMEs tend to be family-owned, managed, and operated, with a paternalistic leadership that has been maintained under the thought of businesses will care for employees. One of the main difficulties SMEs' owners face is to insert themselves into a crowded marketplace. Another difficulty is encountered by rural-based micro-enterprises looking for a greater footprint in the marketplace and can achieve it via internet access (Silva Rodríguez de San Miguel, 2017).

SMEs represent 99.8% of economic units and generate 52% of the GDP. They have historically faced many barriers such as logistical and regulatory ones, but one that has remained and generates a digital divide to the date is the technological gap (Pueyrredon, 2024). Internet is the most appropriate means to promote businesses when access is available and at an affordable price. But in rural areas when it is provided by large five companies, it becomes expensive. Understanding this necessity, people have changed from being internet users to dealers, by setting up a software to generate internet tokens at prices ranging from 10 pesos by the hour to 30 pesos a day (Ríos, 2022).

In Tabasco, internet access in rural areas has suffered a dramatic transformation; however, in many communities, people still struggle with limited options and slow speeds.

Internet is crucial for businesses, online education, and digital services, and a company that can provide this commodity becomes the internet solution for a specific population (Devasia, 2025).

The aim of this case study is to characterize the creation and establishment of a connectivity startup launched during a period of economic crisis in southeast Mexico oriented towards sustainable entrepreneurship and inclusive connectivity. This research utilized a case study approach to analyze the ways in which the Fibre-X startup contributes to and affects the surrounding community. The techniques implemented were literature review and an-in-depth interviews to the entrepreneur.

From the findings, this growing and sustainable startup operates with towers based on renewable energy, chatbot integration for customer service, and the continuous improvement of the network and the coverage, implements promotion through Social Media, and with no direct competitors in the market, it has the opportunity of expanding to other communities due to the lack of coverage by the detected and established competitors, making it an appealing case to be discussed.

1. DEVELOPMENT

The reviewed studies on reveal a growing yet fragmented body of knowledge at the intersection of Sustainable Entrepreneurship and Inclusive Connectivity in SMEs. On one hand, research on inclusive business models and sustainable entrepreneurship demonstrate that digital technologies, when embedded in entrepreneurial ecosystems, contribute to poverty reduction, inequality mitigation, and sustainable economic development in Works of Mejía Trejo et al. (2021); Fuerst et al. (2023) and Pigola et al. (2024).

These Works highlight digital Access, literacy, and security as enabling conditions for sustainability-oriented ventures. However, most empirical evidence is concentrated either at the firm level with limited simples or at a macro-regional level using aggregated indicators leaving a meso-gap that connects local entrepreneurial practices with community-level connectivity outcomes.

Moreover, while sustainable development is frequently invoked as a conceptual framework, few studies explicitly operationalize the Sustainable Development Goals beyond general associations, and inclusive connectivity is often treated as an external condition rather than as a strategic component of entrepreneurial design.

Table 1. Literature review on Sustainable Entrepreneurship and Inclusive Connectivity in SME

Author & Year	Topic	Research Method	Objective	Findings/Results
Mejía Trejo et al. (2021).	Inclusive business model in fruit sector SMEs.	Mixed method	To validate a business model for SMEs.	This IB conceptual model would be applied to attempt and solve the goals described in the 17 Sustainable Development Goals by the United Nations (UN, 2015): 1 No poverty and 10 Reduce inequalities.
García-Mora (2021).	Impact of internet access on poverty: a regional analysis of rural Mexico.	Quantitative, quasi-experimental.	One objective was: To determine the internet access of the population as well as to education, household, security, and healthcare services.	Internet access could assist in helping people live out of poverty in rural areas. The government should implement policies to even the internet diffusion in the rural areas.
Matracia et al. (2023).	Bridging the digital divide.	Qualitative	To summarize the recent developments aimed at bridging such inequality from a technical and economic st.	The economic aspect which hinders digital inclusion.

Author & Year	Topic	Research Method	Objective	Findings/Results
Hoyos Muñoz et al. (2023).	Trends and challenges of digital divide and digital inclusion.	Bibliometric analysis 849 documents out of 1036.	To know what the trends and challenges in digital divide and inclusion studies were.	Mexico did not appear in the listed countries studying these topics. Sustainable development was the most visualized concept. The gap between countries, cities and rural areas according to the concept digital divide. No case studies are mentioned.
Fuerst et al. (2023).	Digital technology within the business model of sustainable entrepreneurship.	Qualitative, in-depth interviews and screening of company documents.	To know the role of digital technologies in the creation of sustainable entrepreneurship.	9 entrepreneurs interviewed with businesses related to households, furnitures, fertilizers, and food for animal and human consumption.
Hernández et al. (2024).	Towards digital inclusion in rural transformation.	Technical report by FAO-UN.	Not indicated	Addressing digital divides is more likely to result in an inclusive digital rural transformation.
Pigola et al. (2024).	Digital Entrepreneurial ecosystems on sustainable development in Latin America.	Quantitative, regression analysis.	To analyze Digital Entrepreneurial Ecosystems components across 14 Latin American countries.	Sustainable economic development from 2013 to 2022 was related to digital access, digital literacy and digital security services.

Author & Year	Topic	Research Method	Objective	Findings/Results
Ghosh & Bhatia (2025).	Bridging the digital divide.	Systematic literature review of global case studies, and digital literacy as a precondition for inclusive connectivity.	To demonstrate the pivotal role digital finance plays as a driver of sustainable development.	Mobile banking, mobile money and microfinance platforms increase Access and empowerment in financial transactions.
Madon & Masiero (2025).	Digital connectivity and the SDGs.	Qualitative, critical discourse analysis.	To strengthen theoretical understanding of institutional resilience and the use of ICTs for attaining the SDGs.	The analysis included Italy, Mexico, South Africa, and Indonesia as countries which engaged in connectivity policy innovation during the Covid-19 pandemic.
Silva León et al. (2025).	Digital Technologies for Young Entrepreneurs in Latin America.	Quantitative, Bibliometric and systematic review (2018-2024): 74 case studies.	Not indicated	Contexts traditionally considered "limited" generate innovations with potential for reverse transfer to developed economies.

From the perspective of inclusive connectivity, the literature underscores the persistent digital divide across rural-urban, regional, and national contexts in García-Mora (2021), Matracia et al. (2023), Hoyos Muñoz et al. (2023) and Hernández et al. (2024). Evidence consistently points to economic constraints uneven infrastructure diffusion, and limited digital literacy as structural barriers to inclusion, particularly in rural areas. Notably, Mexico appears underrepresented in comparative and case-based studies, despite being identified as a country engaged in connectivity policy innovation during the pandemic of Covid-19 in Madon & Maiero (2025).

This absence of localized, empirical case studies constitutes a significant research opportunity. Integrating sustainable entrepreneurship with inclusive connectivity research, especially through context-sensitive case studies in rural and marginalized settings, it could advance understanding of how digital finances, mobile connectivity, and grassroots innovation ecosystems function as co-evolving drivers of inclusive and sustainable development as mentioned by Ghosh & Bhatia (2025) and Silva León et al. (2025). Such an integrative agenda would move the field beyond descriptive analyses of the digital divide towards actionable models that align entrepreneurial innovation with long-term social and territorial inclusion.

2. METHOD

The objective of this case study is to characterize the creation and establishment of a connectivity startup launched during a period of economic crisis in southeast Mexico oriented towards sustainable entrepreneurship and inclusive connectivity. The proposed research question for the study was: How did the intersection of economic crisis and regional socio-economic constraints influence the creation, establishment, and strategic evolution of a connectivity startup in Southeast Mexico committed to sustainable entrepreneurship and inclusive connectivity?

The justification for this study is of practical significance because the problem was affecting people in a rural area, and because it illustrates a unique insight, reveal hidden issues and provide rich and vicarious experience.

This single case study in words of Yin (2018: p. 50) is “an empirical method that seeks to research a contemporary phenomenon in depth and within its real-world context, and the boundaries between phenomenon and context may not be clearly evident”, in other words it is a “realist perspective where objectivity is maintained through the methodological process within the design” (Harrison et al., 2017). The techniques implemented were documentary analysis, literature review and an-in-depth interview to the entrepreneur.

The documentary analysis (Scott, 2006) involves the use of primary and secondary materials and includes four criteria: authenticity, credibility, representativeness, and meaning.

The literature review (Snyder, 2019) is where the relevant literature on the subject is essential for defining the aim of the study and justify the research question. For this matter, only bibliometric or systematic literature review articles were selected, as they had already conducted an-in-depth analysis on the topics Sustainable Entrepreneurship and Inclusive Connectivity in SMEs. 386 articles were found to the related topics, but after a critical revision, only 10 were selected to be closely similar to the intention of this study. 10 articles were detected and were presented in a comparative table, including a summary on the topics previously mentioned as well as the research method implemented.

The in-depth interview (Rutledge & Hogg, 2020) allows to obtain detailed information that provide light on an individual's perspective, experiences, or feelings; the interview guide is in the appendix section at the end of this chapter.

This case follows the model presented by Vallejo Bojorque et al. (2024), and this research is described according to that format as it follows:

- Background
- Philosophy
- Mission
- Vision
- Customers
- Types of administrative tools implemented
- Business Model and Business Plan

The information was collected and analyzed from January 2024 to October 2025. The entrepreneur kindly shared the administrative tools of analysis, such as PEST, SWOT and Lean Canvas.

PEST: A political, economic, social, and technological [PEST] analysis is a method used by businesses to assess external factors that influence their operations and competitive environment.

SWOT: An analysis method used to evaluate the strengths, weaknesses, opportunities, and threats [SWOT] involved in an organization.

Lean Canvas: It is a one-page business plan focused on startups, which helps analyze and validate a business idea by breaking it down into nine key components, as if t were a map of the startup.

The in-depth interview was conducted in the summer of this year, considering the time and availability of the entrepreneur, and to be able to physically observe operations in situ. The findings are explained through a narrative beginning from the background of the startup, context, challenges and opportunities, as well as the resolution and impact on the community where it operates, using the positive information and the transformation that has occurred. In summary:

- Case definition: Single case, startup called Fibre-X.
- Research question: How did the intersection of economic crisis and regional socio-economic constraints influence the creation, establishment, and strategic evolution of a connectivity startup in Southeast Mexico committed to sustainable entrepreneurship and inclusive connectivity?
- Information collection: interview, observations, and documents, to gather rich, detailed data.
- Information analysis: Collate information into a manageable form, look for patterns, and construct a narrative to characterize this case.
- Validity and rigor: To ensure the study's credibility the information obtained from the interview, the unit of analysis, and the information from documents, was cross-referenced and checked.

3. FINDINGS

The business is located in a rural area of the municipality of Nacajuca, Tabasco, specifically near El Pastal (coordinates 18.2022750, -92.9320520). The surrounding area is characterized by low population density, scattered housing, agricultural areas, dirt roads, and abundant vegetation typical of the Tabasco tropics.

This environment offers natural conditions such as clean air, low environmental pollution, and tranquility, which is favorable for activities requiring a quiet environment and ample space. However, it also presents challenges such as limited urban infrastructure (drainage, paving, public transportation, and telecommunications services), which impacts the business's logistical and operational planning.

Despite these limitations, the rural environment represents a strategic opportunity to offer technological solutions (such as internet access) where there is still a marked lack of services, favoring the positioning of the business as an essential provider in the region.

Strategic Rationale for Location

Fibre-X has established this rural center as internet access and distribution point for marginalized communities where stable connectivity was previously unavailable. This decision is part of a digital inclusion project that aims to reduce the digital divide by providing fiber optic services to homes, rural schools, and small businesses such as grocery stores and local workshops.

The choice of location, near El Pastal in Nacajuca, Tabasco, is based on key strategic factors: low competition in internet services, high unmet demand, and the potential to positively impact the region's social and economic development. Furthermore, it is an area with broad coverage extending to neighboring communities, facilitating future expansion through phased infrastructure expansion. Establishing operations in this area also allows for reduced operating costs compared to urban areas and positions Fibre-X as a key player in the digital transformation of the rural environment.

Background

Fibre-X, the local internet company provider, was originally conceived as a technological initiative with the objective of providing band-width internet service for historically marginalized rural and suburban communities located in Ranchería Pastal in the municipality of Nacajuca in Tabasco, Mexico. The internet service is offered in both options fibre optics and wireless services, strategically adapted to the geographic conditions of the region. Fibre-X offers a reliable solution for home activities, local businesses, educational, and government institutions through competitive connectivity plans.

Philosophy

Commitment to Community Development: Fibre-X not only seeks economic benefits but also aims to foster the social and economic growth of the communities it serves by facilitating access to online education, communication, and digital entrepreneurship. This responsible approach strengthens its reputation and long-term impact.

These competitive advantages make Fibre-X an attractive, efficient, and reliable option for users who require quality internet access in underserved regions, allowing it to solidify its position as a leader in its segment.

Values

Innovation: We use advanced technologies and tailored solutions to bring high-speed internet to rural areas, overcoming technical and geographical challenges.

Social Commitment: We work to close the digital divide, promoting social inclusion and economic development in underserved communities.

Quality: We offer reliable, high-speed internet service, guaranteeing customer satisfaction.

Sustainability: We seek economically viable and environmentally responsible solutions to ensure a positive long-term impact.

Accessibility: We provide services at competitive prices, ensuring accessible connectivity for everyone regardless of their location.

Mission

To offer high-quality fiber optic internet services and wireless technologies in rural areas, facilitating access to education, teleworking, and digital services, contributing to reducing the digital divide and improving the quality of life of our users.

Vision

To be the leading provider of high-speed internet in rural areas, driving digital inclusion and socioeconomic development in underserved communities, providing reliable and accessible connectivity for all.

Customers

The target market is families who need connectivity for online education, entrepreneurs who use digital platforms, local micro-businesses operating from areas with limited access to digital infrastructure, and general users seeking a stable, fast, and personalized service. We also have a presence in the surrounding communities of Nacajuca, and looking to expand progressively to other rural regions of the state.

General Objective

To provide high-speed, high-quality internet services in rural and suburban areas,

through accessible and sustainable technological solutions, in order to reduce the digital divide and improve connectivity for communities with limited access to digital services.

Strategic Objectives

- To position Fibre-X as the leading internet provider in rural and suburban areas of Tabasco, offering a reliable, affordable, and high-quality service.
- To consolidate the necessary infrastructure and operations for scalable and sustainable expansion in the short and medium term.
- To attract and retain 1,000 new customers through digital campaigns, local fairs, and business visits in the first year.
- To guarantee a stable, high-speed service, maintaining 95% network availability.
- To optimize the technological network with modern equipment and continuous preventative maintenance throughout the year.

Business Model

A business model identifies the products or services a company plans to sell, its target market, and projected expenses in order to define how to generate revenue. It is necessary for startups established companies, but also for startups (Kopp, 2025).

Fibre-X has opted for the generic strategy of focused business related to the market segment and within that niche, to apply differentiation:

- Families in rural and suburban areas with limited internet access.
- Micro and small businesses (shops, and small businesses).
- Digital entrepreneurs in remote communities.

By offering the following differentiation traits, an added value is highlighted compared to the offer provided by competitors:

- Stable and fast internet where others don't reach.
- Competitive rates with no hidden clauses.
- Fast installation and local technical support.
- Customized options for young families with school-aged children and people of all ages who need internet at home.

Key resources that the entrepreneur of the startup has:

- Tower and fiber optic infrastructure.
- Transmission equipment.
- Trained technical personnel.
- Digital customer service and monitoring platform.
- Partnerships with internet service providers.

Regarding the unfair advantage, the following can be noted:

- Presence and experience in areas where the competition does not operate.
- Close relationship with the local community and earned trust.
- Own infrastructure of towers and strategic links.

Channels of distribution implemented:

- Official website and mobile app.
- Social media (Facebook, Instagram, and WhatsApp).
- Word-of-mouth referrals and promotions.

Scalability towards sustainability with Diversified Internet Plans:

Different internet packages will be offered, varying in speed, capacity, and price, allowing us to cater to different customer profiles:

- Basic Plan: Ideal for light browsing, access to social media, and educational platforms.
- Intermediate Plan: Designed for families or small businesses with moderate internet usage.

- Advanced Plan: Designed for users with high data consumption, video calls, remote work, or streaming services.
- Customized Business Plans: For businesses that require stability and higher bandwidth.

Business Plan

As for the business plan, it must describe the company or proposed project accurately and attractively. The plan must detail the company's or the project's present status, current needs, and expected future. Ongoing and changing resource requirements, marketing decisions, financial projections, production demands, and personnel needs must be justified in a logical and convincing fashion (Rich & Gumpert, 2025).

Table 2. Comparison with competitors

Competitor	Coverage	Strengths	Weaknesses
Starlink	International and national (satellite service).	High speed, global coverage, and low latency.	High cost in installation and monthly payment.
Telmex	National (urban and semiurban).	Known and established brand, good infrastructure, and integrated services.	Scarce rural coverage, and slow processes.
Totalplay	Urban and presence in some suburban areas.	Pure fibre optics, good speed, and efficient technical support.	More complex infrastructure, and limited services in rural areas.
Wizz Plus	Rural and small communities.	Accessible prices, and coverage in distant areas.	Unstable service, and limited technology.
Ruralnet	Rural and suburban areas.	Competitive prices, focuses on unattended communities, personalized assistance.	Own limited infrastructure with coverage in process of expansion.
Fibre-X	Rural and suburban areas.	Competitive prices, historically unattended communities, personalized assistance, and scalable plans.	Own towers and infrastructure with solar pannels, fibre optics and wireless connectivity rural coverage and in process of expansion.

Promotional Strategy

At Fibre-X, it is believed that connecting people is more than just offering a service: it's about building trust, fostering a sense of connection, and creating value in every community reached. Reason why the promotional strategy is focused on presenting the services clearly, directly, and empathetically, highlighting the real benefits provided to their clients:

Social Media Promotion

Using platforms like Facebook, Instagram, and WhatsApp to reach our audiences quickly and effectively. Publishing informative content, promotions, customer testimonials, short videos, and paid ads targeted by location. This channel allows to interact directly with users, answer questions, and build trust in real time.

Community Activations

To hold in-person events in rural and suburban communities, where service demonstrations are shown, informational talks, free installation for on-the-spot sign-ups, and promotional gifts. These activities allow us to have close contact with residents and showcase the quality of our connection live.

Strategic Alliances

To establish agreements with community leaders, schools, local businesses, and neighborhood committees to jointly promote the service. These alliances strengthen our local presence and help us build credibility through direct referrals.

Local Advertising

To promote services through public address announcements, banners in key locations, posters in grocery stores, local public transportation, and ads on community radio stations. In this way, reaching people who are not always connected to the internet.

Added Value

The integration of fibre optics and Wireless technology represents a strategic advantage for Fibre-X. This hybrid model maximizes connectivity reach, optimizes operational costs, and accelerates deployment in areas where full fibre installation is not viable. By combining the speed and stability of fibre with the flexibility of wireless delivery, Fibre-X ensures a reliable, inclusive, and scalable service. This approach not only strengthens the company's competitiveness but also contributes to regional digital inclusion, economic development, and environmental sustainability.

Community Impact

- FibreX's presence in this community has improved access to online education, family communication, and local economic activities.
- The store also offers basic digital literacy workshops and free technical support once a week.
- It has created local jobs for young people as installers, technical assistants, and customer service staff.

Entrepreneurship and sustainability are increasingly intertwined in this case because it goes beyond profit generation to address social and environmental challenges through innovation, ethical management, and long-term value creation.

By aligning creativity and opportunity recognition with sustainability-oriented practices such as resource efficiency, circular economy principles, and community engagement, this entrepreneur has generated transformative impact. In this sense, sustainability becomes not only a guiding principle but also a source of competitive advantage, positioning business as key agents in building resilient, equitable, and environmentally conscious societies.

4. DISCUSSION

This case study reinforces and extends existing scholarships on sustainable entrepreneurship and inclusive connectivity by demonstrating how small, locally embedded enterprises can act as effective agents for bridging the digital divide in marginalized rural contexts.

Fibre-X case confirms the central role of SMEs as drivers of employment generation, local economic dynamism, and broader sustainable development outcomes consistent with Olubiyi (2022) and Kumar & Suppiah (2023). In line with Dasaraju & Tambunan (2023), the study shows that SMEs can directly contribute to the achievement of the SDGs, particularly those related to reduced inequalities, quality education, and decent work, when their business models are explicitly oriented toward underserved populations.

The case aligns with prior research emphasizing digital access, affordability, and infrastructure as key enablers of social inclusion. García-Mora (2021) demonstrated that internet access can alleviate poverty in rural Mexico, a finding that is corroborated through the observed improvements in educational access, microbusiness operations, and local employment associated with Fibre-X's presence. Similarly, the economic constraints highlighted by Matracia et al. (2023) as barriers to digital inclusion are directly addressed by Fibre-X through low-cost connectivity plans, localized distribution, and hybrid fiber-wireless solutions adapted to rural geographies. The case further supports Hernández et al. (2024), who argued that addressing digital divides is a prerequisite for inclusive rural transformation, by showing how connectivity becomes a foundational input for education, entrepreneurship, and public service access in low-infrastructure environments.

Additionally, Fibre-X illustrates how connectivity can function as a core value proposition of a sustainability-oriented business model. The case shows innovation can emerge from constrained rural contexts, reinforcing the relevance of grassroots and reverse innovation. Overall, the study contributes context-specific evidence from Mexico and underscores the importance of integrating entrepreneurial initiatives with broader institutional and policy frameworks to achieve inclusive and sustainable digital development.

CONCLUSION

The development of this business plan for Fibre-X confirms the economic, social, and technical viability of an initiative designed to reduce the digital divide in rural and suburban communities across Tabasco.

In a context where connectivity is an essential driver of education, work, commerce, and personal growth, this project constitutes an innovative, and sustainable response to an urgent regional and global challenge.

Throughout the plan, the analysis demonstrates that Fibre-X offers a differentiated value proposition grounded on hybrid technology, personalized service, competitive rates, and a strong community orientation. Its organizational structure, technical and human capital, as well as its market and distribution strategy, are designed to meet the challenges of the rural environment and ensure an efficient and reliable service with a positive impact on the lives of its users. Furthermore, the financial analyses presented show solid profitability from the first year, with a projected return on investment of 291% and a break-even point achievable in the short term.

Beyond financial and operational indicators, Fibre-X stands out its commitment to digital inclusion, environmental sustainability, and social development. This startup not only seeks to be a profitable company, but also a bridge to opportunity for historically disconnected communities. Network deployment, capacity-building initiatives, and local job creation are among the tangible contributions envisioned through this model, reinforced with the principles of sustainable development.

Fibre-X then exemplifies how technological innovation can be harmonized with social responsibility to produce lasting, transformative impacts. This business plan serves both as a strategic roadmap and as a declaration of purpose: to foster equitable access to connectivity, promote regional development, and strengthen Tabasco digital ecosystem. As such, it offers valuable insights for policymakers, investors, and entrepreneurs committed to advancing inclusive, technology-driven growth in emerging contexts.

As this is a single-case study, the findings cannot be generalized, therefore its specific socio-economic and geographic conditions may not be representative of other rural areas in Mexico or developing countries. Another limitation is the absence of other stakeholders, such as users, community leaders, employees or local institutions.

The study is also bounded to a specific period marked by economic crisis and post-pandemic recovery which may influence entrepreneurial decisions and limit the temporal transferability of the findings.

Future studies could build on these findings by adopting comparative or multiple-case study designs involving connectivity startups in different regions of Mexico or across Latin America. Incorporating mixed methods approaches, combining qualitative insights with quantitative measures of connectivity access, affordability, service quality, and socio-economic impact to strengthen causal inference and enhance external validity. Longitudinal studies would be valuable to examine sustainability and scalability of rural connectivity ventures, and whether social impacts persist or expand.

Finally, future work could explore the interaction between entrepreneurial initiatives and public policy frameworks. Such research would contribute to developing actionable models that more effectively align sustainable entrepreneurship with long-term digital inclusion and territorial development.

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CHAPTER 3
ADMINISTRATIVE, ECONOMICAL, AND PERSONAL LIMITATIONS THAT HINDER THE DIGITIZATION OF OPERATIONAL PROCESSES IN MEXICAN MSMEs

[1]Mario Sánchez SANTANA
[2]Dr. María Cruz Cuevas ÁLVAREZ
[3]Dr. Marcos Pérez MENDOZA

[1]Universidad Juárez Autónoma de Tabasco, mario.sanchez.santana.1108@gmail.com
[2]Universidad Juárez Autónoma de Tabasco, mariacruz.cuevas.ujat@gmail.com, ORCID ID: 0000-0003-2349-5344
[3]Universidad Juárez Autónoma de Tabasco, marcos77pm@gmail.com, ORCID ID: 0000-0003-4911-4757

INTRODUCTION

Small and micro enterprises were caught in a vortex of change in their everyday operations due to the integration of digital tools around the world. Innovation was another concept that continued appearing in the new vocabulary of enterprises' owners and was understood as restructuration. At first, it was seen as a threat, but as time passed, owners understood it was a necessary means to obtain more income and reduce some operational costs. As they integrated technology in their operational procedures, they also knew it was not a matter of implementing it, but how and where to do so.

Digitization is an administrative process of integrating certain technological tools from a basic use level to an advanced use level, and applied to different sections of the enterprise, from accounting to operations, but at the same time providing a better customer service to remain competitive and keep the enterprise operational through time.

Throughout Latin America, there is still resistance to change because of the lack of economic and structural resources, lack of the appropriate infrastructure, and lack of knowledge or training for using digital tools among others. In Mexico, some initiatives have been implemented, however, uncertainty is a constant threat for micro, small, and medium enterprises, especially those where digital tools have not been implemented, and are facing an imminent closure because of low sales and due a leading competitive brand with digitized operational processes.

The objective of this case study is to determine the administrative, economic and personal limitations faced by MSME owners that hinder the digitization of their operational processes. The adoption of digitization has not been exempted from specific barriers, such as administrative, technological, and personal limitations of barriers that hinder the digitization of operational processes in Mexican MSMEs.

1. DEVELOPMENT

Small and micro enterprise owners found themselves into the vortex of a changing market operations and processes, also dealing with the decisions of implementing and adopting new strategies oriented towards digital innovations with the objective of maximizing their income and reducing expenses (Mackee et al., 2014). Nevertheless, one thought needed to be kept in mind: "Only possessing technology does not ensure the success of an enterprise, however, not having it, it will surely turn into a failure" (Fonseca Pinto, 2013, p. 52).

Digitization is associated with the Fourth Industrial Revolution that in terms of reach and complexity is related to every technological aspect, that is not limited to everyday activities and interactions, but economic and productive systems as well (Schwab, 2016). From a governments' perspective, a digital agenda has been implemented in order to help businesses achieve digitization, however the success depended on competitive internet providers and a strong participation from both the private and public partnerships, obtaining as a result a weak digital infrastructure. Because of this, there is a persistent inequality in the adoption of Information and Communication Technologies, especially in micro and small enterprises which are facing mayor restrictions regarding to resources and capabilities (Gallego & Gutiérrez, 2015).

Over the years, digitization has been perceived as a strategic plan to improve productivity, optimize processes, expand markets and foster entrepreneurial sustainability (Thrassou et al., 2019). A fear generated in owners because they are not willing to change their habits and traditional procedures in their administrative, commercial, financial, logistics, and operational processes (Herrera Medina, 2020).

Vázquez Jaramillo & Amaro Rosales (2022) stated that this type of change in procedures with the support of digitization allowed many enterprises to survive specially during the latest pandemic crisis. Digitization is transforming economy and society by forcing to make necessary changes or innovations in business models or service providers. It is a disruptive process that allows the integration of an intertwined digital system where two frameworks interact: analogue and digital (CEPAL, 2025).

This integration of digitization in SMEs in Ecuador have led to a major efficiency both in the management and optimization of resources such as human, financial, and material. Experiencing efficiency in their accounting processes, having more reliable financial records, and having real time access to their financial reports (Giler Araujo & Patiño Espinoza (2025).

Digitization does generate new opportunities, by making use of the knowledge and expertise of people in order to improve operational efficiency and therefore offer more value to their clients. It has become an integral approach that fosters an adaptation culture in the entrepreneurial environment, thus changing the way enterprises' owners learn and adapt to changes (Morales Pulido et al., 2025).

1.1 What is Digitization?

The concept is defined by Dini et al. (2021) as a process enterprises suffer by transforming their organization, and productive process, competitive strategy as well as the business model linked to basic or advanced digital technologies adoption. Understanding by basic digital technologies as technologies associated to email, web page, electronic bank devices, social media, electronic commerce, intranet and extranet. Within the advanced digital technologies, the following can me mentioned: big data analysis, 3D printing, Artificial Intelligence, advanced robotics, blockchain and internet of things.

For Krauss et al. (2022) digitization is related to the adoption of those new communication and collaboration methods who can be used to generate income to an enterprise. In words of Achieng & Malatji (2022) digital transformation or digitization is a process in constant evolution that requires a restructuration of the enterprise procedures. It is essential for satisfying the demands of the market and standing out in a growing competitive environment (Sánchez Sánchez et al., 2022).

According to Calle Herencia (2022) it is an approach that leads to organizational culture, where processes and products are aligned to a virtual environment alongside an organizational change, and competences or abilities are developed, not only for the enterprise improvement, but towards customer service in order to increase profitability and sustainability.

This customer service orientation must have revolutionary changes, so the business model demonstrates commercial strategies based on digitization (Tiburcio-Sánchez et al., 2023).

Digitization is then represented as structural and procedural changes of a micro, medium, and small enterprises [MSME] due to the globalized environment and the use of data as a strategic resource for the economic and entrepreneurial development, becoming a commodity rather than an innovation option (Del Olmo Sansores, 2023).

1.2 Barriers Encountered Towards Digitization

From a systematic literature review conducted by Ordóñez-Gutiérrez et al. (2023), they detected three specific barriers in the following Latin American countries: Argentina, Colombia, Chile, Uruguay, and Paraguay:

- Financial: High cost, profitability, internal or external funding.
- Knowledge: Lack of cooperation, lack of qualified personnel in the enterprise and in the country, lack of information on the market, and technological information.
- Market: Intellectual property, market uncertainty, market dominance, size of the market, and lack of regulation.

Information that is also supported by Hirs & Vargas (2023), the main barriers are lack of financial resources, lack of technological abilities, and limited technological infrastructure. Whereas for Lozano Montero & Tiburcio Sánchez (2024) cultural, economic, social and constant innovation are the recurring factors that intervene in the process of achieving digitization.

Quimiz Sandoya et al. (2025) identified the following challenges for digitization:

- Budgetary restrictions
- Lack of training
- Technological gap in both rural and urban areas

Other barriers detected in the literature are the ones by Mayor Ravines et al. (2026) who distinguished these three categories:

- Technological: Technologies not designed for small enterprises, lack of standards, lack of interoperability between digital systems and deficient connectivity.

- Organizational: Lack of digital abilities in the personnel and administrators, resistance to change, limited financial resources, absence of strategy and vision, as well as rigid organizational processes.
- Environment: Limited Access to external funding, local environment with low digitization, economic crisis, lack of providers, knowledge, and government support.

González Barturen & Ruis de Olano (2025) stated that digitization is strongly conditioned by strategic and human elements. The existence of a digital transformation policy, talent investment, and educative profile are the main reasons owners take their enterprises to a digital maturity level as a result of their vision and strategies to digitize their own enterprises.

Pozo Benites et al. (2025) conducted a comparative study in certain Latin American countries indicating the digitization level they achieved with key observations:

- Chile and Uruguay: leader level with significant advances.
- Paraguay and Colombia: medium-high level
- Mexico: medium level and partial, initiatives, with challenges in infrastructure and training.
- Peru, Argentina and Brazil: medium-high level and partial
- Ecuador and Bolivia: low level and partial
- Venezuela: very low and limited.

In the Mexican context, micro, small and medium enterprises or MSMEs are the pillar of the economy as they represent the 99.8% of the income in the country. 98% of them are microenterprises and contribute to the 52% of the Gross Domestic Product [GDP], providing 70% of jobs in the country (INEGI, 2024). This economic information makes MSMEs an important economic sector to be taken care of, its possible disappearance may jeopardize the country's economy.

It is relevant to mention that in an international survey conducted to MSMEs' owners in Latin American countries by Movistar the cell phone company, among the countries mentioned, Mexico was included in the list; the results are surprising (Telefónica Movistar, 2024):

- 31 % currently use digital alternatives

- 56% agree that the adoption of digital solutions lead to significant benefits
- 68% acknowledges that the lack of knowledge and certified personnel are two main barriers for the digitization adoption.

What is missing between saying and achieving is precisely an effective communication between government and private sector. A route must be set for facing the lack of technological infrastructure and telecommunications in many states and regions of the country. Another point of relevance is the creation of funding programs oriented towards digital transformation or digitization. Acquisition of technology should be the priority in the development plan, but MSMEs' owners need to be provided with a range of affordable options to implement technology alternatives in their everyday activities (IFT, 2023).

1.3 Legal Framework

The legal framework for this research comprises the main regulations and programs of the Mexican State that govern and promote competitiveness, innovation, and digitization in MSMEs. These laws and public policies serve as the basis for understanding the legal context that supports the use of technology in MSEs operating convenience stores in Villahermosa, Tabasco.

Political Constitution of the United Mexican States (DOF, 2024)

Article 25 establishes that the State must foster national economic development and support the activities of businesses of all sizes, promoting competitiveness and innovation. This principle supports the creation of public policies aimed at promoting modernization and the use of digital technologies in the country's productive sector.

Law for the Development of Competitiveness of Micro, Small, and Medium-Sized Enterprises [MSME] (DOF, 2002)

This law seeks to strengthen the capabilities of MSMEs through financing, training, and technological innovation strategies. It recognizes that the incorporation of digital tools is a key element for improving their productivity and competitiveness in the national market.

National Development Plan [NDP] 2019–2024 (Gobierno de México, 2019)

The NDP promotes the use of information technologies as an engine of economic development. Within the "Inclusive and Competitive Economy" pillar, it raises the need to promote digitalization in all sectors, with special attention to small businesses, to increase efficiency and reduce inequality gaps.

National Digital Strategy [NDS]

The National Digital Strategy emerges as a public policy to incorporate Information and Communication Technologies [ICTs] in the public, social, and private sectors. Its objective is to generate a more competitive, connected, and inclusive economy through technological adoption and digital training for citizens and businesses (Gobierno de la República, 2013).

Science and Technology Law (DOF, 2002)

Its purpose is to promote research and technological innovation in Mexico. It fosters collaboration between the government, universities, and the business sector to drive technological development and digital adoption, especially in micro and small businesses seeking to modernize their production and administrative processes.

1.4 State Of The Art

In a study conducted by Lozano Montero et al. (2022) in six MSMEs in Guanajuato, Mexico; the authors detected a slow digitization compared to the process of big enterprises. Those MSMEs were in operation from 8 to 31 years in the market, with one to six employees, number that has not increased even after the digitization process. What has increased is their sales due to the implementation of digitization by using a sales platform, inventory records in an Excel sheet, receiving payments via banking terminal or wire transfer, besides cash; consumer satisfaction can even be recorded through digital surveys, after their employees received training on those digital payment alternatives.

In another study by Morales Pulido (2024) carried out in Querétaro, Mexico; one of the most relevant barriers or limitations was the necessity to inform employees that the implementation of technological resources was not a synonym of losing their jobs. When administering the surveys, some participants expressed their concern of being gradually replaced from their chores or activities. That feeling highlighted the importance of acknowledging their concerns from the beginning of the transformation. Owners should emphasize how new technologies will be of aid in improving efficiency and providing new working opportunities. Owners should also commit to provide the necessary training for their staff so they can have a smooth adjustment to their recent roles and responsibilities into a digital environment.

In a third study detected by Escobedo et al. (2025) carried out in the state of Mexico, the results obtained by authors reveal a concerning perspective regarding the adoption of digital strategies. From the existing 384 MSMEs, only 21 were included as they had as a minimum a web page on Facebook; 20 of them uses an e-mail account as a communication tool; 12 of them has a web page and only one of them has presence on X the social media, previously known as Twitter. Authors argue that Facebook and email accounts are accessible and affordable are not used as a communication means and in the sector market they are. Whereas web pages, although they offer significant benefits such as visibility and credibility, represent a bigger investment, they are not developed by owners; probably derived from the informality status that prevails in that sector, followed by limited access to funding programs.

In a fourth study, surveys administered by Porras Sandoval et al. (2025), they reached Mexican enterprises with less than 250 employees, that were in operation for three years or less, and whose owners had the interest or had previous experience operating digital technologies, and with a strong desire of adopting Artificial Intelligence in their everyday operations, even though they had to face the following challenges: knowledge and training.

From the Center of Retail Sales (Coronel, 2025), it is suggested that MSMEs' owners need to face a new and dynamic environment related to cloud service and Artificial Intelligence in order to survive, followed by deciding which processes to digitize, provide training to their employees, and maintain a mindset or culture of innovation; he also highlights the importance of smart investment with platforms such as an automated CRM where information can be centralized, improve communication with their customers, while chatbots can assist basic consults thus saving up to 80% of man time in customer service.

2. METHOD

The objective of this case study is to determine the administrative, technological and personal limitations faced by MSME owners that hinder the digitization of their operational processes. The proposed research question for the study was: What are the limitations faced by owners of Tabasco-based micro, small, and medium-sized enterprises (MSMEs) in the miscellaneous sector that hinder the digitization of their operational processes?

The justification for this study is of theoretical and practical significance because the problem is affecting small business in an urban context, and because it illustrates a unique insight, reveal hidden issues and provide rich and vicarious experience and enrich the existing literature.

In words of Yin (2018) a case study is an empirical method that seeks to research a contemporary phenomenon in depth and within its real-world context, the boundaries between phenomenon and context are not be clear or evident, in other words it is a realist perception where objectivity is maintained through the methodological process within the design (Harrison et al., 2017). The techniques implemented were documentary analysis, literature review and an-in-depth interview to three MSME owners.

The documentary analysis (Scott, 2006) involves the use of primary and secondary materials and includes four criteria: authenticity, credibility, representativeness, and meaning. The literature review (Snyder, 2019) considered was relevant literature on the subject and essential for determining the objective of the study and justification of the research question.

Bibliometric or systematic literature review articles were selected, as authors in those publications had already conducted an-in-depth analysis on the topics Digitization of MSMEs. 56 articles were found to the related topics, but after an analytical and critical revision, only 35 were selected to be closely similar to the intention of this study. From the material selected, articles from impact journal, web pages, theses, and international reports were revised.

The in-depth interview according to Rutledge & Hogg (2020) allows to obtain detailed information that provides perspectives, experiences, or feelings directly from the MSMEs owners. The research assumption was: The digital transformation of the operational processes of SMEs in Tabasco is hindered mainly by three limitations: the lack of capital or investment, the lack of knowledge of new technologies, and the strong entrenchment of traditional methods in Tabasco businesses. The interviews were conducted from August 2025 to February 2026 based on the owner's availability and visit the establishments in different times and moments for casual observation.

The MSMEs selected are located in Centro neighborhood, in Villahermosa city of Tabasco, located in the southeast of Mexico. These MSMEs were included due to selection criteria, over 20 years in operations, same owners or family business, with no digital implementation in their service or payment alternatives other than cash payment.

The information was coded using free coding to discover the barriers or limitations, also based on what was indicated in the literature, or others mentioned by different authors. The findings are presented into the following categories: administrative, economical, and personal, each one with specific elements that are described in each case, along with their definitions.

For narrative purposes, each case will be described and then categorized into a comparative table with category analysis for a better comprehension and visualization.

Table 1. Operativity Table for analyzing the cases

Category	Subcategory	Element	Definition
Administrative			
	Organizational Change and Strategy	Strategic intent	The purpose of the technology: expand markets, maximize income, reduce costs, or ensure sustainability.
		Process optimization	Improvements in administrative, logistics, or financial procedures.
		Resource efficiency	Keeping track of human, financial, and material resources in a more managed and effective way.
Technological			
	Level of Technological Adoption	Basic digitization	Use of foundational tools such as email, social media, web pages, and electronic banking.
		Advanced digitization	Integration of complex systems like AI, Big Data, 3D printing, and IoT.
		Infrastructure Quality	The reliability of internet providers and the adequacy of the local digital environment.
Personal			
	Barriers and facilitators	Resistance to change	Fear regarding changing traditional habits and procedures.
		Adaptation Culture	The ability of owners to learn and evolve their expertise.
		Resource Restrictions	Constraints related to limited capital or lack of technical capabilities in micro enterprises.

3. FINDINGS

The following is a summary of the information provided by the owners during the interviews. The most relevant information was selected and analyzed into a comparative table.

Case 1

This is a business with over 20 years of operation. It represents stability and administrative order based on empirical experience and traditional methods.

The owner demonstrated to have a high level of knowledge about potential digital methods yet has strong confidence in and attachment to traditional methods. He expressed that due to personal and security reasons, it is unlikely he would change in the short term. However, and despite his concerns, he acknowledges that more competitive business such as the Oxxo leading brand, are gaining ground and businesses like his own will tend to disappear if digital tools are not integrated in the long run.

Case 2

This is a business in a stage of growth and consolidation, its owner is an open-minded person regarding the use of digital tools; however, his lack of knowledge is his greatest weakness. Resistance to change is not the main barrier, but structural reasons that limit the implementation of digitization, such as lack of time and limited economic resources. This type of owner has a high probability of adopting digital methods if he is offered assistance, technical support and training on the use of the equipment.

Case 3

This case represents a business in a critical situation where economic barriers are the main obstacle. Digitization is not perceived as a viable option due to low sales and a lack of liquidity. Therefore, the probability of adopting and achieving a digital transformation is null until the financial problems affecting his business are resolved.

4. DISCUSSION

The three owners interviewed had an open-mind regarding to the adoption of technological alternatives or digital tools to improve their businesses processes. There was no negative attitude towards the idea, however other aspects intervened in their decision. The Personal Barrier was mostly present because two of them did not have the knowledge nor the expertise to implement it, although one openly expressed if trained or given support, he would do it, an aspect related to Adaptation to Culture, because there is an intent of learning and evolving.

Table 2. Comparison table of the barriers or limitations encountered by the MSMEs' owners

Category	Subcategory	Element	Cases
Administrative			
	Organizational Change and Strategy	Strategic intent	Case 1: Positive attitude towards technology. Case 2: Positive attitude towards technology, if assistance is offered. Case 3: Negative due to lack of certainty.
		Process optimization	Cases 1-3: Non existent.
		Resource efficiency	Cases 1-3: Non existent.
Technological			
	Level of Technological Adoption	Basic digitization	Case 1: Knowledge does not reach the next level. Case 2 & 3: Non existent.
		Advanced digitization	Cases 1-3: Non existent.
		Infrastructure Quality	Case 1: Not mentioned, but the place can be adapted based on observation. Case 2: No confidence due to infrastructural reasons. Case 3: Not mentioned, but the place can be adapted based on observation.
Personal			
	Barriers and facilitators	Resistance to change	Cases 1-3: Non existent.
		Adaptation Culture	Case 1: Non existent. Case 2: Willing to learn. Case 3: Willing to learn.
		Resource Restrictions	Case 1: Security reasons. Case 2: Lack of knowledge main weakness, limited capital second weakness. Case 3: Critical economic situation due to low sales.

Another aspect as a Personal Barrier was Resource Restrictions, the economic or monetary situation was the same case in two of them, as for the other he expressed a genuine concern regarding a topic that has not been mentioned in the literature: security reasons. Not cybersecurity, but the security that must be provided by the state and the police.

The other most relevant category was the Technological one, two of them neglected to specify their reasons for not implementing digitization, although through observation, it was clear they had the necessary space or ways of implementing a banking terminal or a basic computer with a digital inventory and continue with cash payments. Only one of them openly expressed he had no confidence in implementing it due to infrastructural reasons, and it is agreed considering his establishment is located in a very old building in the city center, and for the aspect of it, it has not received maintenance in several years.

As for the administrative category, two of them showed a positive attitude towards technology in their establishments as well as their understanding that it will help make certain process faster as the leading brand does. However, this involves a monetary investment that translates to risk, a risk one of the owners is very aware of, which is why he did showed a negative attitude towards digitization as an strategic intent.

CONCLUSION

From the literature review and the findings in this study, it is agreed that the main barriers or limitations for digitization of MSMEs lie on three main categories, administrative, technological, and personal reasons. However, other categories were also detected, such as the size and regulation of the market as indicated by Ordóñez-Gutiérrez et al. (2023), constant innovation, cultural, and social barriers as mentioned by Hirs & Vargas (2023), budgetary restrictions and technological gap noted by Quimiz Sandoya et al. (2025), alongside the levels of digitization and digital maturity countries show as explained by González Barturen & Ruis de Olano (2025).

In the studies analyzed and that were conducted in different states in Mexico, it is inferred that there have been initiatives or first steps of digitization in MSMEs, and that the government and the society must foster certain simple practices such as demanding for different payment alternatives so MSMEs owners feel the need of providing an account number for wire transfers, offering a banking terminal for digital payment with a card, besides the traditional cash payment, and observe the benefits of their implementation.

The research question was answered and it was obtained from the findings, that three main limitations hinder the digitization of MSMEs operational processes, administrative, technological, and personal reasons, along with specific subcategories and elements explained in the operativity table, highlighting one element that was not considered and it might be due to local issues, and that is security related to the one provided by the government to the society.

It is imperative that MSMEs are maintained in operations not only by the owners, but because they form the backbone of the economy, they represent a significant part of the country's economy, and for their impact on employment generation.

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