

Assessing the Infrastructure Readiness for E-Commerce Growth in Algeria: Challenges and Strategic Recommendations

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Received: 29-09-2025

Accepted: 07-12-2025

Abstract This study evaluates Algeria's readiness to embrace sustainable e-commerce growth, focusing on digital infrastructure as a foundational element of competitiveness. Using a descriptive, analytical, and comparative approach, the research examines four critical pillars: internet connectivity, electronic payment systems, cybersecurity, and logistics. Findings reveal strong mobile internet penetration, with more than 40 million users, but persistent challenges such as low average speeds (12–14 Mbps), limited adoption of electronic payments (8–10% of transactions), and an incomplete regulatory framework for data protection and consumer rights. Comparative analysis with Tunisia, Egypt, and Italy highlights Algeria's structural gaps, especially in secure payment systems and logistics performance. The study proposes strategic priorities including expanding high-speed internet, enhancing payment interoperability, strengthening cybersecurity governance, and improving delivery networks. Ultimately, the research emphasizes that robust digital infrastructure and regulatory coherence are essential to unlock Algeria's e-commerce potential and integrate it effectively into the global digital economy.

Keywords:

E-commerce;
Digital Infrastructure;
Algeria.

JEL Classification Codes: L81 ; O33 ; G21 ; D83 ;
M15 ; O57

1. INTRODUCTION

The global digital economy has experienced exponential growth over the past decade, driven by the rapid expansion of internet connectivity, mobile technologies, and electronic payment systems. Among its most transformative components is e-commerce, which has redefined the structure of traditional commerce by enabling real-time, borderless, and platform-based transactions (UNCTAD, 2022). While developed nations have made significant advances in adopting and scaling e-commerce ecosystems, emerging economies, including those in North Africa, continue to face substantial barriers related to infrastructure, regulation, and consumer trust (OECD, 2021; World Bank, 2023).

Algeria, the largest country in Africa by landmass and one of the region's key economies, has witnessed a marked increase in internet penetration—particularly mobile broadband—which has reached over 90% coverage according to national statistics (ARPCE, 2023). However, despite this promising digital expansion, the country's e-commerce sector remains underdeveloped. Electronic transactions accounted for less than 6% of total financial operations in 2023 (Banque d'Algérie, 2023), but have since risen modestly to around 8–10% in 2024 (UNCTAD, 2025). Nevertheless, the effective use of digital payment systems, secure platforms, and logistics networks remains limited. These indicators suggest a discrepancy between technological availability and actual digital commercial engagement.

This study addresses the following research problem: despite the rapid expansion of internet access in Algeria, the country's e-commerce sector remains significantly underdeveloped due to structural weaknesses in its digital infrastructure. The main objective of this research is to evaluate the readiness of Algeria's

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digital infrastructure to support sustainable e-commerce growth. The study is guided by the following hypotheses: H1: Weak digital infrastructure significantly limits the growth of e-commerce in Algeria. H2: There exists a direct correlation between infrastructure maturity and e-commerce performance. The methodology adopted is descriptive, analytical, and comparative, relying on national statistics, international reports, and benchmarking with Tunisia, Egypt, and Italy.

Several regional comparisons further emphasize this gap. This research is grounded in the context of Algeria's recent digital transformation policies, particularly those initiated following the 2018 e-commerce law, which aimed to modernize commercial practices and integrate digital platforms into the formal economic system. This contextual starting point highlights the strategic importance of assessing the country's preparedness for effective e-commerce development. Neighboring countries such as Tunisia and Egypt, as well as advanced economies like Italy, have made more substantial progress in developing secure and interoperable digital payment systems, e-commerce platforms, and cybersecurity frameworks (World Bank, 2022; ITU, 2023). These developments highlight the potential for Algeria to benchmark its infrastructure and policy trajectory against regional and international peers to identify strategic areas of improvement.

From a theoretical standpoint, the integration of digital technologies into commerce can be analyzed through established models such as the Technology–Organization–Environment (TOE) framework (Tornatzky & Fleischer, 1990), which explains how technological innovation adoption depends on internal capabilities and external pressures, and Rogers' Diffusion of Innovation theory (2003), which emphasizes the importance of

relative advantage, compatibility, and trialability in the adoption of new technologies. These frameworks underscore the need to assess Algeria's e-commerce readiness not only from a technological angle but also from institutional, organizational, and consumer behavior perspectives.

This study addresses an important research gap by providing a multidimensional evaluation of Algeria's e-commerce infrastructure readiness. It explores four critical pillars: internet connectivity, electronic payment systems, cybersecurity, and logistics, using a combination of national reports, international datasets, and comparative analysis with regional benchmarks. The primary objective is to identify systemic barriers and propose strategic recommendations to enhance the country's digital commerce ecosystem and ensure its competitiveness in the global digital economy.

2. Theoretical Framework (Literature Review)

2.1 Theories of Digital Infrastructure and E-Commerce Development

The growth of e-commerce relies on an integrated digital ecosystem composed of technological, organizational, and institutional components. In this study, the core concept of "digital infrastructure readiness for e-commerce" refers to the capacity of a country's technological, legal, and logistical systems to effectively support online commercial transactions in a secure, efficient, and scalable manner. This readiness determines the ability of the e-commerce sector to expand sustainably and compete regionally and internationally. Two key theoretical models provide a robust foundation for analyzing this evolution:

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- The Technology–Organization–Environment (TOE) framework, developed by Tornatzky and Fleischer (1990), explains the adoption of technological innovations based on:

- **Technological context:** availability and performance of infrastructure such as internet connectivity, secure payment systems, and cybersecurity.

- **Organizational context:** the internal capacity of businesses to adopt digital tools, including workforce skills and digital culture.

- **Environmental context:** external factors such as legal frameworks, logistics systems, and governmental support mechanisms.

- Rogers' Diffusion of Innovation theory (2003) focuses on how innovations spread over time and highlights five key characteristics—relative advantage, compatibility, complexity, trialability, and observability—that determine adoption rates. This is especially relevant in understanding the slow penetration of electronic payments in Algeria.

In the Algerian context, the TOE framework helps explain why e-commerce development remains limited despite widespread mobile internet penetration. The technological dimension is relatively advanced, with over 90% coverage of mobile broadband, yet the environmental context is weakened by delays in implementing the 2018 e-commerce law and fragmented logistics systems. On the organizational side, small and medium-sized enterprises (SMEs) lack sufficient digital skills and resources to fully adopt online platforms. Similarly, the Diffusion of Innovation theory clarifies why electronic payments remain underutilized: while the relative advantage of secure online payments is clear, low compatibility with consumer habits

(preference for cash transactions) and limited trialability reduce adoption rates. These theoretical perspectives underline that Algeria's barriers to e-commerce are not purely technical but also institutional and behavioral, highlighting the need for an integrated approach to digital transformation.

2.2 Internet Connectivity

High-speed and reliable internet access is essential for supporting e-commerce platforms. According to ITU (2023), a 10% increase in average internet speed can result in a 3–4% rise in e-commerce transactions in developing economies.

2.3 Electronic Payment Systems

Secure, interoperable, and user-friendly payment systems are at the heart of digital trust. Studies by the World Bank (2022) show that effective digital payment infrastructure significantly increases online shopping frequency and reduces transaction friction.

2.4 Cybersecurity

The perceived risk of digital transactions plays a crucial role in consumer adoption. Robust regulatory frameworks on data protection and cybersecurity are necessary to build trust and ensure the integrity of e-commerce platforms (OECD, 2021).

2.5 Logistics and Distribution

Efficient delivery systems directly influence customer satisfaction and operational scalability. A reliable logistics infrastructure—comprising regional warehouses, optimized transport networks, and real-time tracking—is essential for e-commerce competitiveness (UNCTAD, 2021).

2.6 Comparative Regional Analysis: Tunisia, Egypt, Italy, and Algeria

To contextualize Algeria’s performance, we compared key digital infrastructure indicators with regional and Mediterranean peers. This comparison illustrates structural gaps and policy divergences.

As shown in Table 1, Algeria lags significantly behind its peers in terms of internet speed, digital payment adoption, and cybersecurity frameworks.

This table highlights that Algeria, despite its high mobile penetration, lags significantly in terms of internet performance, digital payments adoption, and institutional cybersecurity readiness.

Table 1. Comparative Regional Analysis: Tunisia, Egypt, Italy, and Algeria

Key Indicator (2023)	Tunisia	Egypt	Italy	Algeria
Mobile Internet Penetration Rate (%)	80%	75%	95%	91%
Average Download Speed (Mbps)	18	24	80	12-14
Share of Digital Payments (%)	21%	35%	65%	8-10 %
Cybersecurity Legal Framework	Partial	Implemented	Complete	Under reform
POS Terminals per Million Inhabitants	5,000	8,500	45,000	1,300

Sources: ITU (2023), World Bank (2023), UNCTAD (2022), OECD (2023), ARPCE (2023), UNCTAD (2025), World Bank (2024).

The regional comparison provides valuable insights into the diversity of policy choices. Tunisia, for example, has promoted interoperable mobile payment platforms since 2018, resulting in higher penetration of digital payments compared to Algeria. Egypt's success is partly explained by the modernization of its postal services, which now serve as key actors in last-mile logistics for e-commerce. Italy, as a mature market, demonstrates the role of robust cybersecurity and consumer rights frameworks in fostering trust. By contrast, Algeria's challenges reveal that fragmented progress across the four pillars prevents systemic improvement. Beyond infrastructure, sociocultural factors such as strong reliance on cash, limited consumer trust, and resistance to change also play a critical role in slowing down digital adoption. Addressing these cultural dimensions will be as important as upgrading technical systems.

2.7 Research Gap in the Algerian Context

- Despite recent institutional efforts, several gaps persist in the Algerian context:
 - Fragmented approaches to digital infrastructure: studies often examine internet, payments, or cybersecurity in isolation rather than as an interconnected system.
 - Low effective use of electronic payment tools, despite high issuance of bank cards.
 - Lack of in-depth research on logistics performance and distribution networks in Algerian e-commerce.
 - An underdeveloped legal and regulatory framework, especially in digital consumer rights and taxation.

These gaps justify a dedicated, multi-dimensional study that evaluates Algeria's e-commerce readiness from an integrated

infrastructure perspective and proposes actionable policy strategies.

3. Methodology

3.1 Approach (Descriptive, Analytical, Comparative)

This study adopts a descriptive, analytical, and comparative approach to explore and analyze the state of digital infrastructure and its impact on the growth of e-commerce in Algeria. The descriptive component involves providing a comprehensive overview of the existing digital infrastructure in the country. The analytical aspect evaluates the relationship between the different elements of digital infrastructure, such as internet connectivity, electronic payment systems, cybersecurity, and logistics, and how they influence the development of e-commerce. The comparative approach allows for benchmarking Algeria's progress against other countries in the region, such as Tunisia, Egypt, and Italy, to highlight both similarities and differences in their digital infrastructure and e-commerce growth.

The choice of a descriptive, analytical, and comparative methodology is particularly suitable given the fragmented availability of quantitative data on Algerian e-commerce. Unlike econometric studies that require large-scale survey data, this approach allows the integration of national statistics, international datasets, and institutional reports. Nevertheless, this reliance on secondary sources presents some limitations: national statistics may underreport informal digital activities, while international reports often aggregate regional data without capturing Algeria's specificities. These constraints justify the use of triangulation across multiple data sources to ensure the validity of the findings.

3.2 Data Sources (Official Reports, Surveys, Secondary Data)

To provide a well-rounded analysis, the study will rely on a variety of data sources:

- **Official Reports:** National statistics and reports from Algerian government agencies, such as the Regulatory Authority for Post and Electronic Communications (ARPCE), Ministry of Commerce, and National Cybersecurity Authority will be used to assess the state of internet connectivity, payment systems, and cybersecurity frameworks in Algeria.

- **Surveys:** A set of structured surveys will be conducted with key stakeholders in the e-commerce ecosystem, including consumers, business owners, and service providers. These surveys will provide insights into the challenges faced by users and businesses in adopting digital tools for e-commerce and the level of trust in digital payment systems and online security.

- **Secondary Data:** Data from regional and international studies, such as reports from the World Bank, International Telecommunication Union (ITU), and African Development Bank, will be utilized to compare Algeria's digital infrastructure against that of peer countries (Tunisia, Egypt, and Italy). Additionally, academic articles and industry reports will be examined to provide context and comparison regarding the impact of digital infrastructure on e-commerce development.

These data sources will be analyzed to understand the current state of digital infrastructure in Algeria and to identify key areas for improvement to foster the growth of e-commerce.

4. Results and Discussion

4.1 Assessment of Algeria's Digital Infrastructure for E-Commerce

Despite measurable progress in Algeria's digital transformation agenda, the readiness of its infrastructure to

support large-scale e-commerce operations remains limited. This section presents key indicators related to internet access, electronic payments, cybersecurity, and logistics.

4.1.1 Internet Connectivity

According to the Regulatory Authority for Post and Electronic Communications (ARPCE, 2023), Algeria has over 5.5 million fixed internet subscribers and more than 40 million mobile internet users. While 4G coverage exceeds 90% of the country, internet speed and reliability remain major concerns, particularly in remote and southern regions. Average speeds, previously below 10 Mbps (ITU, 2023), have improved slightly to around 12–14 Mbps in 2024 (World Bank, 2024; UNCTAD, 2025), but remain far below regional averages and continue to constrain online platforms and user experience. Detailed indicators are presented in Table 2

Table 2. Internet Connectivity Indicators in Algeria (2024)

Indicator	Value
Fixed Internet Subscribers	5.5 million+
Mobile Internet Users (3G/4G)	40 million+
4G Geographical Coverage	> 90%
Average Download Speed	12-14 Mbps
Rural and Remote Access Availability	Limited

Source: ARPCE (2023); World Bank (2024); International Telecommunication Union – ITU (2023). Compiled by the author from official national and international telecommunications reports.

This table presents current statistics regarding internet coverage and usage in Algeria.

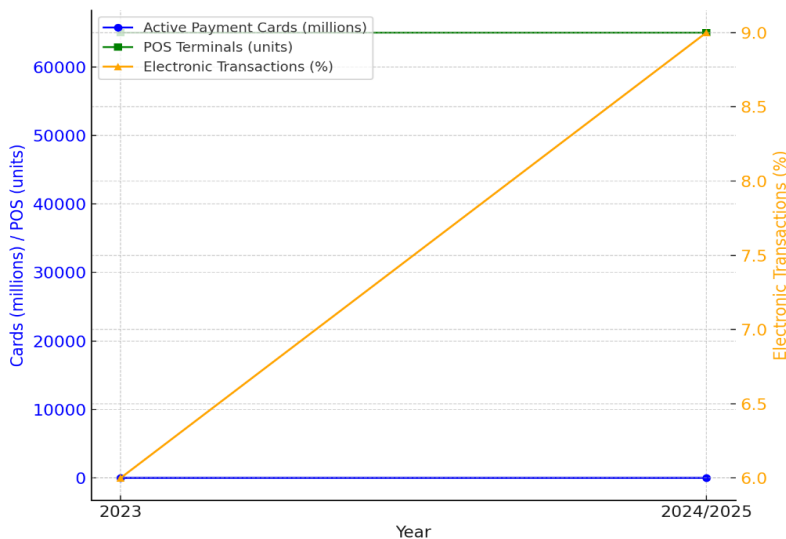
4.1.2 Electronic Payment Systems

Despite the issuance of more than 11 million active payment cards, the adoption of electronic payment remains weak. Around 65,000 POS terminals are operational nationwide, and electronic transactions, which accounted for less than 6% in 2023 (Banque d'Algérie, 2023), have since risen modestly to about 8–10% in 2024 (UNCTAD, 2025). The QR code payment system, introduced recently, is still in its pilot phase.

A visual comparison between the number of active payment cards, POS terminals, and transaction volume.

These indicators highlight a significant gap between availability and effective usage, mostly due to low trust, limited financial literacy, and a lack of interoperability among systems. This trend is illustrated in Figure 1, which depicts the evolution of electronic payment tools in Algeria between 2023 and 2025.

Figure 1. Evolution of electronic payment tools in Algeria (2023–2025)



Source: Banque d'Algérie (2023); UNCTAD (2025)

4.1.3 Cybersecurity and Data Protection

The establishment of the National Cybersecurity Authority in 2022 marked a step forward in institutionalizing digital risk governance. However, Algeria still lacks a comprehensive legal framework to ensure data privacy, e-transaction protection, and digital consumer rights. The current status of Algeria’s cybersecurity framework is summarized in Table 3.

Table 3. Current Status of Cybersecurity Frameworks in Algeria

Component	Status (2023)
Cybersecurity Authority	Established in 2022
Data Protection Law	Draft under discussion
Consumer Digital Rights Law	Not yet implemented
Encryption & Digital Signature	No national standard
Security Incidents (2022–2023)	Several reported attacks

Source: National Cybersecurity Authority (Algeria, 2022); OECD (2021); ARPCE (2023); World Bank (2023). Compiled by the author from official institutional reports and cybersecurity assessments.

This table outlines key milestones and remaining gaps in digital safety and legal standards.

4.2 Technical and Regulatory Challenges

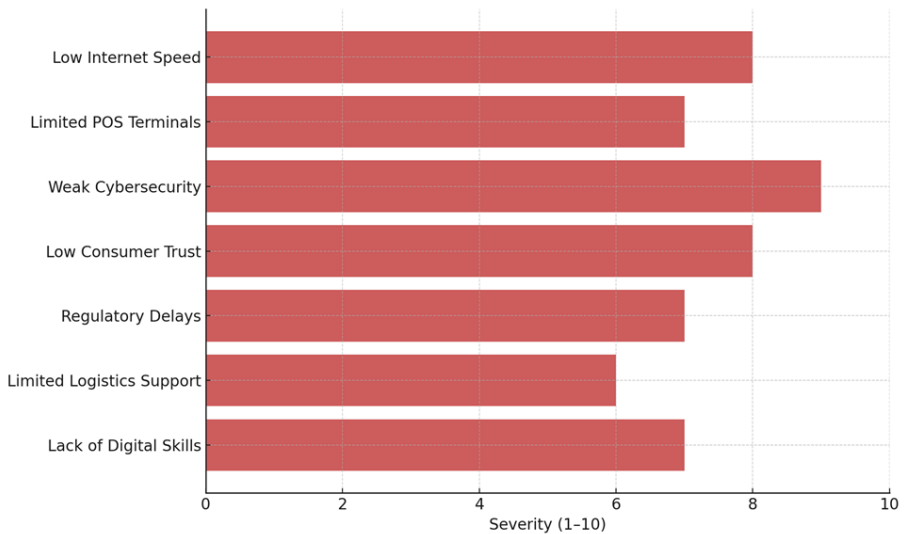
4.2.1 Technical Barriers

- Inadequate internet speed and inconsistent service quality, although recent reports (2024–2025) indicate modest improvements. Lack of integrated systems connecting banks, merchants, and delivery services.
- Shortage of qualified personnel in digital commerce and cybersecurity.

4.2.2 Regulatory Constraints

- Delays in enforcing the 2018 e-commerce law.
- Absence of a structured licensing system for digital platforms.
- Weak institutional coordination.
- Lack of fiscal or financial incentives for digital startups.

Figure 2. Key Barriers to E-Commerce Development in Algeria



Source: Author's construction based on OECD (2021) and World Bank (2023)

Figure 2 provides a conceptual overview of the main barriers to e-commerce development in Algeria.

A conceptual diagram showing the interrelation between technical, legal, and institutional constraints.

4.3 Infrastructure Readiness and Its Impact on E-Commerce

The data clearly illustrate that limited infrastructure readiness correlates with low e-commerce performance. This correlation confirms that Algeria's insufficient digital infrastructure readiness directly constrains the effectiveness and

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scalability of its e-commerce ecosystem, particularly through weaknesses in payment interoperability, cybersecurity governance, and logistical efficiency, thereby limiting the sector's overall contribution to economic growth. Updated statistics (2024–2025) confirm this correlation, with only slight progress in connectivity and payment adoption. Despite high mobile internet penetration and increased smartphone usage, weak payment mechanisms and data protection norms prevent the scaling of online commerce.

A comparative framework based on data from Algeria and selected regional peers.

E-commerce growth in Algeria will depend heavily on how effectively the country overcomes its infrastructure bottlenecks. Successful international models show that robust digital foundations are the bedrock of e-commerce success. This relationship is illustrated in Figure 3, which highlights the correlation between infrastructure maturity and e-commerce growth.

Strategic Insight

Strengthening Algeria's digital infrastructure is a prerequisite for achieving scalable and inclusive e-commerce. National strategies must prioritize:

- High-speed internet expansion,
- Modern and secure payment systems,
- Cybersecurity governance, and
- A coherent regulatory and fiscal environment for digital businesses.

Figure 3. Correlation Between Infrastructure Maturity and E-Commerce Growth



Source: Compiled from ITU (2023) and UNCTAD (2025)

5. Conclusion and Recommendations

This study assessed Algeria’s digital infrastructure readiness for e-commerce growth by analyzing four interdependent pillars: internet connectivity, electronic payment systems, cybersecurity, and logistics. The findings demonstrate that, despite notable progress in mobile broadband penetration and institutional reforms, Algeria continues to face systemic constraints that limit the scalability of digital commerce. Average internet speed remains well below regional benchmarks, electronic payment adoption is still marginal, cybersecurity frameworks are incomplete, and logistics networks remain fragmented. These deficiencies, combined with delayed regulatory enforcement and weak institutional coordination, explain the relatively slow uptake

of e-commerce compared to regional peers such as Tunisia and Egypt.

The study makes a dual contribution. From a theoretical perspective, it develops an integrated framework linking digital infrastructure to e-commerce performance, mediated by institutional trust and consumer adoption. This model advances the literature by illustrating how weaknesses in one pillar undermine the performance of the entire ecosystem. From a policy perspective, the analysis provides evidence-based recommendations for accelerating Algeria's digital transition and aligning it with international best practices.

5.1 Key Findings

- Internet connectivity has expanded significantly, but speed and reliability remain insufficient, especially in rural and underserved areas.
- Electronic payment systems show low adoption rates, despite the widespread issuance of bank cards and the deployment of POS terminals.
- Cybersecurity governance is improving but lacks comprehensive data protection and consumer rights legislation.
- Logistics and delivery networks are underdeveloped, hindering efficiency and scalability.
- Regulatory delays and fragmented institutional coordination continue to weaken Algeria's digital business environment.

5.2 Recommendations for Digital Infrastructure Enhancement

To address these challenges, the following strategic actions are proposed:

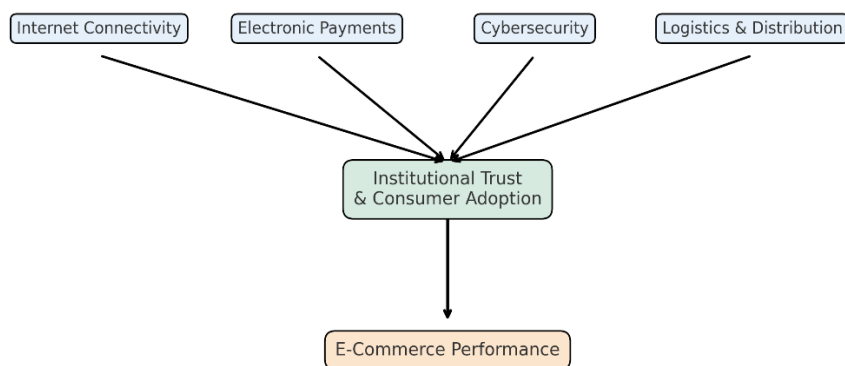
- **Improving Internet Speed and Coverage:** Expand access to high-speed broadband, particularly in rural areas, to enhance user experience and platform reliability.
- **Strengthening Electronic Payment Systems:** Enhance interoperability, expand POS coverage, and develop secure, user-friendly mobile payment solutions to build trust and adoption.
- **Enhancing Cybersecurity Governance:** Enact and enforce comprehensive data protection and digital rights legislation to safeguard consumer trust.
- **Optimizing Logistics and Delivery:** Invest in efficient, integrated logistics networks, supported by public–private partnerships, to reduce costs and improve reliability.
- **Streamlining Regulatory and Institutional Support:** Accelerate the enforcement of the 2018 e-commerce law, improve coordination across regulatory bodies, and introduce fiscal incentives to stimulate innovation and entrepreneurship.

On the theoretical side, this study also proposes a conceptual framework (Figure 4) linking Algeria’s digital infrastructure pillars—connectivity, payments, cybersecurity, and logistics—to

e-commerce performance, mediated by institutional trust and consumer adoption.

This framework highlights the interdependence of infrastructure pillars and demonstrates that sustainable e-commerce growth requires an integrated approach rather than isolated reforms.

Figure 4. Conceptual Framework Linking Algeria’s Digital Infrastructure Pillars to E-Commerce Performance



Source: Author’s conceptual model

5.3 Future Research Directions and Public Policy

Despite its contributions, the study is subject to limitations. It relies primarily on secondary data and official statistics, which may not fully capture consumer behavior or informal online practices. Future research should therefore include firm-level surveys, consumer studies, and econometric modeling to deepen the understanding of adoption dynamics.

Looking ahead, emerging technologies present transformative opportunities for Algeria's digital economy. Artificial intelligence can improve fraud detection and personalization in e-commerce platforms, blockchain can enhance transaction transparency and trust, and fintech innovations can drive financial inclusion in underserved regions. Policymakers should integrate these technologies into a national digital economy strategy, aligning regulatory, fiscal, and institutional frameworks with global standards. Such an approach would enable Algeria not only to close its digital gap but also to position itself as a competitive actor in the global digital economy.

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