Challenges and Opportunities in the Panamanian Digital Economy: A Systematic Review of the Future

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Desafíos y Oportunidades en la Economía Digital Panameña: Una Mirada desde la Revisión Sistemática

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ABSTRACT

This article offers a comprehensive review of the current state of the digital economy in Panama. It presents an analysis of academic studies, official reports, and statistics published between 2015 and 2025. The findings indicate significant advancements in digital infrastructure, e-commerce, and online financial services, although challenges remain such as regional digital divides, low technological training, and a limited regulatory framework. Progress in digital management and the adoption of *fintechs* is highlighted, and public policies are suggested to promote a more inclusive and innovative development. This review aims to serve as a starting point for future research and strategic decisions in digital transformation in Panama.

Keywords: Digital Economy; Panama; E-Commerce; *Fintechs*; Digital Government; Digital Transformation.

RESUMEN

Este artículo ofrece una revisión exhaustiva del estado actual de la economía digital en Panamá. Presenta un análisis de estudios académicos, informes oficiales y estadísticas publicadas entre 2015 y 2025. Los hallazgos indican avances considerables en infraestructura digital, comercio electrónico y servicios financieros en línea, aunque aún enfrentan desafíos como las brechas digitales regionales, la baja formación tecnológica y un marco regulatorio limitado. Se resaltan progresos en administración digital y en la adopción de *fintechs*, además de sugerir políticas públicas para promover un desarrollo más inclusivo e innovador. Esta revisión pretende ser un punto de partida para futuras investigaciones y decisiones estratégicas en la transformación digital en Panamá.

Palabras clave: Economía Digital; Panamá; Comercio Electrónico; *Fintechs*; Gobierno Digital; Transformación Digital.

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INTRODUCTION

Panama, as one of the most dynamic countries in Central America, has experienced remarkable growth in its digital economy over the last decade. According to the World Bank,[1] Panama has an internet penetration rate of 86 %, higher than the regional average. This technological advancement has boosted sectors such as finance, education, commerce, and government, generating new economic and social opportunities.

However, structural barriers persist, such as a lack of rural connectivity, low digital literacy, and limited technical training in the education system.[2] In addition, the legal framework does not always keep pace with innovation, especially on issues such as data protection, cybersecurity, and cryptocurrency regulation.[3]

The objective of this article is to conduct a systematic review of scientific literature, government reports, and relevant statistics to identify the current status, trends, and challenges of the digital economy in Panama, and to offer evidence-based recommendations for its sustainable development.

METHOD

This research begins with a systematic review, conducting an exhaustive search of international and national scientific databases between January 2015 and March 2025. The sources consulted included Scopus, Dialnet, Redalyc, Google Scholar, as well as Panamanian institutional repositories such as the National Institute of Statistics and Census (INEC), the National Bank of Panama (BNP), the Ministry of Economy and Finance (MEF), and the Scientific Journals portal of the University of Panama.

The keywords used were: "Digital Economy," "Digital Transformation," "e-commerce," "Fintech," "Digital Government," and "Panama." The Boolean operators used were: AND, OR.

Selection process

A total of 245 sources related to publications on the digital economy were identified. After removing duplicates, 187 records were retained. Subsequently, 96 documents were excluded for not meeting the inclusion criteria. After a thorough reading and detailed evaluation, 21 papers were selected for the final qualitative analysis.

Figure 1. Keyword cloud on the Digital Economy in Panama

Table 1 shows an increase in the number of publications related to the digital economy in Panama since 2020. Most of the research comes from Panamanian institutions, reflecting local interest in the topic. The topic covers multiple areas such as technology, economics, education, and government. Few studies are published in internationally indexed journals, suggesting opportunities to strengthen global academic visibility.

The word cloud (figure 1) shows the words that appear most frequently in the documents. Twenty-five words were selected based on their frequency about the keywords.

Table 1. Bibliometric indicators of the sources reviewed on the digital economy in Panama

Category	Indicator
Total documents analyzed	21 selected sources (articles, technical reports, official statistics)
Year	From 2015 to 2025
Countries	Panama (62 %), United States (19 %), Spain (14 %), others (5 %)
Type of document	Scientific articles (48 %), Government reports (33 %), Statistics (19 %)
Subject areas	Digital economy (30 %), Technology (25 %), Digital education (15 %), Digital government (15 %), Fintechs (10 %), Digital divides (5 %)
National journals	Management and Organizations Journal (UP), Innovation and Development Journal (UP), Science and Technology Journal (UP)
International sources	World Bank, OAS, IDB, United Nations, Microsoft, ECLAC
Most cited authors	Castillo et al.[4], López et al.[5], Rojas et al.[6],
Key institutions	University of Panama, INEC, National Bank of Panama, MEF
Emerging issues	Electronic payments, fintechs, digital divides, digital education
Temporary trends	Increase in publications since 2020; greater emphasis on digital government and fintechs
Languages of publication	Spanish (76 %), English (24 %)

Note: This table summarizes the main indicators obtained from the analysis of 21 documents selected during the systematic review carried out between 2015 and 2025.

RESULTS

This section presents the main findings derived from the analysis of 21 documents selected during the systematic review process. The results are organized according to the following central themes: digital penetration, e-commerce, fintechs, digital government, digital education, and digital divides.

In the context of Latin America's digital transformation, Panama has made significant progress in terms of connectivity and access to digital technologies. According to the National Institute of Statistics and Census,[7] 86 % of Panamanian households have internet access, and 97 % of the population over 15 years of age has at least one mobile device. However, there are still marked territorial gaps, as internet use in urban areas reaches 94 %, while in rural areas it barely reaches 54 %. These penetration levels place Panama above the regional average, positioning it as one of the countries with the most significant potential to consolidate a knowledge-based economy.[1] In this scenario, digital education plays a strategic role in reducing inequalities, developing digital skills, and strengthening the

human capital necessary for an inclusive and resilient digital economy.

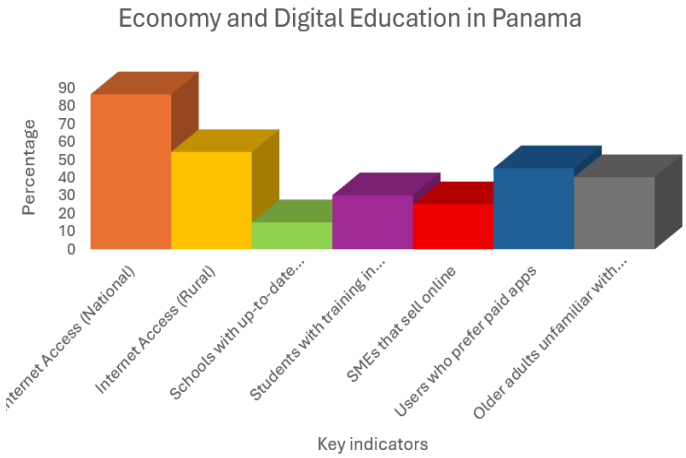
This connectivity environment has also facilitated the growth of e-commerce, consolidating new economic dynamics centered on digital platforms and virtual payment methods. E-commerce in Panama has experienced sustained growth in recent years, driven by the digitization of consumption and the expansion of digital payment methods. According to the Ibero-American Observatory of Electronic Commerce,[8] the value of e-commerce in the country reached US $ 1 8 billion in 2021. However, the participation of small and medium-sized enterprises (SMEs) remains limited, with only 25 % of them marketing their products through online platforms. In terms of consumer preferences, international sites such as Amazon and AliExpress stand out, accounting for most of the digital purchases made by Panamanians. This growth is closely related to the increase in the use of electronic means of payment, such as mobile banking applications and digital wallets.[9]

In line with this digital evolution of consumption, the fintech ecosystem has gained prominence in the Panamanian economy, expanding access to financial services through technological solutions. According to data from the National Bank of Panama,[9] by 2024, more than 50 fintech companies were operating in the country, 80 % of which specialized in electronic payments and mobile banking services. In addition, 45 % of users said they preferred to use digital payment apps over traditional methods, evidence of a transformation in the population's financial habits. There has also been growing interest in alternative financial services such as digital microloans and online insurance, which expand opportunities for financial inclusion and boost the local economy through innovative solutions.

In parallel with this development in the private sector, the Panamanian government has also made progress in institutional digitization processes, although it faces significant structural challenges. The United Nations E-Government Development Index[10,11] ranked Panama 85th out of 193 countries evaluated, indicating moderate progress compared to the rest of the region. Although several public services and digital platforms have been modernized, weaknesses persist in key areas such as digital citizen participation, personal data protection, and interoperability between government institutions. Nevertheless, the use of online services by citizens has been increasing: the Ministry of Economy and Finance[12] reported that more than 70 % of citizens access digital procedures at least once a month. These data suggest that, despite regulatory and technical limitations, there is a growing demand from the population for more agile, efficient, and accessible public services through digital means.

Within this ecosystem of digital transformation, education is one of the fundamental pillars for ensuring the sustainable and equitable development of the digital economy. However, the structural challenges in the Panamanian education system are significant. According to a study by the Technological University of Panama,[13] less than 30 % of secondary school students receive training in key areas such as programming or artificial intelligence, and only 15 % of public schools have up-to-date technology laboratories. This shortcoming limits the possibilities of training citizens with the skills necessary to participate actively in the digital economy. Despite this, some initiatives have begun to reverse this trend. The "Panama Digital" program, led by the City of Knowledge Foundation, has trained more than 10 000 teachers in the pedagogical use of technological tools since its implementation in 2020,[14] contributing to the strengthening of the educational ecosystem through teacher professional development.

However, despite growth in connectivity, e-commerce, digital services, and teacher training, digital divides continue to represent a critical obstacle to equity and inclusive development. According to the Panamanian Internet Association[2] report, although overall internet access is high, only 54 % of rural communities have stable connectivity. In addition, there remains a significant disparity in digital skills among different population groups. While young university students are more comfortable with technological environments, 40 % of older adults do not know how to carry out a secure digital transaction. This intergenerational and geographical inequality in access to and effective use of digital technologies underscores the need for comprehensive policies that address not only infrastructure, but also digital literacy and technological inclusion as fundamental rights in the digital age.



Note: the graph presents a selection of relevant indicators on the state of the digital economy and education in Panama.

Figure 2. Key indicators of the digital economy and education in Panama

There is a high level of overall internet access (86 %), although with a considerable gap in rural areas (54 %). The low proportion of public schools with up-to-date laboratories (15 %) and secondary students with training in programming or artificial intelligence (30 %) reflects structural challenges in the education system. In the economic sphere, only 25 % of SMEs sell products online, while 45 % of users prefer digital payment applications over traditional methods. Finally, 40 % of older adults do not know how to conduct secure digital transactions, highlighting an intergenerational gap in digital skills. These data underscore the need for comprehensive public policies that strengthen digital inclusion and literacy.

DISCUSSION

The results indicate that Panama has made considerable progress in the digital economy, particularly in areas such as internet access and the use of technology in the financial sector. However, significant challenges remain that are hindering comprehensive development.

Compared to other countries in the region, such as Costa Rica and Chile, Panama shows lower investment in digital

infrastructure and fewer technology startups per capita.[16] This suggests that, although there is potential, more ambitious policies are needed to reach leading regional levels.[17,18,19]

One of the most relevant findings is the relationship between the growth of e-commerce and the expansion of digital payment methods.[4] However, the low participation of SMEs in the digital market represents an opportunity to strengthen local competitiveness.

In terms of digital education, low rates of training in technological skills jeopardize the country's ability to fully reap the benefits of the digital economy.[12,20] It is therefore necessary to integrate programming, big data, and cybersecurity content into school and university curricula.

Finally, digital divides represent a significant social and economic problem, as they limit equitable access to essential services such as health, education, and banking.[5] Policies aimed at improving rural connectivity and digital literacy are critical to building a more inclusive digital economy.

CONCLUSIONS

Panama has made significant progress in the digital economy, particularly in access to the internet and electronic financial services. However, gaps in connectivity, digital education, and the regulatory framework persist, hindering comprehensive development.

It is recommended to promote digital literacy programs in rural areas, encourage the creation of technology startup incubators, update data protection and cybersecurity laws, and integrate digital economy content into school curricula. In addition, the real economic impact of fintechs on employment should be investigated, as well as the role of digital government in citizens' perception of transparency.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

AUTHORSHIP CONTRIBUTION

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Data curation: Antonio Sucre, Delia Consuegra, María Mitre.

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