

IMPACT OF THE DIGITAL ECONOMY ON THE DEVELOPMENT OF MSMEs IN LATIN AMERICA

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Abstract

Introduction: The digital economy represents an opportunity to transform MSMEs in Latin America by enhancing their productivity, market access, and competitiveness. However, technological gaps, financing limitations, and low digital adoption persist in many countries of the region.

Methodology: A systematic review was conducted following the PRISMA guidelines, considering 85 studies published between 2015 and 2025. Databases such as Scopus, Web of Science, SciELO, and RedALyC were used, including only peer-reviewed studies focused on Latin American MSMEs and their link to the digital economy.

Theoretical framework: The digital economy is defined as an ecosystem composed of infrastructure, technological applications, and users. The relationship between digitalization and productivity, e-commerce, and digital payments was analyzed, identifying common barriers such as lack of connectivity, limited training, and territorial inequality.

Results: MSMEs that adopt digital technologies report increases in productivity (up to 30%), operational efficiency, and expansion into new markets. The use of digital payments improves sales and access to credit. However, digital maturity varies by country: Chile and Colombia show greater progress, while Ecuador and Bolivia face significant setbacks.

Conclusions: The digital economy drives the development of MSMEs in Latin America, but its impact is uneven. Overcoming structural barriers requires coordinated public policies, investment in infrastructure, digital training, and access to financing to achieve inclusive and sustainable digitalization.

Keywords: Digital economy, MSMEs, Productivity, Digital transformation, Latin America.

Resumen

Introducción: La economía digital representa una oportunidad para transformar las MIPYMES en América Latina, fortaleciendo su productividad, acceso a mercados y competitividad. Sin embargo, persisten brechas tecnológicas, limitaciones de financiamiento y baja adopción digital en muchos países de la región.

Metodología: Se realizó una revisión sistemática bajo el enfoque PRISMA, considerando 85 estudios publicados entre 2015 y 2025. Se utilizaron bases de datos como Scopus, Web of Science, SciELO y RedALyC, incluyendo únicamente investigaciones revisadas por pares centradas en MIPYMES latinoamericanas y su vínculo con la economía digital.

Marco teórico: Se definió la economía digital como un ecosistema compuesto por infraestructura, aplicaciones tecnológicas y usuarios. Se analizó la relación entre digitalización y productividad, comercio electrónico, pagos digitales, y se identificaron barreras comunes: falta de conectividad, escasa capacitación y desigualdad territorial.

Resultados: Las MIPYMES que adoptan tecnologías digitales reportan aumentos de productividad (hasta 30%), eficiencia operativa y expansión hacia nuevos mercados. El uso de pagos electrónicos mejora las ventas y el acceso a crédito. No obstante, la madurez digital varía entre países: Chile y Colombia presentan mayores avances, mientras que Ecuador y Bolivia enfrentan rezagos importantes.

Conclusiones: La economía digital impulsa el desarrollo de las MIPYMES en América Latina, pero su impacto es desigual. Superar barreras estructurales requiere políticas públicas articuladas, inversión en infraestructura, capacitación digital y acceso a financiamiento para lograr una digitalización inclusiva y sostenible.

Palabras clave: Economía digital, MIPYMES, Productividad, Transformación digital, América Latina.

Introduction

The research presented herein examines the effects of the digital economy on the growth of micro, small, and medium-sized enterprises (MSMEs) in Latin American countries, with particular emphasis on the impact of digital technologies, e-commerce, and electronic payments on productivity, market access, and competitiveness.

In Latin America, MSMEs represent 99.5% of all formal enterprises and generate over 60% formal employment in the region (1). However, there is a significant productivity gap compared to advanced economies, largely due to their limited integration into the digital economy, characterized by low levels of digitalization, weak financing, and technological barriers (2).

The digital economy, defined as the set of practices related to information technology, e-commerce, and digital payments, has demonstrated its capacity to promote economic growth, innovation, and business competitiveness (3). For SMEs in the region, digital transformation is associated with productivity increases of up to 30%, improvements in operational efficiency, and enhanced capacity for data-driven decision-making. The adoption of electronic payment systems has also translated into greater access to credit and strengthened business formalization (4).

Between 88% and 95% of MSMEs operating in the Latin American business environment are microenterprises, engaged in economic activities in low value-added sectors, with high levels of informality and limited access to financing options (5). At the same time, fewer than 10% of MSMEs implement advanced data analytics systems, as many still rely on paper-based records in their operations, resulting in low efficiency and limited progress of digitalization (6).

Given that MSMEs constitute the backbone of the formal economy in the region, it is necessary to understand how the digital economy can transform productive units and thereby identify mechanisms that integrate technology into these enterprises to formulate public policies, drive innovation, and close competitiveness gaps (7).

Despite the growing number of studies in recent years on business digitalization and the adoption of electronic payment systems, there is a clear thematic dispersion, and a lack of comprehensive analyses focused on Latin American MSMEs (8). Little systematic analysis has been conducted on the relationship between digitalization, productivity, market access, and regional competitiveness within the context of public policy. Comparative evidence has not been coordinated between leading countries in terms of digitalization, such as Chile, Uruguay, or Colombia, and those with structural lags, such as Ecuador or Bolivia.

The purpose of this review is to conduct an analysis focused on the evaluation of technical and academic literature published over the past ten years, concerning the impact of the digital economy understood as the adoption of ICTs, e-commerce, and digital payments on the productivity, market access, and competitiveness of MSMEs in Latin America, identifying enabling factors, barriers, and inter-country gaps.

Theoretical Framework

Concept and Dimensions of the Digital Economy

The digital economy, in its essence, refers to all economic activities and transactions that are facilitated or enabled by digital technologies (9). From broadband network infrastructure and the ICT industry to end-users (i.e., businesses, governments, and citizens), the digital economy comprises an interconnected space of platforms, content, and services. It is defined by three core components: network infrastructure, the ICT applications industry, and users (10).

To this definition, one must add the complexity assumed by the concept in each of its dimensions: access to infrastructure, capabilities for its use, application development, and advanced adoption by business consumers (11). The various dimensions of the digital economy operate in an interdependent framework and are central to understanding the degree of digitalization achieved by countries and

companies. At the same time, this framework helps guide the design of policies aimed at closing digital gaps (12).

Characteristics of MSMEs in Latin America

In Latin America, MSMEs micro, small, and medium-sized enterprises account for approximately 99% of the entire productive structure and contribute more than 60% of all formal employment. However, their participation in GDP is less than 25% (13). The phenomenon of business dwarfism is observed, where a concentration of micro enterprises generates most of the employment but faces limited access to capital, skilled labor, and technology, reducing their competitiveness (14).

Heterogeneity is reflected in the uneven implementation of digital technologies, with medium-sized enterprises and those with stronger organizational capacities operating in more advantageous contexts (15). Differences also exist between countries: regions such as Chile and Colombia show higher levels of technology adoption, contrasting with lagging nations like Bolivia and Ecuador (16).

Relationship between Digitalization and Business Productivity

Business productivity in the region has remained stagnant for years, with limited progress observed between 2009 and 2016. The adoption of digital technologies has become essential for increasing efficiency (4). Studies by multilateral organizations show that a 10% increase in broadband penetration is associated with a productivity growth of approximately 2.6% in the region, along with GDP growth and job creation (17).

From an organizational perspective, the initial phase of addressing basic digital technologies serves as the first step toward adopting more advanced technologies, acting as a driver of productivity (18). The effectiveness of this process depends on organizational capital, namely, the managerial capacity and structure of the organization to apply and experiment with digital tools (19).

Effects of E-Commerce and Digital Payments on Business Growth

The advent of e-commerce has enabled MSMEs to access both national and international markets, diversify sales channels, and expand their reach (20). In the context of the pandemic, the Inter-American Development Bank (IDB) reported that digital commerce increased by over 157% in the region, highlighting the transformative potential of these platforms (21).

Regarding electronic payments and digital financial services, more than 60% of MSMEs adopt at least one digital financial instrument, with the highest adoption rates among medium-sized enterprises (82%) and the lowest among microenterprises (48–60%) (22). The use of these tools improves operational efficiency, facilitates formalization, and enables credit access through digital transactional histories (23).

Barriers and Digital Gaps in the Region

MSMEs face multiple barriers in their digitalization efforts: inadequate infrastructure, high connectivity costs, lack of digital skills (24), and limited access to funding for technological projects, among others (25). The digital divide in Latin America and the Caribbean goes beyond basic access and also encompasses advanced use and digital capabilities of participants (26).

Furthermore, gender, geographic, and capability-related gaps persist, particularly affecting rural MSMEs and those led by women (27). These inequalities limit opportunities for growth and for fully benefiting from the digital economy, underscoring the need for comprehensive public policy measures and support practices (28).

Methodology of the Review

This review followed a systematic review format, adhering to PRISMA standards. This format enables exhaustive and unbiased identification of evidence through explicit criteria and a replicable strategy (29).

To conduct the literature collection, a robust set of academic databases was used, including Scopus, Web of Science, SciELO, and RedALyC. These databases were selected to ensure broad international and local coverage, guaranteeing sufficient thematic and geographic scope.

The inclusion and exclusion criteria were clearly defined: the studies included had to be published within the last ten years, focus on MSMEs in Latin America, and examine the impact of digital adoption on productivity, market reach, or competitiveness. Excluded documents included those not peer-reviewed, gray literature (thesis, conference papers), and studies on digitalization unrelated to MSMEs.

The review covered the time from 2015 to 2025 to capture the most current trends associated with the pandemic, regulatory changes, and technological advances. The initial search yielded approximately 1,200 citations; after removing duplicates and screening titles and abstracts by two independent reviewers, 195 full-text articles were analyzed. Ultimately, 85 studies were included in the final synthesis. This systematic process ensures the validity and replicability of the analysis while identifying the best available evidence regarding the impact of the digital economy on MSMEs in Latin America.

Results and Analysis

Digital Transformation and Productivity

The adoption of digital technology has strengthened the productivity and competitiveness of MSMEs in the Latin American region (30). It is generally stated that “digital transformation is a necessary condition for companies in Latin America and the Caribbean to achieve productivity growth and remain competitive” (31). Empirical studies support this relationship. For example, in Mexico, 80% of SMEs have increased the use of digital tools since 2020 and report an average productivity increase of 20%, along with a 15% reduction in costs (32).

Similarly, over 60% of SMEs in Chile report an increase in sales and productivity associated with digitalization. Data-driven management enables faster and more efficient operations: a study by the IDB notes that data allow for greater speed and accuracy in operations, optimizing resources, reducing time and operational costs. This, in turn, fosters the innovation of products and services targeted at emerging demands, thereby increasing competitiveness: data-driven companies become “recognizable in emerging markets” (7).

Indeed, the evidence shows that the greatest productivity gains occur when ICTs are combined with strong and determined human capital: only companies that report intensive use of technology and employ properly trained workers achieve significant productivity improvements (33).

- **Better management:** Digitalization enables SMEs to operate with greater agility, optimizing resources and responses to market changes (6).
- **Process optimization:** Digital tools reduce time and costs (e.g., through cloud systems or CRM platforms), leading to improved customer experience and overall efficiency (6).
- **Continuous innovation:** SMEs that apply data analytics are better positioned to offer new products and services aligned with customer demand (6).
- **Enhanced competitiveness:** Strategic use of business data allows companies to differentiate and grow in new markets (6).

These internal benefits are reflected in specific examples. A recent study indicates that the COVID-19 pandemic triggered this process, forcing many SMEs to adopt digital tools to continue operating. However, data also indicate that more than 70% of SMEs in the region still operate at low levels of digital maturity and face structural barriers (limited connectivity infrastructure, lack of talent, and scarce financing) that diminish the positive impact (34).

Externally, countries such as Chile, Uruguay, and Colombia have developed comprehensive digital strategies and show higher levels of productivity linked to technology; in contrast, Ecuador, Bolivia,

and Venezuela demonstrate more limited progress due to lack of infrastructure and supportive policies. These gaps illustrate that productivity growth through digitalization depends on each company's context, including organizational and human capital (34).

Access to New Markets via Digital Platforms

E-commerce and digital platforms have significantly increased market access for MSMEs. A 2022 survey reveals that, during the pandemic, over 75% of MSMEs in Argentina, Brazil, and Mexico began selling products or services online after restrictions on physical operations were imposed (35). In those countries, one in four companies experienced at least a 50% increase in digital sales compared to 2019. In Colombia, by contrast, only 66% of companies attempted online sales, and their growth was more modest (36).

Overall, the use of mobile platforms and social media has been decisive: the most widely used tools by SMEs are WhatsApp (64% adoption), Mercado Libre (55%), Instagram (50%), and Facebook Marketplace (46%). This demonstrates that small businesses not only gain access to major marketplaces (such as Mercado Libre or Amazon) but also reach customers beyond their local areas via free channels and messaging systems (37). In Peru, 27% of SMEs reported an increase in sales thanks to the use of digital tools (38). Altogether, the results indicate that digital marketplaces (online commerce, apps, or networks) offer a valid channel for customer diversification, enabling Latin American MSMEs to overcome geographic barriers and connect with consumers beyond their borders through digital means (39,40).

Moreover, MSMEs are diversifying their strategies based on the platform: for instance, 80% of MSMEs in Argentina, Brazil, and Mexico already engage in online sales, compared to 63% in Colombia (41). WhatsApp tops the list of preferred applications among Latin American companies (64%), reflecting the trend toward direct sales through messaging (42).

Mercado Libre and Instagram follow. MSMEs can expand their markets and pursue internationalization through this multichannel ecosystem (marketplaces, social networks, apps) (43). The literature largely concurs with the fact that access to new markets has been boosted by e-commerce and digital networks, though results vary depending on country and sector (44,45).

Electronic Payments and Operational Efficiency

The digitalization of payments has significantly improved the financial management of MSMEs, providing regularity and security in operations. A recent report by Mastercard states that 85% of SMEs in Latin America that adopted digital payments have seen increased sales and business scalability (46,47).

In addition, 86% of companies report that improved customer service following the adoption of digital payments. These payment methods simplify administrative tasks, with 83% of SMEs indicating that electronic payments streamline accounting and regularization (48). Regarding practical use, 78% of companies report adopting digital payments for supplier transactions, improving tracking of income and expenses (49). Specific benefits reported by studies include:

- **Sales and operations growth:** 85% of SMEs state that digital payments helped increase sales and scale operations (50).
- **Enhanced customer experience:** 86% report improved customer satisfaction due to secure and seamless payment systems (50).
- **Administrative efficiency:** 83% of companies consider that electronic payments simplify accounting and regulatory compliance (50).
- **Formalization and access to finance:** 78% indicate that digital payments improve financing opportunities by generating a transparent transaction history, thereby enhancing financial credibility with banks and fintechs (50).
- **Operational continuity:** 78% of companies use digital payments for purchases and supplier payments, reinforcing the value chain and business resilience (50).

Evidence shows that the adoption of digital payments is considered essential for business growth and survival: most companies acknowledge that they could not operate without them. By significantly reducing the use of cash and digitizing financial flows, SMEs improve their financial awareness, track transactions more carefully, manage payment and collection cycles, and gain access to new financing opportunities along with improved financial efficiency (51,52).

Technological and Financial Challenges for MSMEs

Despite all the benefits that MSMEs can derive, they also face obstacles that hinder their full integration into the digital economy (53). On the technological front, there is insufficient infrastructure: in certain Latin American countries, access to high-speed internet remains scarce, particularly for small businesses. Additionally, there is a severe shortage of digital human capital: many SMEs lack personnel with advanced technical skills (54).

In Chile, for example, 75% of SMEs identify the lack of specialized ICT personnel as one of their main challenges (55). Financially, access to credit is severely restricted: nearly one-third of businesses in the region report difficulties obtaining formal financing. These credit access issues are worsened by high levels of informality. In countries like Paraguay, more than 60% of commercial transactions still occur in cash, limiting the availability of accounting records and hindering loan approval (56). Moreover, the poor availability of resources to invest in the digital economy and the absence of supportive ecosystems exacerbate the limitations. Studies consistently identify the following major obstacles:

- **Connectivity and infrastructure:** Lack of stable broadband networks and equipment, especially in rural and remote areas (57).
- **Talent and skills shortages:** Deficiencies in digital training and IT specialist education; many SMEs lack personnel trained in emerging technologies (57).
- **Limited financing:** Difficulty accessing formal credit for technological innovation and adoption; high use of cash impairs transaction traceability and worsens loan access (57).
- **Regional disparities:** There are differences across countries. Governments in Chile, Uruguay, and Paraguay have advanced in public policy, connectivity, and training, enhancing the digital maturity of their MSMEs. Others (e.g., Ecuador, Bolivia, Venezuela) remain at low levels of digitalization with inadequate infrastructure and almost no relevant public policy (57).

These technological and financial constraints largely explain why most Latin American MSMEs are still unable to fully benefit from the digital economy (58). Literature is conclusive in affirming the need for coordinated efforts (improved infrastructure, digital education, and access to credit) to overcome these bottlenecks and enable companies to invest more confidently in technological innovation (59).

Specific Country Examples or Case Studies

Chile

In Chile, there are no academic case studies that deeply analyze MSMEs and the digital economy; however, recent reports offer insight based on survey data (37). A 2024 report by the Santiago Chamber of Commerce indicates that only 23.1% of Chilean SMEs have a web presence, in contrast to large companies, where the percentage reaches 80% (60).

This clearly reveals a significant digital gap. The same report shows that 63% of Chilean SMEs consider themselves to be in the process of digitalization (using basic tools), compared to 93% of large companies. Only 23% of SMEs report having advanced digitalization processes (61).

This information is supported by data from the Economic Commission for Latin America and the Caribbean (ECLAC), which reports that e-commerce in Chile grew by 90% during 2022, and the most

used payment method is the debit card (79%). However, 52% of the population still prefers using cash, compared to 41% who prefer debit cards (62).

These figures show the challenges small businesses face in adopting digital payment methods (63). The digital transformation of Chilean SMEs remains limited; their access to digital markets is constrained by the still-limited digital presence and the rising use of electronic payment tools. Small businesses must still overcome barriers related to cost and skills (64).

Mexico

In the Mexican context, significant examples of MSME digital transformation emerged because of the pandemic. Beltrán et al. (2023) document two microenterprises one in León, Guanajuato, and another in Ciudad Guzmán, Jalisco through an action research approach (65).

This study combined a PESTEL diagnosis with iterative workshops involving the microenterprise owners (66). The two selected cases, from the auto parts and fashion sectors, implemented concrete actions such as creating their own websites (via Wix) with product catalogs, developing social media channels (Facebook, Instagram), setting up Google Business profiles, and joining digital marketplaces (Mercado Libre) (67,68).

They also adopted digital communication channels like corporate email (e.g., business@xyz.com) and WhatsApp Business to improve customer service. These changes were implemented to boost sales and improve operational efficiency, resulting in a profound internal cultural shift (69).

The findings indicate that digitalization enabled these businesses to explore new (online and national) markets and optimize processes, though infrastructure and budget requirements remain considerable. In short, digital transformation has become essential for survival in the post-pandemic "new normal." However, MSMEs are still in the process of digital transformation due to limited capacity for investment. Even though increased sales capacity is a key motivator for adopting digital tools, many MSMEs still face significant technological and knowledge-based limitations, including a lack of budget and digital skills (70,71).

Colombia

Several empirical studies in Colombia explore digital MSMEs. Research focusing on micro and small enterprises in Valle del Cauca assessed their digital maturity before and after COVID-19 lockdowns. The evaluation used quantitative surveys (in January 2021 and May 2023) and qualitative analysis based on the Forrester model (72).

Before the lockdown, 75% of the surveyed MSMEs had no website, and most used manual records for sales and inventory (73). After experiencing the pandemic's negative effects, 97.8% of MSMEs had begun adopting relevant digital processes, and 89% had developed a digital strategy (74).

By 2023, 71.9% claimed to have their own website, 76.4% used social media for visibility, and nearly 90% incorporated digital record-keeping (74). These MSMEs evolved from being "adopters" to "collaborators" in the digital transformation process, gaining a competitive and resilient edge.

A second study conducted in Colombia focused on training in digital marketing and e-commerce through in-person workshops with 18 entrepreneurs (75). The methodology was qualitative and descriptive, involving training in secure mobile transactions, e-commerce, and social media. As a result, 88% of participants emphasized the importance of training in these areas (76).

The main barriers identified were the lack of digital knowledge/skills for online selling. Participants highlighted the need for security systems (e.g., blockchain, biometrics) to facilitate electronic payments (77).

This study demonstrates that improving the digital skills of business owners can enhance access to digital markets (via e-commerce) and mobile payment adoption, thereby eliminating technological and financial barriers for Colombian SMEs (78).

Peru

A study was conducted on the digitalization of 267 micro and small enterprises (MSEs) in Arequipa, Peru, in the post-COVID era. Using a quantitative approach with sectoral surveys and a logit model, the study analyzed firm-related, marketing, and banking factors that influence digitalization (79).

Among its key findings: MSEs that serve consumers who prefer digital payments are more likely to pursue digitalization; additionally, the longer the business has existed and the more likely the owner has internet access, the greater the propensity to digitalize (80,81).

Digitalization is seen as vital for the competitiveness and survival of Peruvian MSEs, although major limitations include lack of knowledge and insufficient training in ICT (82). Other constraints include limited access to financing and infrastructure (e.g., connectivity), which moderately affect digital adoption (83,84).

The study highlights advance in digital tool usage (e.g., internet access, use of electronic payment methods) driven by customer demand for digital payments, while also emphasizing the need for training and financial support to close technological gaps and maximize productivity gains (85).

Discussion

The findings presented in this review support and expanded the empirical evidence on the impact of the digital economy on MSMEs in Latin America. It is thus confirmed that digital transformation is a determinant of operational efficiency and competitiveness (4). In this regard, in the case of Mexico, a 20% improvement in productivity and a 15% reduction in costs were observed following the adoption of digital tools by 80% of SMEs (32).

These results are consistent with the understanding of the digital economy as an ecosystem composed of infrastructure, ICT applications, and users an essential framework for interpreting business digitalization processes (10). At the same time, digital maturity is identified as being related to organizational variables, that is, internal factors such as technological culture and managerial capabilities (3).

The conclusions have direct implications for regional economic policy. The use of electronic payment methods has promoted the formalization of MSMEs, facilitated greater access to financing, and enabled business scaling (50). Additionally, recent data indicate that 85% of organizations that adopted digital payments experienced improved sales, and 83% reported enhanced administrative efficiency (50). These positive effects underscore the potential of digitalization to foster financial inclusion and sustainability (52).

Moreover, it is evident that countries with established public strategies such as Colombia and Chile exhibit higher levels of digital maturity. Initiatives like "MiPyme Vive Digital" and "Chile Digital 2035" have promoted technological adoption, highlighting the importance of well-coordinated public policies, as emphasized in studies focused on designing digital transformation frameworks for small businesses (14).

Despite the progress made by public institutions, many policies remain incomplete. Challenges persist in the form of inadequate infrastructure, low digital skills, and limited access to financing, especially in countries such as Ecuador, Bolivia, and Venezuela (16,34). This explains why many MSMEs have not yet fully integrated digital technologies. Additionally, many government initiatives are supply-oriented, failing to address the real constraints faced by businesses. Recent studies show that many MSMEs lack the capacity or budget to adopt technology, which ultimately reduces the impact of available platforms and solutions (70,71). This evidence reflects fragmented institutional frameworks and uncoordinated approaches across countries (5).

Several methodological limitations were identified in the reviewed studies. Many rely on self-reported data from surveys, which can introduce bias regarding the actual level of digitalization and its effects (74). Furthermore, most lack longitudinal follow-up, making it difficult to assess whether the benefits of digitalization are sustained over time (62).

Additionally, there is a concentration of evidence in urban contexts and formal enterprises, excluding a significant portion of the regional economic fabric that operates informally or in rural areas. This omission has been noted as an obstacle to designing truly inclusive policies (12).

Conclusions

Based on the systematic review conducted, it can be concluded that the digital economy exerts a significant effect on the development of MSMEs in Latin America, particularly in relation to productivity growth, increased operational efficiency, and enhanced business competitiveness. The adoption of digital technologies has proven to be a key factor in driving efficiency and fostering innovation in products, services, and business models.

In addition, it is evident that e-commerce and digital platforms have considerably expanded access to new markets. MSMEs have leveraged social networks, marketplaces, and mobile applications to diversify their customer base and extend their reach beyond local boundaries. However, the advancement of the digital economy among MSMEs has been uneven across countries, depending on the coherence of public policies, the quality of digital infrastructure, and organizational capabilities. Furthermore, the implementation of electronic payments has facilitated the formalization of business operations, improved customer experience, and expanded access to credit. These tools have contributed to professionalizing financial processes, enhancing traceability of business activity, and increasing credibility with banks and digital financing platforms.

Nevertheless, structural limitations have been identified that hinder the full potential of the digital economy. These include poor technological infrastructure, a shortage of digitally skilled personnel, difficulties in financing technological investments, and persistent high levels of informality. These constraints are especially pronounced among microenterprises and those located in rural or peripheral areas.

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