

The impact of digital technology on international trade

Digital advancements have revolutionized international trade, driving efficiency and innovation while presenting new challenges. The rise of e-commerce platforms like Amazon and Alibaba has enabled SMEs to access global markets, with WTO data showing global e-commerce exports surging from 4 trillion (2019) to 6.3 trillion (2023). AI and blockchain further enhance trade – AI optimizes supply chains and overcomes language barriers, while blockchain slashes trade documentation time from 5–10 days to under 24 hours, reducing fraud risks (IBM, 2022). IoT and digital twins also bolster supply chain resilience, with DHL reporting a 30 % reduction in spoilage losses via sensor-enabled tracking [1].

However, digital trade faces significant hurdles. Cybersecurity threats cost \$6 trillion annually (McAfee, 2023), with attacks disrupting shipping and ports. Regulatory fragmentation – such as GDPR versus China's data laws – increases compliance costs. Additionally, a stark digital divide persists: only 30 % of African SMEs engage in cross-border e-commerce (ITC, 2023), lagging behind Western nations due to infrastructure and skill gaps [2].

Addressing these issues demands global cooperation. Harmonized agreements like DEPA can standardize digital trade rules, while public-private partnerships must expand broadband and digital literacy in emerging markets. Strengthening cybersecurity frameworks through shared protocols is equally critical.

In summary, digitalization offers unparalleled trade benefits but requires balanced policies to ensure security, inclusivity, and equitable growth. Only through coordinated action can its full potential be realized.

Keywords: digital trade; e-commerce; blockchain; AI in trade; global supply chains; trade finance; digital divide [3].

Introduction. International trade has experienced a revolutionary shift due to the rapid integration of digital technologies, disrupting traditional trade mechanisms while creating new opportunities for businesses worldwide. The emergence of e-commerce platforms, AI-driven logistics solutions, blockchain-based financial systems, and automated customs clearance technologies has dramatically reduced transaction costs, minimized delays, and strengthened global supply chain resilience. Digital trade has enabled businesses – from multinational corporations to small and medium-sized enterprises (SMEs) – to access global markets more efficiently than ever before, fostering greater economic interconnectedness.

However, alongside these benefits, digital trade introduces significant challenges that require urgent attention. Data privacy concerns remain a critical issue, as cross-border data flows encounter conflicting regulatory frameworks in different countries. Cybersecurity threats, such as ransomware attacks on logistics networks and digital payment fraud, continue to undermine trust in digital transactions. Additionally, intellectual property disputes have risen with the increased digitization of goods and services, as digital piracy and counterfeiting become more sophisticated. Regulatory fragmentation further complicates matters, as nations enforce varying laws on digital taxation, consumer protection, and cybersecurity compliance – leading to legal uncertainties for businesses engaged in global e-commerce [4].

This study examines the dual nature of digital trade's impact, analyzing how digital technologies enhance efficiency and market access while simultaneously creating new risks and inequalities. Key questions guide this exploration: First, how do digital technologies enhance trade efficiency and market access? Evidence suggests that AI-powered demand forecasting optimizes supply chains, blockchain ensures secure and transparent transactions, and digital marketplaces provide SMEs with unprecedented global reach. Second, what risks and inequalities emerge from digital transformation in trade? Research highlights cybersecurity threats, a growing digital divide between technologically advanced and developing nations, and regulatory inconsistencies that hinder seamless cross-border commerce. Finally, how should policymakers respond to ensure sustainable and inclusive digital trade growth? Proposed solutions include harmonizing international digital trade agreements, investing in digital infrastructure for developing economies, and establishing strong cybersecurity frameworks to protect businesses.

Ultimately, while digital technology has undeniably accelerated global trade growth, its full potential can only be realized through coordinated international efforts to address data governance, cybersecurity, and equitable access to digital trade benefits. Policymakers, businesses, and regulatory bodies must collaborate to create a balanced framework that fosters innovation while minimizing risks – ensuring that the digital transformation of trade remains sustainable, secure, and inclusive for all participants in the global economy.

Analysis of recent research and publications. Recent research underscores the strong positive correlation between digital infrastructure development and trade expansion. Akerman et al. (2022) demonstrate that nations with advanced digital ecosystems have seen export volumes grow by an average of 15 %, primarily due to improved connectivity and significant reductions in logistics costs. Similarly, Ferracane et al. (2023) highlight blockchain's transformative potential in international trade, showing how its application in trade documentation has helped save approximately \$450 billion annually by reducing fraud and streamlining processing. These findings confirm that digital technologies serve as powerful catalysts for trade efficiency, enabling businesses to overcome traditional barriers like geographical distance and bureaucratic delays.

However, alongside these benefits emerges a pressing challenge: the growing «digital trade divide» identified by McKinsey (2021). While developed economies rapidly integrate advanced technologies into their trade systems, many developing nations continue to struggle with inadequate digital infrastructure. This gap significantly limits their ability to participate in global e-commerce platforms and digital trade networks. The World Trade Organization (WTO, 2023) reinforces these concerns, revealing that only 35 % of low-income countries have established digital trade policies, compared to 90 % of advanced economies, creating a regulatory vacuum that further marginalizes them in international trade. Without targeted interventions, this digital disparity risks exacerbating existing global economic inequalities, as technologically disadvantaged nations face increasing difficulties in accessing digital trade opportunities.

Addressing these disparities requires coordinated global action, including investments in digital infrastructure for developing economies and the formulation of inclusive international frameworks. Only through such measures can the benefits of digital trade be equitably distributed, ensuring sustainable and inclusive growth across all regions [5].

Statement of the problem. While digital technologies have revolutionized global commerce, critical challenges continue to hinder their full potential and equitable adoption. Regulatory fragmentation remains a foremost obstacle, as conflicting national policies on cross-border data flows create barriers for digital service providers and e-commerce platforms. For instance, stringent data localization requirements in some jurisdictions constrain the seamless exchange of information essential for modern trade operations. Concurrently, escalating cybersecurity threats – particularly ransomware attacks targeting logistics networks and digital payment systems – erode confidence in online transactions. A 2023 Interpol report revealed a 62 % annual increase in cyberattacks on supply chains, exposing vulnerabilities that could destabilize global trade networks.

The human dimension presents equally pressing concerns, as AI-driven automation transforms traditional trade sectors. While productivity gains are undeniable, the displacement of jobs in customs brokerage, documentation processing, and other trade-related roles raises legitimate socioeconomic anxieties, particularly in developing economies where alternative employment opportunities may be limited. Compounding these issues is the persistent digital divide, where inadequate infrastructure in developing nations – including unreliable internet connectivity, insufficient digital payment systems, and underdeveloped e-commerce frameworks – effectively excludes many countries from meaningful participation in global digital trade. The World Bank estimates that 3.4 billion people worldwide still lack meaningful internet access, creating what economists term «digital deserts» in international commerce.

This research undertakes a systematic evaluation of these multifaceted challenges, aiming to develop practical policy solutions that can foster inclusive digital trade growth. Key focus areas include the harmonization of international digital trade regulations, capacity-building initiatives for cybersecurity resilience, transition programs for workers displaced by automation, and targeted investments in digital infrastructure for emerging economies. By addressing these critical issues, policymakers can help ensure that the benefits of digital trade expansion are both sustainable and equitably distributed across all nations and economic strata.

Research Methods. This study analyzes digital trade through a mixed-methods framework combining quantitative modeling, qualitative case studies, and expert insights. Statistical analyses of World Bank, WTO, and UNCTAD datasets assess correlations between digital adoption (broadband access, AI integration, blockchain use) and trade performance (export growth, cost efficiency). Case studies examine transformative models like Alibaba's cross-border e-commerce platform and Maersk's blockchain-based TradeLens (40 % faster document processing), leveraging internal data and stakeholder interviews. Structured expert interviews with policymakers, digital economists, and cybersecurity specialists provide frontline insights on regulatory and operational challenges. This triangulation bridges macro trends with micro implementations, offering policymakers evidence-based strategies to balance digital trade's opportunities and risks, particularly for developing economies [6].

Complementing these big-data analyses, the research incorporates deep-dive qualitative case studies examining pioneering digital trade ecosystems. One focal point involves deconstructing Alibaba's cross-border e-commerce platforms, which have fundamentally reshaped SME export capabilities through integrated digital payment systems and AI-powered customs clearance. Equally significant is the investigation of Maersk's blockchain-based TradeLens platform, which has demonstrated 40 % reductions in documentation processing times across certain shipping corridors. These cases will be analyzed through both proprietary performance data and stakeholder interviews to identify transferable best practices.

The methodological triad is completed with structured expert interviews targeting three critical knowledge domains: trade policy architects from major economic blocs to assess regulatory coordination challenges; digital economists specializing in emerging market transitions; and cybersecurity specialists focused on cross-border data vulnerabilities. This triangulated approach enables cross-validation between statistical trends, operational realities from leading implementations, and frontline policy insights. Particular attention will be given to identifying inflection points where digital trade acceleration either reduces or paradoxically exacerbates existing global trade asymmetries – findings that will directly inform the study's policy recommendations for more inclusive digital trade frameworks. Through this multidimensional methodology, the research aims to produce both granular performance metrics and contextualized operational insights, offering policymakers a robust evidentiary base for decision-making in this rapidly evolving domain. The integration of longitudinal trade datasets with contemporary case evidence addresses a critical gap in current literature, which often treats digital trade's macroeconomic impacts and micro-level implementations as separate research streams rather than interconnected phenomena.

Research results. Digital trade has transformed global commerce, yet its rapid expansion presents both significant opportunities and critical challenges. Recent data from the WTO (2023) highlights how e-commerce platforms like Amazon and Alibaba have fueled a 27 % surge in global B2C trade between 2018 and 2023, demonstrating the profound impact of digital marketplaces. At the same time, blockchain technology has revolutionized trade logistics, with IBM (2022) reporting that digital documentation processing, which previously took 5–10 days in traditional systems, now occurs in under 24 hours, significantly reducing trade friction and costs.

However, persistent challenges threaten the sustainability and inclusivity of digital trade growth. Cybersecurity vulnerabilities, particularly ransomware attacks and data breaches, impose staggering costs on global commerce, with McAfee (2023) estimating annual losses at \$6 trillion. Such risks not only disrupt supply chains but also deter businesses from fully embracing digital transactions. Additionally, uneven access to digital trade remains a major barrier, especially for small and medium-sized enterprises (SMEs) in developing regions. A 2023 ITC survey found that only 30 % of African SMEs engage in cross-border e-commerce, largely due to digital literacy gaps, payment processing limitations, and unreliable internet infrastructure.

To ensure that digital trade benefits are widely distributed, targeted policy interventions are essential. First, harmonizing digital trade regulations through frameworks like the Digital Economy Partnership Agreement (DEPA) could minimize cross-border discrepancies in data governance and digital taxation, lowering entry barriers for businesses. Second, public-private partnerships must accelerate digital infrastructure development in underserved regions, ensuring that emerging economies are not left behind. Investments in broadband expansion, digital skills training, and secure e-payment systems can empower SMEs and bridge the digital divide. By addressing these challenges while reinforcing the drivers of digital trade expansion, such as AI-driven platforms and blockchain efficiency gains, policymakers can cultivate a more secure, inclusive, and competitive global digital trade ecosystem. Future strategies should prioritize cybersecurity cooperation, regulatory alignment, and infrastructure investments to fully unlock digital trade's potential as an engine of equitable economic growth.

Conclusions. The proliferation of digital technologies has fundamentally reshaped international trade, unlocking unprecedented efficiencies through AI-powered logistics, blockchain-enabled transactions, and e-commerce platforms that connect businesses and consumers worldwide. These innovations have dramatically reduced trade costs and processing times – IBM estimates blockchain can compress trade documentation processes from days to hours – while global e-commerce has grown by over 25 % in five years (WTO, 2023). However, this digital revolution has simultaneously widened global inequalities, with advanced economies capturing disproportionate benefits while many developing nations struggle with inadequate infrastructure, cybersecurity vulnerabilities, and regulatory fragmentation [7].

Three critical policy priorities must guide the evolution of digital trade frameworks moving forward. First, robust cybersecurity frameworks are urgently needed as digital transactions multiply. With cybercrime costing global trade an estimated \$6 trillion annually (McAfee, 2023), nations must harmonize cybersecurity standards, improve threat intelligence sharing, and establish liability protocols for digital trade disputes. Second, targeted digital inclusion initiatives can help bridge the growing divide – currently, only 30 % of African SMEs participate in cross-border e-commerce (ITC, 2023), hindered by unreliable connectivity, payment barriers, and skills gaps. Multilateral development banks should partner with tech firms to deploy affordable broadband, digital literacy programs, and SME-friendly fintech solutions. Third, international standards for emerging technologies like AI and blockchain must be developed to ensure interoperability while preventing fragmentation; bodies like the ITU and WTO should convene public-private working groups to establish ethical guidelines and technical specifications. Achieving sustainable digital trade will require unprecedented global cooperation – not just among governments but also involving corporations, standards organizations, and civil society. The Digital Economy Partnership Agreement (DEPA) offers one model for aligning regulations on data flows and digital taxation, but its principles must be expanded to include stronger equity safeguards. Looking ahead, the challenge lies in constructing governance systems that simultaneously foster innovation, protect against systemic risks, and ensure all nations can participate meaningfully in the digital trade ecosystem. Only through such balanced, inclusive approaches can the promise of digital commerce be realized as a true driver of shared global prosperity.

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Scientific interests:

- problems of development of accounting and analysis to ensure sustainable economic development.

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Вплив цифрових технологій на міжнародну торгівлю

Цифрові досягнення революціонізували міжнародну торгівлю, забезпечивши ефективність та інноваційність, і водночас створивши нові виклики. Зростання електронної комерції, представлене, зокрема, такими платформами, як Amazon і Alibaba, дало можливість малим і середнім підприємствам (SME / МСП) виходити на глобальні ринки. За даними СОТ, світовий експорт у сфері електронної комерції зріс із 4 трлн доларів (2019) до 6,3 трлн (2023). Штучний інтелект і блокчейн додатково підсилюють торгівлю: ШІ оптимізує ланцюги постачання та долає мовні бар'єри, тоді як блокчейн скорочує час оформлення торговельних документів із 5–10 днів до менш ніж 24 годин, зменшуючи ризики шахрайства (IBM, 2022). IoT (Інтернет речей) і цифрові двійники також підвищують стійкість ланцюгів постачання: за даними логістичного оператора DHL, завдяки відстеженню за допомогою сенсорів втрати через зіпсовані товари скоротилися на 30 % [1].

Однак цифрова торгівля стикається з серйозними перешкодами. Кіберзагрози завдають щорічних збитків на 6 трлн доларів (McAfee, 2023), зокрема зупиняючи роботу портів і морських перевезень. Регуляторна фрагментація – наприклад, відмінності між GDPR (Загальний регламент захисту даних ЄС) та китайським законодавством про дані – збільшує витрати на дотримання вимог. Крім того, зберігається суттєвий цифровий розрив: лише 30 % африканських МСП беруть участь у транскордонній електронній комерції (ITC, 2023), значно відстаючи від західних країн через проблеми з інфраструктурою та браком цифрових навичок [2].

Подолання цих викликів потребує глобальної співпраці. Гармонізовані угоди, як-от DEPA, можуть стандартизувати правила цифрової торгівлі, тоді як державно-приватні партнерства мають розширювати доступ до широкосмугового інтернету та цифрової грамотності на ринках, що розвиваються. Не менш важливим є посилення кібербезпеки шляхом створення спільних протоколів.

Отже, цифровізація пропонує безпрецедентні переваги для торгівлі, проте потребує збалансованої політики для забезпечення безпеки, інклюзивності та справедливого зростання. Лише завдяки скоординованим діям можна реалізувати її повний потенціал.

Ключові слова: цифрова торгівля; електронна комерція; блокчейн; ШІ у торгівлі; глобальні ланцюги постачання; торговельне фінансування; цифровий розрив [3].

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