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ORIGINAL CONTRIBUTION

Digital Trade Agreements and Their Implications for Developing Economies

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Abstract— The rapid development of digital trade requires the revision and modernization of rules governing the international circulation of goods and services. The expansion of e-commerce regulation may significantly influence the export performance and economic growth of developing countries. The study aims to determine the impact of e-commerce provisions in trade agreements on ICT goods exports and economic growth in developing countries and to identify country groups according to their regulatory and economic characteristics. The study combines statistical and regression analysis of TAPED data on e-commerce regulation with World Bank panel data on ICT exports and GDP growth for 2006–2024. The analysis covers 113 developing economies and 261 trade agreements involving developed, developing, and least developed countries across Africa, America, Asia, Europe, and the Pacific. Correlation-regression analysis and hierarchical cluster analysis using the k-means method were applied to identify relationships and classify countries by regulatory intensity and economic performance. Developing countries generally apply less stringent e-commerce provisions within free trade agreements. Regression analysis indicates that softer e-commerce regulation is positively associated with ICT export volumes. Cluster analysis identified nine countries characterized by e-commerce regulation, relatively high GDP growth, and a substantial share of ICT exports. Another group demonstrated limited e-commerce regulation, lower or moderate GDP growth, and smaller ICT export shares. Of the 261 agreements examined, 55.17% contain e-commerce provisions and 36.02% include dedicated sections. Regulatory disparities, limited e-commerce promotion, insufficient SME support, and unequal trading conditions constrain developing countries' digital trade potential. Effective digital trade regulation can reduce barriers to electronic transactions, facilitate paperless trade, strengthen consumer protection, and support ICT exports. Harmonized regulatory approaches and stronger institutional support for e-commerce may enhance the participation of developing economies in global digital trade.

Index Terms— E-commerce, Digital trade agreements, Logistics infrastructure, Foreign trade, Customs offenses

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Introduction

As global digital trade grows rapidly and more and more ways of exchanging goods and services are emerging over the internet, there is a real need for proper regulation in this area. Digital Trade Agreements (DTAs) help create a legal framework that opens up access to new markets and makes electronic transactions easier. They also ensure the protection of personal data, increase business confidence through legal certainty, and make e-commerce more accessible (Comission, 2026). For developing countries, digital trade and the international exchange of digital services have become an important economic driver. For example, in 2022, digital services accounted for as much as 54% of total services exports (Ossa, 2023), and this figure in developing countries continues to grow (Ossa, 2023).

According to the World Trade Organization, good regulation of digital services helps to significantly reduce trade costs. In particular, in middle- and low-income countries, it allows digital interactions to double (Organization, 2023). An analysis of digitalization in 58 countries for the period 2014-2018 also confirms that the level of trade costs directly depends on how effectively digital trade is regulated. This applies to better access to information, reduced transaction costs, and optimized logistics and customs services.

In addition, government policies and measures ensure the compatibility of the regulatory and legal framework for digital trade, the development of digital skills, and digital infrastructure (Ossa, 2023). Effective DTAs and regulatory environments contribute to increases in international transactions, increase businesses' confidence in digital markets, and allow for a balanced approach to regulating data flows between countries.

The recent studies reviewed here assess the economic effects of digital trade agreements on developing economies, but they treat exports and growth separately. Modeling of digital trade regulations in 143 countries from 2005 to 2019 links them to higher digital services exports, with larger gains for low- and middle-income countries (Jiang et al., 2023). Clear bilateral rules stimulate digital exchange between countries (Suh & Roh, 2023), and digital trade rules in preferential agreements expand services trade in global value chains (Wu et al., 2023). A separate strand of research, based on a sample covering 2005–2019 and including 45 developing countries, estimates the long-term effect of digital services exports on GDP (Mulenga & Mayondi, 2022). Neither of the two cross-country estimates covers the post-pandemic acceleration of digital trade (Peters, 2023). It remains unclear whether e-commerce provisions in trade agreements are associated, within one sample, with both ICT goods exports and economic growth in developing countries. Nor is it known which developing economies combine such provisions with high ICT exports and fast growth.

In developing countries, the regulation of digital trade lags behind, and clear rules are still missing (Rahman & Rahman, 2022), partly because most trade rules predate the spread of digital exchange (Khan, 2023). Their digital trade commitments have been mostly non-binding: Banga et al. (2021) found that, among the trade agreements they examined, less than 2% contain mandatory obligations on digital trade. Restrictions on data flows and localization requirements have hindered digital trade (Meltzer, 2019)), while national rules on privacy, cybercrime, and consumer protection can sometimes distort trade and discriminate against foreign suppliers (Obiora, 2023). Developing countries are also a small minority among the countries taking part in the negotiations on digital trade rules (Burri et al., 2024). Digital trade rules in free trade agreements can, in turn, leave developing countries at an economic disadvantage compared with developed countries (Kelsey et al., 2020). These problems converge on one question: what the e-commerce provisions that developing countries sign actually deliver. The empirical problem is therefore whether having such provisions, mostly non-binding ones, is associated with the share of ICT goods exports and GDP growth rates in developing countries.

Aims

To address this problem, the aim of the article is to determine the impact of e-commerce regulations on ICT goods exports and economic growth in developing countries, and to study the consequences and economic effects of existing Digital Trade Agreements (DTAs) and the regulation of digital trade for the economies of developing countries. The main objects of the study are: The main approaches to regulating digital trade in developing countries; the economic effects of adopting digital trade agreements in developing countries. Three research questions follow from these aims. RQ1: Which e-commerce provisions do agreements involving developing countries contain? RQ2: How are these provisions, ICT goods exports, and GDP growth related? RQ3: Which groups of developing economies do these characteristics distinguish? Hypotheses H1–H3 for RQ2 are developed in the literature review.

The study contributes to research on the economic effects of digital trade agreements on developing economies in three ways. Conceptually, it combines the trade-cost argument for exports and the growth argument, which recent studies examine separately (Jiang et al., 2023; Mulenga & Mayondi, 2022), into three testable hypotheses on e-commerce provisions, ICT goods exports, and GDP growth. Empirically, it maps the e-commerce provisions of 261 trade agreements concluded between developed, developing, and least developed countries from 2000 to September 2025, including the new digital economy and digital trade agreements. It then relates the presence of such provisions in free trade agreements to the average share of ICT goods in total exports and to GDP growth in 106 developing economies over 2006–2024. It also groups these economies by the three characteristics. Practically, the mapping of provisions (Tables I-II) shows developing-country negotiators which commitments, such as national treatment and most-favored-nation treatment, are still uncommon in their agreements and could be prioritized in new ones. The association between e-commerce provisions and ICT goods exports indicates what such provisions may bring.

Literature Review and Hypotheses Development

Digital trade agreements are a set of provisions for regulating and managing data, cross-border data flows, and e-commerce that directly or indirectly affect the development of digital trade in different countries (Burri & Polanco, 2020). More effective digital trade rules can reduce the digital divide between trading partner countries and provide a higher level of trust and security (Ismail, 2021).

Among the approaches and tools for promoting digital trade between countries are the elimination of tariffs on digital products and services, moratoriums on customs duties on electronic transactions, paperless trade, and others (Burri & Polanco, 2020). For example, at the twelfth Ministerial Conference in June 2022, WTO members agreed to eliminate tariffs on products supplied in digital format (Organization, 2022).

Unlike digital trade agreements in developed countries, developing countries have less stringent policies, regulations, and other mandatory aspects of digital trade. One study found that approximately 23% of trade agreements address data protection, while less than 2% contain mandatory obligations on digital trade. Only 8% of agreements prohibit "data localization" among developed countries. Most agreements do not recognize electronic authentication or trust technologies, which are important for facilitating contracts in the digital economy (Banga et al., 2021).

Data analysis and modeling of digital trade regulations in 143 countries from 2005 to 2019 show that regulation does indeed help stimulate digital services exports because it reduces trade costs (Jiang et al., 2023). The impact of these regulations varies depending on the type of digital trade and the level of national income. Interestingly, low- and middle-income countries benefit even more from the establishment of such regulations than high-income countries.

At the same time, digital services exports have a significant positive impact on GDP in the long term for all countries, including 45 developing countries, during the period 2005-2019. For example, in developing countries, a 1% increase in digital services exports is associated with a 0.78% increase in GDP per capita (Mulenga & Mayondi, 2022).

The debate surrounding digital trade regulation is constantly changing, influenced by the policies of developed country governments. For example, in 2017-2019, there was much discussion about restrictions on global data flows and requirements for their localization, which hindered the development of digital trade (Meltzer, 2019). However, after the 2020 pandemic, digital trade began to develop much faster (Peters, 2023). This prompted countries, especially developing ones, to review their rules and regulations (Rahman & Rahman, 2022).

On the other hand, the increasing digitalization of trade has brought new challenges: privacy issues, cybercrime, consumer protection, and national security. All of this requires new regulations at the national level, although sometimes such measures can distort trade and create discriminatory conditions for foreign suppliers (Obiora, 2023). In addition, in an increasingly digital economy, combating tax evasion by large multinational companies is critical to ensuring a fair distribution of profits from their activities (Kelsey et al., 2020).

Developing countries are lagging behind in terms of regulation, as they still lack clear rules for digital trade (Rahman & Rahman, 2022). Most trade rules in such countries, as in developed countries, are established through World Trade Organization (WTO) agreements or regional agreements (Rahman & Rahman, 2022). The problem is that these rules were created before digital exchange became a mass phenomenon (Khan, 2023). That is why it is so important now to review them and discuss new standards. New rules for digital trade are currently being developed either within the WTO or through free trade agreements (Meltzer, 2019).

It is also worth mentioning that Regional Trade Agreements (RTAs) seek to address cybercrime, protect privacy and consumer rights, but this often creates problems with digital inclusion (Obiora, 2023). While RTAs help prevent unilateral restrictions, they still need to contribute to the creation of a coherent regulatory framework for the global digital economy. At the same time, the WTO is currently seeking to conclude a special agreement on e-commerce to boost the development of digital trade.

On the other hand, the new digital trade regimes introduced in free trade agreements may reinforce the harmful tax policies of large multinational companies. This is because governments may lose the ability to effectively influence and regulate the digital economy. In addition, such rules in free trade agreements put developing countries at a significant disadvantage (Kelsey et al., 2020).

Another option is to develop standards and mutual recognition agreements in areas such as consumer protection and privacy. This gives national regulators the confidence that data transfers across borders will not interfere with domestic rules (Meltzer, 2019). However, a different approach gained traction during the 2020-2025 period. It involves addressing issues through preferential trade agreements, as well as active negotiations on so-called digital trade agreements (DEAs) (Burri & Polanco, 2020). Preferential agreements have become much more important since the early 2000s, as trade rules within the WTO have been changing too slowly (Elsig & Klotz, 2021).

A study of the signing of information technology agreements from 1995 to 2015 shows that such agreements do indeed accelerate digitalization and internet penetration in participating countries. This is most noticeable in developing countries, as well as in economies with better telecommunications infrastructure, better regulation, and higher ICT tariffs. In addition, the agreements promote digitalization by lowering ICT trade barriers and accelerating cross-border digital mergers and acquisitions (M&A) (Ma et al., 2025).

Research on how domestic digital trade regulations and bilateral agreements work suggests an important point: clear rules and common understandings do indeed stimulate digital exchange between countries (Suh & Roh, 2023). However, when a country tries to implement domestic regulations unilaterally, they often become barriers that restrict trade. Moreover, this negative effect is even more pronounced when such regulations are imposed by the importing country itself (Suh & Roh, 2023).

When it comes to negotiations on digital agreements or specific standards for e-commerce, the situation is quite mixed. For example, among the 90 countries participating in the discussions, only 15 are developing countries (Burri et al., 2024). The challenges that have emerged since

the pandemic are also quite diverse. These include supporting electronic transactions, simplifying logistics and digital processes, addressing customs duties on e-commerce goods, as well as access to the Internet and data. In addition, issues of trust remain critical, including consumer protection and cybersecurity, regulation of information flows, international cooperation, the creation of special regimes for certain countries, and the development of telecommunications (Burri et al., 2024).

The expected link between e-commerce provisions and ICT exports rests on the trade-cost argument. Digital trade agreements create legal certainty and trust (Comission, 2026; Ismail, 2021) and regulation that reduces trade costs helps expand digital services exports (Jiang et al., 2023; Organization, 2023). Rules agreed between partners matter here, since unilateral domestic rules often become barriers to trade (Suh & Roh, 2023). The export evidence concerns services, but the same mechanism is expected to apply to ICT goods: Provisions on paperless trade and electronic transactions lower the cost of selling goods across borders, and information technology agreements have lowered ICT trade barriers (Ma et al., 2025). This leads to the first hypothesis.

H1: E-commerce provisions in free trade agreements are positively associated with the share of ICT goods in the exports of developing countries.

For growth, the argument is less certain. Digital trade has become an important driver of growth in developing economies (Ossa, 2023), and digital services exports are linked to long-term GDP gains (Mulenga & Mayondi, 2022). If e-commerce provisions are associated with higher ICT exports, part of this gain may contribute to GDP growth, although the reviewed studies do not show such gains for ICT goods. Such provisions may also weaken the ability of governments to regulate the digital economy (Kelsey et al., 2020). On balance, positive associations are expected.

H2: E-commerce provisions in free trade agreements are positively associated with GDP growth in developing countries.

H3: A higher share of ICT goods in exports is associated with faster GDP growth in developing countries.

Methodology

In the first phase of the study, we used statistical analysis methods to analyze data from the TAPED dataset. It collects and organizes provisions on digital trade regulation found in preferential trade agreements from the 2000s to September 2025 (Burri & Polanco, 2020). The data cover rules on e-commerce, data protection, and cross-border information flows. This dataset allows us to assess the extent to which certain rules are legally binding and to clearly distinguish between soft and hard obligations. As of September 2025, the database contains 477 trade agreements, of which 247 have provisions on digital trade, and 149 have separate sections on e-commerce or digital regulation. In total, the dataset contains 130 provisions covering five key areas: E-commerce, data regulation, new data economy rules, cross-sectoral rules, and intellectual property issues. (TAPED, 2025).

Given that this article examines the economic effects of digital trade agreements on developing economies, provisions on e-commerce were analyzed. Annex 1 provides ratings of the provisions of trade agreements on e-commerce and digital trade for developed countries, developing countries, and least developed countries. The ratings of the provisions (0 – none, 1 – soft provisions, 2 – hard provisions) were determined for the following selected types of provisions relevant to economic effects: general provisions, market access, customs duties, electronic transactions, facilitation of digital trade, consumer protection, use of the Internet in trade, facilitation of e-commerce for SMEs, cooperation in the field of ICT and e-commerce, and the application of dispute settlement mechanisms.

The agreements for analysis were selected based on the following criteria: status of the agreement and types of agreement. The analysis included agreements in force, partially in force, and agreements that had not been ratified by the parties from 2000 to September 2025. The analysis included the following types of agreements that regulate digital trade: 5 Digital Economy Agreement (DEA), 3 Digital Trade Agreement (DTA), 200 Free Trade Agreement (FTA), 34 Economic Partnership Agreement (EPA), 15 Economic Complementation Agreement (ECA), and 4 Regional Trade Agreement (RTA). As a result, 261 agreements were selected that regulate digital trade and are relevant to the economies of developing countries in Africa, America, Asia, Europe, and the Pacific.

The analysis was conducted among three groups of countries:

o developing countries and developed countries;

o agreements between developing countries;

o developing countries and least developed countries.

The UN classification and the UN Committee on Development Policy's list of least developed countries were used to identify country groups for analysis. The data selection included 113 developing economies that participate in trade agreements and regulate digital trade.

In the second stage, we examined the dynamics of ICT exports as a share of the total exports of each of these countries, as well as their GDP growth rates for the period from 2000 to 2025. We also collected data on whether free trade agreements contain separate chapters dedicated to e-commerce for the period from 2006 to 2024. The annual observations were then averaged over 2006–2024, so that each country entered the analysis as a single case described by three variables: the average share of ICT goods in total exports (%), the average annual GDP growth rate (%) and a binary indicator of whether the country's free trade agreements contain e-commerce provisions (0 – no, 1 – yes). The correlation-regression analysis and the hierarchical cluster analysis using the k-means method were therefore carried out on a cross-section of country averages and not on pooled year-by-year observations. Of the 113 developing economies, 106 entered the estimation: seven were excluded list-wise because

World Bank data on the share of ICT goods exports were not available for them for the whole period 2006–2024. This is why the regression reported in Appendix 2 has *N* = 106 (2 regression and 103 residual degrees of freedom) and why Table VI reports one average value per country.

Results

Among the 261 agreements, 55.17% (144) contain provisions on electronic trade, 36.02% have a separate section on e-commerce, and 8.05% define the principle of technological neutrality of the country and equal treatment of digital and other means of supply of goods and services. Only 13.41% of agreements contain provisions on stimulating and facilitating the private sector to self-regulate in the field of e-commerce. Among all agreements, 26.05% contain provisions on the importance of developing and promoting e-commerce. A low proportion of agreements (23.37%) contain provisions on national treatment in e-commerce (absence of discrimination). Among the 261 agreements, only 18.01% include provisions on the most favored nation treatment in digital trade (or provisions on regulating equal trade conditions with partner countries). This means that foreign suppliers of digital products and services from different countries still compete with each other depending on the conditions offered to them by the partner country. It is important to note that only 9.96% of agreements, mainly free trade agreements, contain provisions on the non-application of customs duties to electronic transactions and fees or other payments other than customs duties. At the same time, an average share of agreements (34.10%) specifies rules on the non-application of customs duties to electronic transfers (Table I).

Table I

Agreements regulating digital trade and e-commerce: general rules, customs duties, and market access (2000 – September 2025)

Type of agreements	ec_prov	ec_chapter	ec_tech_neutrality	ec_self_reg	ec_promotion_facilitation	ec_nt	ec_mfn	ec_serma_nt	OECD_ec_non_imposition_duty_fees	ec_non_imposition_duty
DEA	4	4	0	2	2	6	4	0	0	4
DTA	3	3	1	1	2	0	0	0	0	3
ECA	2	1	0	0	0	2	0	0	1	1
EPA	23	9	1	2	13	5	2	0	0	7
FTA	111	77	19	30	51	48	41	0	25	74
RTA	1	0	0	0	0	0	0	0	0	0
Total, units	144	94	21	35	68	61	47	0	26	89
Total, %	55.17	36.02	8.05	13.41	26.05	23.37	18.01	0.00	9.96	34.10

Source: Calculated by the author based on data (TAPED, 2025)

At the same time, FTAs provide the most comprehensive regulation of digital trade, while Digital Economy Agreements are not widely used among countries and do not contain provisions on technological neutrality, market access obligations, and national treatment in the field of services and investments necessary for the development of e-commerce / digital trade. Thus, new types of agreements are characterized by a low level of support for innovations in e-commerce. In addition, new types of Digital Trade Agreements do not contain provisions on the elimination of discrimination in trade between countries. For example, the Digital Trade Agreements between the EU and Singapore in 2025, between the EU and Korea (not signed), and between the United Kingdom and Northern Ireland and Ukraine in 2023 do not contain provisions that regulate discrimination issues.

Among all types of agreements, only 36.40% have provisions on the regulation of e-transactions, which are aimed at eliminating or preventing unjustified obstacles to e-commerce. A total of 40.23% contain provisions on paperless trade, and 42.15% on the protection of consumer rights. Despite the fact that 45.98% of agreements regulate issues of cooperation between countries in the field of ICT, only 13.41% define the principles of access to the Internet and its use for E-commerce. Among the 261 agreements, 23.37% contain provisions on promoting e-commerce among SMEs, while 15.33% define dispute settlement mechanisms (Table II).

Table II

Agreements regulating digital trade and e-commerce: e-transactions, promotion of e-commerce, consumer protection, use of the Internet and other regulations (2000 – September 2025)

Type of agreements	ec_barriers	ec_paperless_trade	ec_consumer_protection	ec_internet_principles	ec_prov_smes_msmes	ec_prov_coop_ICT	ec_institutional_arrangement
DEA	7	7	8	3	4	3	0
DTA	3	4	6	3	3	3	3
ECA	1	1	0	0	0	2	0
EPA	8	17	10	6	8	20	8
FTA	76	76	86	23	46	91	29
RTA	0	0	0	0	0	1	0
Total, units	95	105	110	35	61	120	40
Total, %	36.40	40.23	42.15	13.41	23.37	45.98	15.33

Source: calculated by the author based on data (TAPED, 2025)

The United States and Korea signed a free trade agreement known as KORUS. It was revised in 2010 and replaced superseded by a newer version in 2019. Interestingly, KORUS was the first U.S. agreement to include rules for the free flow of data across borders. Along with the

U.S.-Japan Digital Trade Agreement signed in 2019, it is one of only two U.S. bilateral agreeents to include such provisions.

In 2016, after long negotiations between Singapore, Chile, Brunei, and New Zealand, the Trans-Pacific Partnership Agreement was signed. It is believed that corporations actually tailored it to the goals of the Trans-Pacific Strategic Economic Partnership. This document was the first to include a separate section on the regulation of digital trade. However, the US Congress did not support the agreement, so it was never ratified by the United States. Despite this, its rules formed the basis of subsequent agreements. Since 2017, various countries, including developing ones, have begun to negotiate their own rules in the digital space.

In March 2018, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) was adopted. Its chapter on digital trade made some changes: It removed clauses on digital intellectual property protection and shortened the terms of its protection. The document also covered issues of cross-border data flows, localization, and access to program source code. Among the developing countries that adopted this agreement were Vietnam, Peru, Malaysia, Mexico, and Singapore.

After the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) was adopted in 2018, governments around the world began to take an active interest in how to regulate digital trade through specific treaty templates (Burri & Polanco, 2020).

For example, in October 2018, the US-Mexico-Canada Free Trade Agreement was updated to include separate rules on intellectual property and digital trade. Due to pressure from large corporations, these rules were effectively adjusted to the CPTPP standards. On the one hand, this act helps big tech giants, in particular in relation to intermediary liability, the free flow of data, and access to source code.

In August 2020, Singapore and Australia signed the Singapore-Australia Digital Economy Agreement (SADEA). It updated digital trade arrangements and added new rules on technology exchange, data flows, source code, cryptography, digital identification, and the regulation of artificial intelligence.

Back in November 2020, China, Chile, Bangladesh, and other Asian countries signed the Regional Comprehensive Economic Partnership Agreement (RCEP). It focused on a moratorium on e-commerce and cross-border data flows. In June 2020, Chile, Singapore, and New Zealand launched a new format for the agreement – DEPA. It focuses on the digital ecosystem, issues of data flows, access to code, digital identities, and AI.

In February 2022, the UK and Singapore signed the SUKDEA agreement. It is considered one of the most innovative, but at the same time the most restrictive for governments in regulating the digital economy, in particular regarding data flows, source code, and open government data.

Africa is no exception. In February 2024, 37 countries on the continent adopted the Digital Protocol to the African Continental Free Trade Area (AfCFTA). Its goal is to create a single digital economy and a favorable environment for business, especially in relation to data transfer.

Table III
Economic effects of digital trade regulation

Regulatory scope	Key provisions of the agreements (based on KORUS, CPTPP, USMCA, SADEA, DEPA, AfCFTA)	Direct and indirect economic effects
Data flow regulation and localization	Prohibition of server and data localization requirements. Ensuring free cross-border transfer of data and information. Implementation of uniform standards in the field of personal data protection (AfCFTA, DEPA).	Reducing costs for multinational companies to develop and modernize IT infrastructure. Promoting the entry of startups and SMEs into international markets. Accelerating digital integration and expanding regional markets (particularly in Africa and Asia).
Artificial Intelligence (AI) and Digital Identification	Cooperation in the field of ethical use of AI and ecosystem development (SADEA, DEPA). Mutual recognition of digital identification and electronic signature. Common standards for the safe implementation of new technologies.	Increased investment in research and development (R&D) of technologies I. Reducing bureaucratic obstacles in identifying counterparties. Increasing consumer and business trust in digital transactions.
Electronic commerce (e-commerce)	Moratorium on customs duties on cross-border transfers of electronic goods (RCEP). Simplifying electronic payments and paperless commerce. Harmonization of norms and rules for the protection of consumer rights online.	Reducing the cost of digital goods and services for end consumers. Growth in international trade volumes due to lower transaction costs. Stimulating the development of logistics chains.
Source code protection and cryptography	Prohibition of requirements for the transfer of source code or algorithms to regulators (USMCA, DEPA, SUKDEA). Protection of Private Cryptography Systems (SADEA).	Protection of intellectual property and trade secrets of developers. Attracting foreign direct investment into the technology sector through high security guarantees. Reducing the risks of leakage of critical technologies.
Intermediary liability and open data	Limiting the liability of digital platforms for user content (USMCA). Access to open government data for business use (SUKDEA).	Reducing legal risks for technology corporations and marketplaces. Creating new products based on the analysis of open public data. Stimulating innovation through access to secondary information.

Source: Summarized by the author.

Table III summarizes the direct and indirect economic effects of regulating digital trade. While such agreements have advantages, such as reducing transaction costs, free exchange of data, or standardizing the protection of personal information, they also have significant limitations. First, the main benefits are often concentrated among large multinational corporations, while small and medium-sized businesses may experience limited reductions in trade costs. In addition, cooperation in the field of AI and data exchange requires substantial investments. However, among

the potential advantages, one can identify the reduction of bureaucracy through the recognition of digital identification systems and electronic signatures.

A moratorium on customs duties on e-commerce has not been implemented in most developing countries. Therefore, only a few countries benefit from trade advantages that reduce the cost of digital goods and services.

For developed countries, digital trade agreements are a tool for expanding and protecting their own technologies, as they guarantee unrestricted access for their technology companies to foreign markets, consumers, and data (Table IV).

Table IV

Comparative analysis of the economic effects of digital trade agreements in developed and developing countries

Comparison parameter	Developed countries (USA, Singapore, UK)	Developing countries (Vietnam, Peru, Malaysia, Mexico)
Main economic benefit	Export of high-tech services and software, enabling global BigTech leadership, scaling of digital platforms, and strengthening intellectual property protection.	Attracting FDI and integrating into global value chains and logistics (attracting foreign direct investment in manufacturing and technology sectors, SME access to external markets and digital platforms, marketplaces).
Impact of rules on cross-border data flows	Maximizing profits, in developed countries, companies freely transfer data for AI training, Big Data analysis, and monopolizing markets without the cost of local infrastructure.	Dependence on external servers and significant risks of loss of digital sovereignty due to the lack of own data centers and potential difficulties with taxation of digital giants.
Prohibition of source code requirements	Protecting technologies and protecting source code and algorithms from forced disclosure to governments of other countries.	Limitation of technology transfer due to the inability to demand the transfer of technology or code to accelerate one's own technological growth.
Regulatory flexibility	Formation of global rules and establishment of high standards that become a benchmark for other countries in the world (USMCA, DEPA).	Narrowing of regulatory space (Policy Space) in connection with the rejection of strict measures to protect the domestic market in exchange for access to the markets of developed countries.
Customs moratorium on e-commerce	Streaming, cloud services) are delivered quickly without paying duties.	Loss of customs revenues and potential reduction in budget revenues from imports of digital content and software.

Source: Summarized by the author.

For developing countries, digital trade agreements or separate e-commerce provisions allow access to the latest technologies and advanced digital tools, infrastructure, and global value chains at lower costs. However, at the same time, trade rules limit their ability to stimulate their domestic technology sector and SMEs using regulatory levers.

Table V

Results of correlation analysis of regulatory provisions, share of ICT goods exports and GDP growth rates in developing countries for 2006-2024

		Adjustment (0 – 1)	ICT exports (%)	GDP (annual growth rate, %)
Regulation	Pearson Correlation	1	,281 **	0.138
Regulation	Sig. (2-tailed)		0.003	0.158
Export_ICT	Pearson Correlation	,281 **	1	0.034
Export_ICT	Sig. (2-tailed)	0.003		0.727
GDP	Pearson Correlation	0.138	0.034	1
GDP	Sig. (2-tailed)	0.158	0.727	
*. Correlation is significant at the 0.01 level (2-tailed).			**. Correlation is significant at the 0.01 level (2-tailed).	

Source: Summarized by the author.

Correlation-regression analysis demonstrates that a soft policy of regulating e-commerce in developing countries has a positive effect on the volume of exports of ICT goods in 2006-2024 (Table V). At the same time, statistical analysis confirms that the largest share of exports of ICT goods is in countries such as the Philippines, Malaysia, Singapore, China, the Republic of Korea, Vietnam, and Thailand. That is, developing Asian countries with highly developed infrastructure and access to the Internet have much better conditions for e-commerce, which contributes to the export of ICT goods. Regression analysis confirms statistically significant relationships between a soft policy of regulating e-commerce through free trade agreements and the share of exports of ICT goods in the exports of developing countries. The coefficient of determination R 2 explains 7.9% of the change in the share of ICT exports in developing countries, depending on the presence of e-commerce regulations in free trade agreements in 2006-2024. The coefficient for the Regulation variable is statistically significant at the 1% level (B = 5.087; p = 0.004): the presence of less restrictive e-commerce provisions in a country's free trade agreements is associated, on average, with a share of ICT goods in

exports that is 5.087 percentage points higher, other things being equal. The standardized coefficient (β = 0.282) expresses the strength of the same relationship in standard-deviation units and should not be read as a percentage-point effect (Appendix 2).

As a result of clustering, a second cluster comprising nine countries was identified among the 106 developing economies included in the analysis. These countries combine a high share of ICT goods in their exports with relatively high GDP growth rates and, in most cases, e-commerce provisions in their free trade agreements (Hong Kong, the Philippines, Malaysia, Singapore, China, the Republic of Korea, Vietnam, Saint Kitts and Nevis, and Thailand) (Appendix 3, Table VI). The final cluster centers in Appendix 3 are reported rounded to whole numbers, so the center of 1 for the Regulation variable in the second cluster corresponds to a mean of 0.67: Six of the nine countries have e-commerce provisions in their free trade agreements, while three — the Philippines, Malaysia and Vietnam — do not (Table VI). The cluster is therefore defined primarily by the high share of ICT exports and GDP growth rate, rather than by uniform regulatory coverage.

Table VI

Group of developing countries falling into the second cluster: GDP growth rates and share of ICT exports in 2006-2024

Country/economy	Regulation – presence of e-commerce provisions in free trade agreements (0-1)	Average share of ICT goods exports (%), 2006-2024	GDP growth (%), 2006 -2024
Hong Kong	1	49.29	2.31
Philippines	0	36.49	5.09
Malaysia	0	31.28	4.43
Singapore	1	30.52	4.57
China	1	25.87	7.73
Republic of Korea	1	23.18	3.15
Vietnam	0	21.48	6.15
Saint Kitts and Nevis	1	17.93	1.81
Thailand	1	16.82	2.69

Source: Summarized by the author.

Another group of countries has no provisions on regulating e-commerce from 2006 to 2024, average GDP growth rates, and a low share of ICT exports in exports of goods. This suggests that exports of ICT goods are significantly dependent on the regulatory conditions of developing countries. Soft policies and incentives created by the state to encourage international trade can significantly improve the exports of the ICT industry in the country.

H1 is supported: e-commerce provisions are positively associated with the average share of ICT goods in total exports (r = 0.281, p = 0.003, Table V; B = 5.087, p = 0.004, Appendix 2). H2 and H3 are not supported. GDP growth is not significantly correlated with Regulation (r = 0.138, p = 0.158) or with the share of ICT exports (r = 0.034, p = 0.727; Table V). Unlike the growth link reported for digital services exports (Mulenga & Mayondi, 2022), none appears for ICT goods, though weak links cannot be ruled out with 106 observations.

Discussion

The study shows that developing countries have established “soft” rules and regulations to regulate digital trade with developed countries and with other countries (including least developed countries). Similar findings are consistent with the results of Banga et al. (2021), which indicate less stringent regulation of digital trade in developing countries. However, in contrast to the study by Banga et al. (2021), this article found that out of 261 agreements, 55.17% and 36.02% contain either general provisions or separate sections on digital trade. This suggests that since 2021, there has been significant progress in regulating the exchange of digital goods and services. One possible explanation is the dynamic development of digital trade after the coronavirus pandemic in 2020 (Peters, 2023), which required a review of rules and regulations, especially among developing countries (Rahman & Rahman, 2022).

The results of the study indicate a moderate level of regulation of e-commerce transactions aimed at eliminating or preventing obstacles to transactions and implementing paperless document management in e-commerce. Such findings indicate significant potential for reducing transaction costs, which is especially important for SMEs. As Jiang et al. (2023) point out, effective regulation of digital trade contributes to reducing transaction costs, thereby supporting the growth of digital services exports. In the context of a digital economy, digital services exports have a positive impact on GDP in developing economies in the long term (Mulenga & Mayondi, 2022).

The analysis indicates that a significant proportion of trade agreements between developing and developed countries already include consumer protection clauses. This is a consequence of the active digitalization of trade, which has raised issues of human rights protection and national security. However, there is a downside to this process: digitalization may contribute to discrimination between suppliers in different parts of the world (Obiora, 2023). Since most agreements already provide for cooperation in the field of ICT, we can confidently expect further growth in digital trade. This will mean that the terms of exchange of goods and services will have to be constantly reviewed and updated.

The problem of discrimination in digital trade is evident in the context of the low level of self-regulation in e-commerce. Current trade agreements do not yet create a legal environment that would ensure equal conditions for different types of suppliers in developing countries. In

addition, the data show that only 23.37% of agreements contain provisions on national treatment in e-commerce. In fact, this means the presence of discrimination and too-high competition in the markets of developing countries.

It is worth noting that the analysis shows that the new digital trade regime is mainly formed within the framework of free trade agreements. This can only strengthen the harmful tax policies of transnational corporations, since regulators have limited opportunities to influence e-commerce. As a result, developing countries find themselves at an economic disadvantage compared to developed countries, where such corporations are constantly expanding their presence. Similar conclusions about the negative consequences of trade regulation were also reported by Kelsey et al. (2020).

These results are consistent with the findings of Burri et al. (2024), who note that out of the 90 countries taking part in the negotiations on digital trade rules, only 15 are developing countries. Moreover, only 18 developing countries are parties to free trade agreements that set rules for e-commerce, and only two of them — Ukraine and Vietnam — are parties to a dedicated digital trade agreement (DTA). As a result, developing countries are missing out on the chance to fully realize their trade potential, even though the digital economy is growing rapidly and makes a significant contribution to GDP. Whether such an agreement translates into export growth also depends on the maturity of the domestic business environment: in Ukraine, one of the two developing economies that are parties to a dedicated DTA, business ecosystems are still taking shape, and their further development is treated as a precondition for fuller integration into international markets (Horban & Bilenko, 2025). At the same time, digital trade agreements are an important tool for integrating e-commerce and strengthening ties between states (Mitchell & Mishra, 2020). Clear rules for digital trade stimulate the export of services in value chains (Wu et al., 2023). Therefore, if developing countries and highly digitalized countries become more actively involved in the DTA, they can gain significant economic benefits from data protection, intellectual property, and e-commerce regulations (Li & Li, 2026).

Conclusion

Free trade agreements remain the main instrument for regulating the digital market, which has grown rapidly since the 2020 pandemic. Dedicated digital trade agreements (DTAs) are still rare by comparison: the dataset used in this study records only three agreements of this type for the period 2023–2025 (Table I), and, according to Burri et al. (2024), only two developing economies — Ukraine and Vietnam — are parties to such an agreement. Digital trade between developed and developing countries is therefore still governed mainly by e-commerce chapters within free trade agreements rather than by stand-alone digital instruments.

The study shows that developing countries generally adopt less stringent regulatory policies within their own agreements. Less restrictive e-commerce rules in Asian economies, in particular, are associated with higher exports of ICT goods. GDP growth, by contrast, is not significantly associated with these rules or with ICT exports. Of the 261 trade agreements concluded between developed, developing, and least developed countries, more than half (55.17%) contain provisions on e-commerce and slightly more than a third (36.02%) devote a separate section to it.

At the same time, developing countries face a number of serious problems: discrimination in the supply of goods and services, insufficient support for e-commerce, difficulty in involving the private sector in self-regulation, and limited support for small and medium-sized enterprises in this area. The gap in trading conditions between developed and developing countries remains wide. It may contribute to imbalances in trade flows, intensify competition and, overall, constrain the trade potential of developing economies.

Well-designed regulation of digital trade nevertheless offers considerable advantages. By standardizing electronic transactions, it removes unnecessary friction and reduces costs, makes paperless trade possible, eliminates technical barriers and strengthens the protection of consumer rights. The estimates reported here are based on a cross-section of country averages for 2006–2024, so they describe associations rather than causal effects; testing these relationships using a full year-by-year panel remains a task for further research. The regulatory dimension is measured only by a binary indicator of whether the country's free trade agreements contain e-commerce provisions; domestic regulation and ICT services exports are not examined.

Author contributions

A.D.: Conceptualization, methodology, investigation, formal analysis, writing – original draft, project administration.

O.P.: Investigation, data curation, formal analysis, writing – original draft.

I.P.: Methodology, validation, formal analysis, writing – review and editing.

M.P.: Data curation, statistical analysis, visualization, writing – review and editing.

I.K.: Investigation, validation, writing – review and editing.

A.S.: Methodology, supervision, writing – review and editing.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Table VII
Coding variables that define provisions in agreements governing digital trade

No.	Variable code	Question	0	1	2
		1.1. General provisions			
1	ec_prov	Does the agreement include provisions regarding e-commerce/digital trade?	No	Yes	—
2	ec_chapter	Does the agreement contain a separate section on e-commerce/digital trade?	No	Yes	—
3	ec_tech_neutrality	Does the agreement include the principle of technological neutrality, i.e. does it provide for equal treatment of digital and other modes of supply of goods and services?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
4	ec_self_reg	Does the agreement contain provisions encouraging private sector self-regulation in the area of e-commerce/digital trade?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
5	ec_promotion_facilitation	Does the agreement contain provisions recognizing the importance of developing or promoting e-commerce/digital trade?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.2. Market access			
6	ec_nt	Does the agreement provide for national treatment ? Treatment, NT) in the field of e-commerce / digital trade?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
7	ec_mfn	Most-Favoured-Nation (MFN) treatment in the area of e-commerce/digital trade?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
8	ec_services_ma_nt	Does the agreement contain commitments on market access (MA) and national treatment (NT) in the area of services and investments necessary for the development of e-commerce/digital trade?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.3. Customs duties			
9	ec_non_imposition_duty	Does the agreement contain a provision on the non-application of duties to electronic transfers?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
10	ec_non_imposition_duty_fees	Does the provision on the non-application of duties to electronic transmissions also include the non-application of “fees or other charges” other than duties?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.4. Electronic transactions			
11	ec_barriers	Does the agreement contain provisions on the regulation of electronic transactions aimed at eliminating or preventing unjustified barriers to e-commerce/digital trade?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.5. Promoting digital trade			
12	ec_paperless_trade	Does the agreement include provisions for paperless trading?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.6. Consumer protection			
13	ec_consumer_protection	Does the agreement contain provisions on consumer protection in the field of e-commerce/digital trade?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.7. Using the Internet in commerce			
14	ec_internet_principles	Does the agreement contain principles for access to the Internet and its use for e-commerce/digital trade purposes?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.8. Promoting e-commerce for SMEs			
15	ec_prov_SMEs_MSMEs	Does the agreement contain provisions to promote e-commerce/digital trade for small and medium-sized enterprises (SMEs) or micro, small and medium-sized enterprises (MSMEs)?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.9. Cooperation in the field of ICT and e-commerce			
16	ec_prov_coop_ICT	Does the agreement contain provisions or arrangements for cooperation in the field of ICT, e-commerce/digital trade?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)
		1.10. Application of dispute resolution mechanisms			
17	ec_institutional_arrangement	Does the agreement provide for specific institutional mechanisms to regulate or develop e-commerce/digital trade, such as working groups, committees, etc.?	No	Yes, the ”soft” form (soft)	Yes, the ”hard” form (hard)

Source: compiled by the author based on (Burri et al., 2025)

Table VIII

Model Summary

Model Summary[b]					
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	Durbin-Watson
1	,281 a	0.079	0.061	8,067	2,148

a. Predictors: (Constant), GDP, Regulation

b. Dependent Variable: Export_ICT

ANOVA [a]

Model		Sum of Squares	df	Mean Square	*F*	Sig.
1	Regression	575,707	2	287,854	4,423	,014 b
	Residual	6702,617	103	65,074		
	Total	7278,324	105			

a. Dependent Variable: Export_ICT

b. Predictors: (Constant), GDP, Regulation

Coefficients [a]

Model	Unstandardized Coefficients		Standardized Coefficients			Correlations		
1		*B*	Std. Error	Beta	*t*	Sig.	Zero order	Partial	Part
	(Constant)	1,948	1,038		1,876	0.064			
	Regulation	5,087	1,723	0.282	2,952	0.004	0.281	0.279	0.279
	GDP	-0.007	0.148	-0.005	-0.049	0.961	0.034	-0.005	-0.005

Dependent Variable: Export_ICT

Source: constructed by the author using SPSS Statistics software.

Table IX

Results of clustering countries by level of e-commerce regulation, ICT goods exports and GDP growth in 2000-2025

Final Cluster Centers			
	Cluster		
	1	2	3
Regulation	1	1	0
Export_ICT	0	28	1
GDP	44	4	3

Distances between Final Cluster Centers			
Cluster	1	2	3
1		48,663	40,804
2	48,663		26,932
3	40,804	26,932	

ANOVA

	Cluster		Error			
	Mean Square	df	Mean Square	df	*F*	Sig.
Regulation	0.925	2	0.199	103	4,650	0.012
Export_ICT	2985,396	2	12,694	103	235,172	0.000
GDP	824,296	2	13,501	103	61,056	0.000

The *F* tests should be used only for descriptive purpose because the clusters have been chosen this maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal

Source: constructed by the author using SPSS Statistics software

Note. Final cluster centres are reported rounded to whole numbers. For Cluster 2 the mean of the binary Regulation indicator is 0.67 (six of the nine countries are coded 1), which is displayed as 1; the composition of the cluster is given in Table IV.