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# DIGITAL TRANSFORMATION OF INTERNATIONAL TRADE IN THE CONTEXT OF GLOBAL COMPETITION: TECHNOLOGICAL INNOVATIONS AND INVESTMENT PRIORITIES

## ABSTRACT

In today's world, globalization and digital technologies are significantly transforming the landscape of international trade. Digital transformation has become a critical aspect that determines the competitiveness of countries and businesses in the international arena. The study aims to identify the impact of the digitalization of international trade on the economic development of countries and their competitiveness based on technological innovations that determine the future of global competition at the country and company levels, affect trade processes, and identify and justify investment priorities to support digital transformation in Ukraine.

The study analyzes the impact of the digitalization of international trade on the economic development of countries, which is caused by the digital divide between developed and least developed countries (LDCs). Developed countries are characterized by Internet coverage and access of more than 90%, as opposed to LDCs, where the corresponding figure is less than 20%. Given the current conditions of access to the Internet, the countries of the latter group are not able to be fully involved in e-commerce and cross-border trade in digital products. An additional barrier to developing digital commerce in certain regions of the world is the need for more legislation on various e-commerce trade issues.

The impact of the war in Ukraine on the e-commerce market is determined: the e-commerce market declined 12 times in 2022 compared to the pre-war period and began to recover gradually in 2023. The market is expected to recover almost fully in Ukraine by the end of 2023 or early 2024. The main challenge for Ukraine will be to expand the scope of the existing free trade agreements to cover services, e-commerce, and investment. Ukraine should become a significant player in several global markets for services and digital products, given the availability of an updated regulatory framework on these issues. E-commerce is expected to grow rapidly after the end of the war in Ukraine.

**Keywords:** digitalization of trade, international trade, digital transformation, industry 4.0, global competition, investment, technology, innovation, digital economy

**JEL Classification:** F02, F13, O5

## INTRODUCTION

In the contemporary landscape, the trading system is experiencing a rapid evolution due to the extensive digitization of economic operations. This includes the emergence of digital trade, the integration of electronic payment systems, the proliferation of digital product exchanges, and the globalization of trade in all its facets, resulting in an expanded participant base within this system. Furthermore, it entails an all-encompassing approach to trade liberalization, alongside the utilization of neo-protectionist measures aimed at regulating the trading framework.

The global digital transformation has been significantly hastened by the outbreak of the COVID-19 pandemic. The period of lockdown and quarantine measures has driven a substantial portion of the world population to embrace online platforms, making digital technologies a fundamental requirement for the uninterrupted functioning of public,

private, and social spheres. This acceleration has amplified trends that have been in motion for several decades, leading to the widespread influence of digital technologies on numerous aspects of life. This influence ranges from the individual level, where people are increasingly engaged in online learning, remote work, and digital shopping, to entire nations, where there is a shift towards digital economies, governance, and societal structures (Vlasenko, 2023; Kubalskyi, 2022). This digital transformation extends to companies, which are now exploring new business models, services, and delivery methods, as well as entire industries, which are embracing process automation and harnessing the potential of artificial intelligence (Sytnyk et al., 2022). Moreover, this transformation is observable at the governmental level, where both local and national authorities are enhancing their services, offering more transparent and efficient governance, and providing digital public services.

While digital transformation is a worldwide phenomenon and the world is becoming increasingly digital (some predicts indicate that 70% of new economic value worldwide will be generated on digital platforms over the next ten years (World Economic Forum, 2023), and the global e-commerce market is projected to double in size by 2025 (World Economic Forum, 2020), these shifts will have both positive and negative consequences, and countries with varying economic development will be affected differently. Digital transformation is occurring at varying rates and intensities in each country, with some countries advancing quicker than others and others remaining in the early phases of adoption. The extent of digital transformation initiatives differs from one nation to another, contingent upon factors like their economic, political, and societal circumstances, alongside their digital infrastructure, proficiency, regulatory readiness, and more. Nonetheless, as of 2022, a substantial number of 2.7 billion individuals will continue to lack internet access. Achieving comprehensive and substantial connectivity remains an elusive objective, especially in the case of the least-developed countries (LDCs), where only 36% of the population had internet usage in 2022, a figure significantly lower than the global average of 66% (ITU, 2023a).

Governments around the world are increasingly prioritizing digital transformation in their policy agendas and investment strategies to leverage the advantages of digital technologies and mitigate the risks of falling behind in the race for digital transformation. This shift is aimed at promoting social progress and economic prosperity. According to the most recent data from ITU, approximately half of the world's countries have adopted digital strategies that encompass various economic sectors. However, there is a need for more equitable development of digital policies, legislative frameworks, and governance structures both across and within regions. Currently, only a minimal number of countries, specifically nine, which is less than 5% of countries globally, have established comprehensive national frameworks for digital markets with the goal of catalyzing the advancement of digital economies and societies (ITU, 2023b).

## LITERATURE REVIEW

The digital transformation of international trade is a dynamic and evolving phenomenon that has been reshaping the global business landscape. With technological advancements and changes in consumer behaviour, traditional trade practices are being disrupted, and new opportunities are emerging. This literature review aims to provide a comprehensive overview of the key themes, trends, and research related to the digital transformation of international trade, focusing on technological innovations and investment priorities in the context of global competitiveness. It explores how digitalization is impacting global competition and shaping the importance of businesses and governments in the international trade arena.

Aleinikova et al. (2023) emphasize the role of digital technologies as both a catalyst and tool for dynamic transformation in the marketing of territories. This highlights the profound impact of digitalization on international trade, which extends beyond transactional processes to broader economic and marketing strategies. ITU's "Global Digital Regulatory Outlook" (ITU, 2023b) offers a comprehensive look at the regulatory aspects affecting international digital trade. Understanding the regulatory landscape is crucial as it shapes the operating environment for businesses engaged in international trade. López and Ferencz (2018) explore the relationship between digital trade and market openness, emphasizing the significance of open markets in international trade. Understanding how digital commerce influences market access is crucial for businesses and policymakers. Mozgovyy et al. (2023) investigate the factors influencing investment models chosen by Asian companies in implementing global business initiatives. This research offers insights into the strategic decisions of businesses in a digitalized global marketplace. Tsygankova et al. (2023) study the influence of Industry 4.0 on the strategies of companies entering the global market of data integration services. This is a crucial aspect of digital transformation, particularly in the context of data-driven international trade. Tananaiko et al. (2023) delve into the economic rationale for manifestations of asymmetry in the global trading system in the digital age. This research uncovers disparities and challenges that digitalization brings to international trade.

Research on the opportunities that arise from the digitalization of economic and trade processes has also found its place in the global works of such companies as Microsoft, Forbes, CNBC, OECD, KPMG, and others.

The IMD World Digital Competitiveness Ranking for 2022 (IMD, 2022) provides information on the global competitive landscape of digital economies. This rating can help us understand how nations are placing themselves in the global digital marketplace, as well as the relationship between network readiness and digitalization level. The Network Readiness Index (2022) assesses the readiness of countries for digital trade. A high ranking indicates that a nation is well-prepared for the challenges and opportunities digitalization presents (Network Readiness Index, 2022).

KPMG's report on "Investment in Technology Innovation" (KPMG, 2019) provides insights into the investments made in technology that drive digital transformation in international trade. It highlights the importance of technological innovation in remaining competitive. The OECD's report on "Seizing Opportunities for Digital Trade" (OECD, 2022) explores the various opportunities and challenges of digitalization in international trade. This report offers recommendations for governments and businesses.

At the same time, despite the significant contribution of these scholars to the growth of scientific achievements and research in this area, there is an objective need to study further the impact of the digitalization of international trade on the economic development of countries. To implement digital transformation, actors need to find ways to make processes and information systems work better and have an innovative component.

## AIMS AND OBJECTIVES

The purpose of the study is to identify the impact of the digitalization of international trade on the economic development of countries and their competitiveness based on technological innovations that affect trade processes and to identify and justify investment priorities to support digital transformation in Ukraine.

## METHODS

To achieve this goal, the study used several general scientific and special methods of scientific knowledge based on the principle of the unity of theory and practice. In particular, the systematic method, content analysis, induction, and deduction, historical method, analysis, and synthesis (systematization of publications for the digitization of international trade and regional trade agreements); economic and mathematical (to determine the dynamics of costs of digital transformation of economies; determination of areas of countries' activity in concluding and improving RTAs' landscape and existing free trade agreements (FTAs) to services, e-commerce, and investment); comparative analysis to study the dependence of a country's competitiveness on its networking; correlation and regression analysis (the relationship between digitalization and trade volumes). As part of the correlation and regression analysis, the Pearson correlation coefficient ( $cor$ ) was calculated based on the following significant assumptions: the variables under analysis are normally distributed, and the relationship between them is linear; with independent variation of variables, when there is no relationship between them,  $r = 0$ ; the stronger the relationship, the greater the value of the correlation coefficient will approach 1. In this case, positive  $r$  values indicate a positive (direct) connection and negative values indicate a negative (inverse) relationship. Along with Pearson's correlation coefficients, the number of degrees of freedom ( $df$ ) and  $p$ -value were calculated in the study (Vitlinsky, V.V., 2014). All these calculations were performed using the R programming language, in which the Pearson correlation coefficient was calculated using the `cor.test()` function. To rank the factors of changes in world trade caused by Russia's aggression against Ukraine, a multiple regression model was built using the `lm()` function in the R statistical software environment. The least significant factors of the model were filtered using the `stepAIC()` function. As a result of the modelling, several coefficients were obtained, based on which the variable's value can be predicted. In addition, the result of this function is the calculation of such indicators as Intercept (the point of intersection of lines with the coordinate axis, or intercept), R-squared (coefficient of determination), Adjusted R-squared (adjusted coefficient of determination), F-statistic (used to assess the significance of the regression model as a whole), t-value (a criterion based on Student's  $t$  distribution),  $p$ -value.

All indicators in the study are analyzed in the regional context, as well as following the level of economic development of the countries. With regard to the division of countries into categories depending on the level of economic development, all analyzed countries and individual customs territories are divided into three groups: developed countries, developing countries, and least developed countries (LDCs). Given that Ukraine did not sign the Decision of the Council of Heads of State of the Commonwealth of Independent States (CIS), which adopted the CIS Charter, did not subsequently accede to it, and did not conclude an agreement on associate membership in the CIS, the classification of Ukraine as a member of the Commonwealth of Independent States (CIS), including associate and former member states, for the purposes of this study is considered incorrect. In addition, it should be noted that starting with the World Economic Outlook 2019 (WEO),

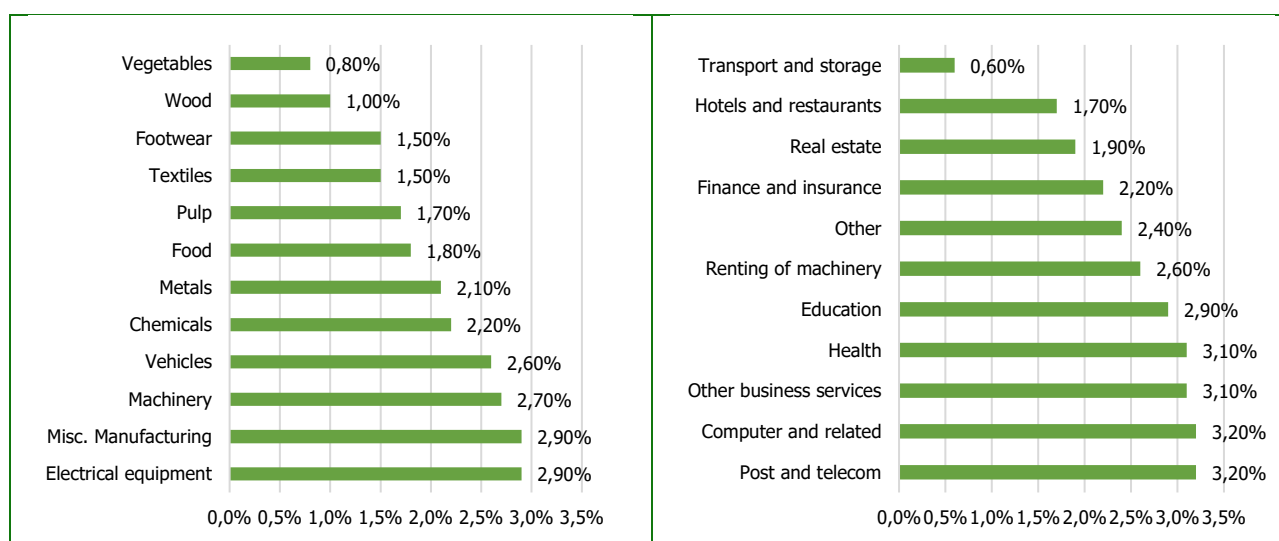
the IMF stopped using the Commonwealth of Independent States (CIS) regional group in its classification and moved some countries, including Ukraine, that were previously part of it, to the Emerging and Developing Europe group. To classify countries in the WTO publications, in particular the World Trade Statistical Review and World Trade Report, the statistical data of Ukraine and Georgia, based on their geographical affiliation to this category, which includes all European countries (EU member states, EFTA, the United Kingdom, Turkey, etc.), will be taken into account in the "Europe" region.

The use and combination of the described research methods made it possible to obtain reasonable conclusions and results presented in the article.

## RESULTS

Digital transformation has lowered the costs of international trade, facilitated the coordination of global value chains, promoted the spread of ideas and technologies, and connected more businesses and consumers worldwide. Digitalization increases the scale, volume, and speed of trade. It allows companies to offer new products and services to more digitally connected customers worldwide. It also allows companies, especially small businesses, to use new and innovative digital tools to overcome barriers to growth by helping to simplify payments, enabling collaboration, and avoiding fixed asset investments through the use of cloud services and alternative financing mechanisms such as crowdfunding.

Digital trade matters because it creates several benefits. Countries with better digital connectivity, such as higher internet penetration, have a greater degree of trade openness and sell more goods to more markets. Greater digitalization also means more trade: a 10% increase in digital connectivity between countries increases trade in goods by almost 2% and trade in services by more than 3% (López, G. J., Ferencz, J., 2018). Importantly, these positive effects are seen across all sectors (Figure 1). So, whether we are talking about trade in carrots, cardigans, copper, household appliances, or laptops, digitalization can potentially increase exports. When goods are traded internationally in small parcels, a 10% increase in bilateral digital connectivity (both countries increase connectivity) increases parcel exports by 4% (López, G. J., Sorescu S., 2021).



**Figure 1. The positive impact of digitalization on trade in goods and services.** (Source: created by the authors based on OECD Report)

Digitalization is also changing the methods, i.e., how we trade goods and services. For example, the growth of online platforms has led to an increase in the number of small packages being sold across international borders. This raises several issues for policymakers, ranging from the physical management of parcel trade to the implications for risk management (e.g., counterfeit goods or biosecurity standards), as well as revenue implications regarding tax and tariff collection. At the same time, new technologies and business models are changing the way goods and services are produced and delivered, blurring the already blurred distinctions between goods and services and the ways they are delivered and introducing new combinations of goods and services. A smart refrigerator needs to be marketed not only as a product but also as an embedded service. A product made with 3D printing, for example, can cross borders as a design service but becomes a product at the moment of consumption. Together, these issues create new challenges for international trade and investment policy (Tsyhankova et al., 2021; Gochua and Gibradze, 2022). The KPMG report outlines the technologies

that, according to respondents to the Technology Innovation Survey, have the most significant potential for future business transformation and long-term value creation and should be considered when formulating an investment strategy (Table 1).

The main prerequisite for both accelerating the digitalization of certain processes of trade in physical and digitized goods and developing cross-border e-commerce is the availability of free and unimpeded access to the Internet. In 2005-2022, the leaders in terms of the number of users with an Internet connection were the countries of Europe and America (over 80%). Since 2010-2011, a significant increase in consumers has been observed in the CIS countries, including Ukraine (73.9%). About half of the population in the Middle East and Asia-Pacific region (55.3% and 45.7%) have an Internet connection. Internet penetration in Africa has increased from 2.7% to 29.3% over the past 15 years (ITU, 2023c), but this figure is still the lowest globally. In 2019, there were 4.2 billion users, 54% of the world's population. In 2020 it was 4.7 billion (60%), in 2021 - 4.9 billion (63%), in 2022 - 5.3 billion (66%), meaning that almost 70% of the population is currently Internet users. The result of this distribution is asymmetric access to the Internet due to an infrastructure gap caused by the uneven scientific and technological development and available resources of countries with different levels of economic development.

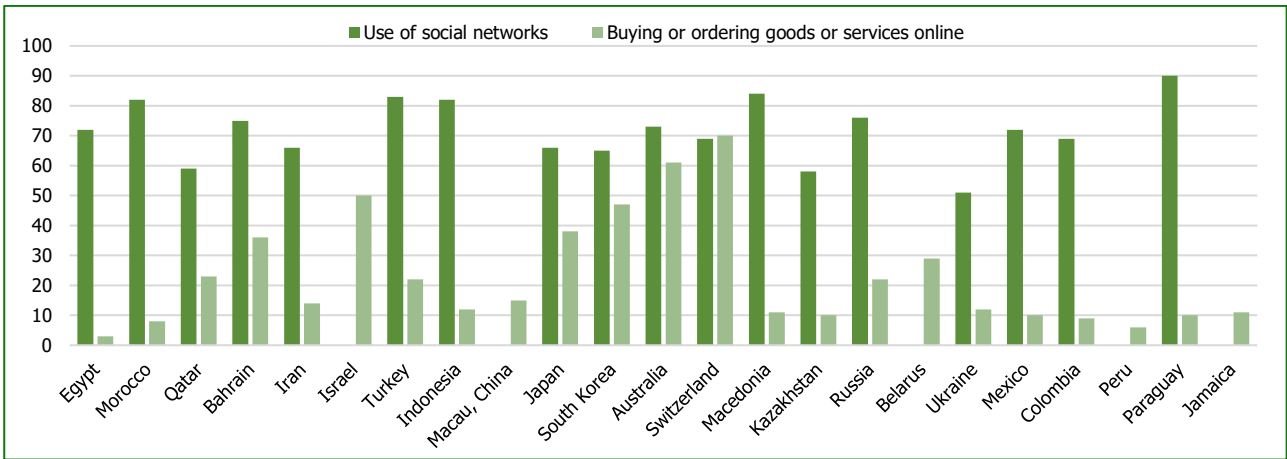
**Table 1. The investment rankings of transformation technologies.** (Source: created by the authors on the basis of KPMG Report)

№	Greatest potential for transformation and long-term value creation	Investing in now	Plan to invest in three years from now
1	Internet of Things (IoT)	Internet of Things (IoT)	Internet of Things (IoT)
2	Robotic process automation (RPA)	Artificial intelligence	Robotics (including autonomous vehicles)
3	Artificial intelligence	Robotic process automation (RPA)	Artificial intelligence
4	Blockchain; tie 4th	Robotics (including autonomous vehicles)	Blockchain
5	Robotics (including autonomous vehicles); tie 4th	Augmented reality	Robotic process automation (RPA)
6	Augmented reality	Blockchain	Virtual reality
7	Virtual reality	Social networking, collaboration technologies	Biotech, digital health, genetics
8	Social networking, collaboration technologies	Biotech, digital health, genetics	Social networking, collaboration technologies
9	Biotech, digital health, genetics	Virtual reality	On-Demand platforms
10	On-Demand platforms	On-Demand platforms	Augmented reality

For a group of developing countries, the percentage of Internet users who make online purchases is, on average, almost seven times lower than the level of user activity on social media (Figure 2). For example, in Ukraine, 51% of all users spend time on social networks. In contrast, only 12% are involved in e-commerce (World Trade Report, 2020, World Trade Report, 2022). The situation differs only in Switzerland, Israel, Belarus, Peru, and Jamaica. It is also worth noting that 30% of countries worldwide have made progress in creating advanced national digital policies, and legislative and governance frameworks. As a result, four distinct groups of countries can be identified, each at a different stage of digital development and with varying levels of maturity of their national digital transformation strategies: countries with limited readiness, countries in transition, advanced countries, and leading countries.

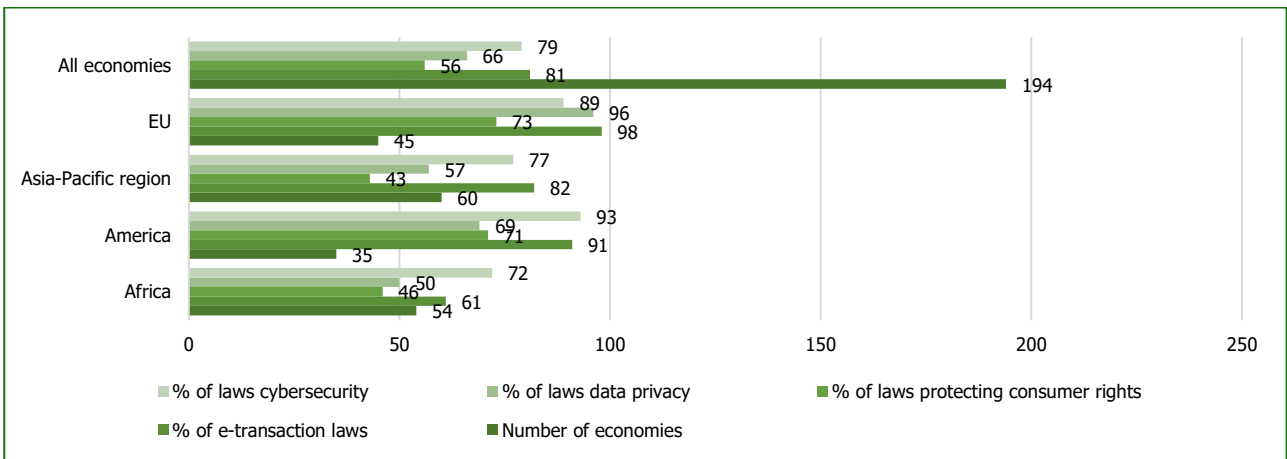
The digital divide remains significant between developed and developing countries regarding access to broadband services and e-commerce platforms, quality of infrastructure, and legal frameworks. Similar gaps exist within countries, particularly between men and women. The share of women using the Internet globally is 42%, compared to 58% of men. However, it is worth noting that there are other reasons why consumers in developing countries are reluctant to buy goods and services online. Other barriers to the development of online shopping are prevalent, including low consumer purchasing power, underdeveloped or even non-existent electronic payment systems, and outdated legal and regulatory frameworks that significantly reduce consumer confidence in the digital market.

In addition to the usual asymmetry between the groups of countries by level of development, there is also uneven regulation of various aspects of e-commerce. Consumer protection is the least well-regulated across all groups of countries, and personal data protection is the least well-regulated in LDCs and developing countries. This can be partially explained by the fact that there is currently no consensus on whether it is necessary to prescribe separate rules at the legislative level to protect users on the Internet or to equate their rights with those of consumers of physical goods.



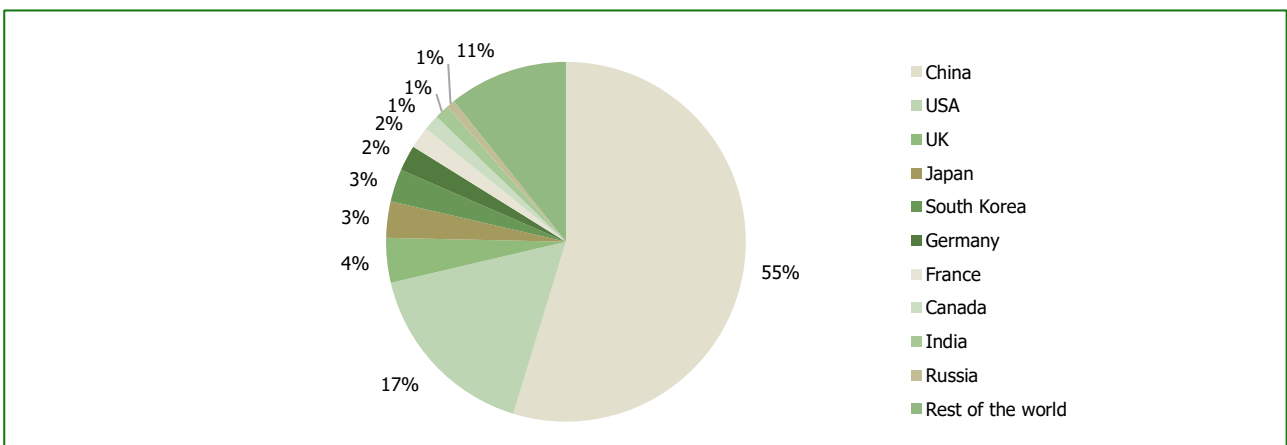
**Figure 2. Degree of user engagement in social media and e-commerce by country, average for 2018-2022.** (Source: created by the authors on the basis of World Trade Report)

Studying the current regional breakdown of the issue, according to UNCTAD, the European region is the leader in terms of e-commerce legislation development, while the African region is the worst (Figure 3).



**Figure 3. The level of development of e-commerce legislation in the world's regions.** (Source: created by the authors on the basis of World Trade Report and UNCTAD)

According to UNCTAD and eMarketer, the global e-commerce market is dominated by several large economies: 5 countries (China, the United States, the United Kingdom, Japan, and the Republic of Korea) account for more than 80% of the total (Figure 4).



**Figure 4. Sales volumes in countries with e-commerce markets, on average for 2019-2022.** (Source: created by the authors on the basis of UNCTAD)

In 2021, China became the largest e-commerce market, with revenues of USD 1,543 billion. It was ahead of the United States of America. The most significant player in the Chinese e-commerce market is JD.com, whose revenue in 2021 amounted to USD 95.5 billion. After jd.com, suning.com and vip.com ranked second and third with revenues of USD 22.8 billion and USD 14.9 billion, respectively. USD respectively (AdChina.io., 2022). The emergence of the Chinese e-commerce market has opened a new era for the country's economy (Statista, 2022a). Today, China has the largest number of digital shoppers in the world - 780 million people (Zaiats and Yakob, 2023).

Although China's dominance in this market is undeniable, the United States ranks second in sales. The US has not been a leader in this market since 2013. The growth rate of the US e-commerce market is also declining compared to the Chinese market. In 2021, the revenue of the US e-commerce market amounted to USD 599.2 billion. The US e-commerce market is growing. In 2021, the US e-commerce market grew by 11%, accounting for 15% of global growth. The giants of e-commerce are Amazon and eBay. According to the E-Commerce Foundation, a non-profit organization that collects and organizes information on e-commerce, the United States ranks first in all e-commerce indices. Another indicator of market saturation is the use of the Internet by the country's population. The United States has a very high level of trust in online shopping. About 75% of the population, or 258.5 million, purchases online. In addition, the percentage of Internet users who make purchases electronically is also growing in the United States (E-CommerceDB, 2022).

The UK is the third largest e-commerce market in the world. Total e-commerce sales in the UK increased by 11% from USD 123 billion in 2018 to USD 151 billion. USD in 2018 to 151 billion USD in 2021. The European market is also one of the leaders, where e-commerce is developing rapidly and dynamically in all EU countries. The share of e-commerce users in the EU continues to grow steadily. Two other Asian countries, Japan and South Korea, round out the top 5 e-commerce markets. They brought in USD 115.40 billion and USD 103.48 billion, respectively. USD and 103.48 billion USD. They generated USD 115.40 billion and USD 103.48 billion in online sales, respectively, with growth rates of 4.0% and 18.1%.

This technological asymmetry is reflected not only in differences in the level and pace of trade digitalization but also in the degree of a country's involvement in cross-border e-commerce. This is evidenced by analyzing the provisions of free trade agreements (FTAs) between countries for the presence of a relevant section (World Trade Organization).

More and more members with different levels of economic development are becoming parties to such FTAs: between developed members (11%), between developing members (32%), and between developed and developing members (57%) (World Trade Organization). While previously, e-commerce provisions were traditionally part of agreements to which a developed country was a party, today, there is an increase in agreements between developing members. Out of 89 FTAs, as of mid-2020, 31.4% (28) were signed between developing WTO members, while only 11.2% (10) were signed between developed members. Accordingly, the vast majority (51) are agreements between developed and developing countries - 57.3%.

Regarding geographic representation, not all regions are equally represented in such arrangements. Among developing countries, Asian and Latin American countries are more active in this area. On the other hand, African countries still need to be included in the list of parties to such agreements. In Africa, only Morocco is a party to an FTA that contains a chapter on e-commerce. The EU's Economic Partnership Agreements (EPAs) with Côte d'Ivoire and Ghana have only the declared intention of the parties to deepen cooperation to facilitate the conclusion of an agreement in the area of trade facilitation in services and e-commerce, as well as other areas.

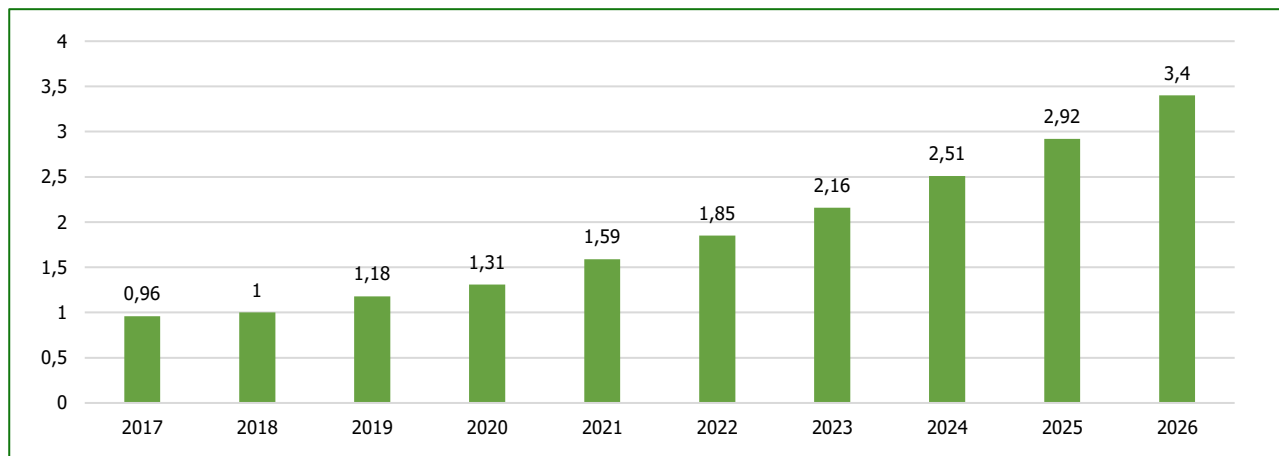
The FTAs analyzed in this study are generally aimed at promoting e-commerce as an alternative to conventional trade in physical goods between trading partners while encouraging the development of a coherent system of rules and limiting barriers to its implementation and expansion. The list of topics covered by the chapters of these agreements is quite broad. Some provisions relating to generally accepted issues, such as cooperation, transparency, and non-discrimination, are commonly found in agreements of this type. However, their scope also extends to e-commerce. Other provisions deal with more specific issues directly related to digital commerce, such as consumer protection and personal data, electronic authentication (including the use of electronic digital signatures), and cross-border information transfers (World Trade Organization).

Having become key trends in the development of the global trading system, the issues of digitalization of trade processes and, in particular, the development of e-commerce, support for foreign trade activities of micro, small, and medium-sized enterprises, as well as strengthening the role of women in trade, have been put on the agenda of negotiations in most multilateral platforms, including the WTO, precisely because they are factors of deepening trade asymmetries in these aspects (Yatsenko and Dmytriyeva, 2018).

Technological asymmetry is the inability of the least developed countries and a significant share of developing countries, due to the digital divide with the developed countries, to simplify trade procedures by switching to paperless trade, which

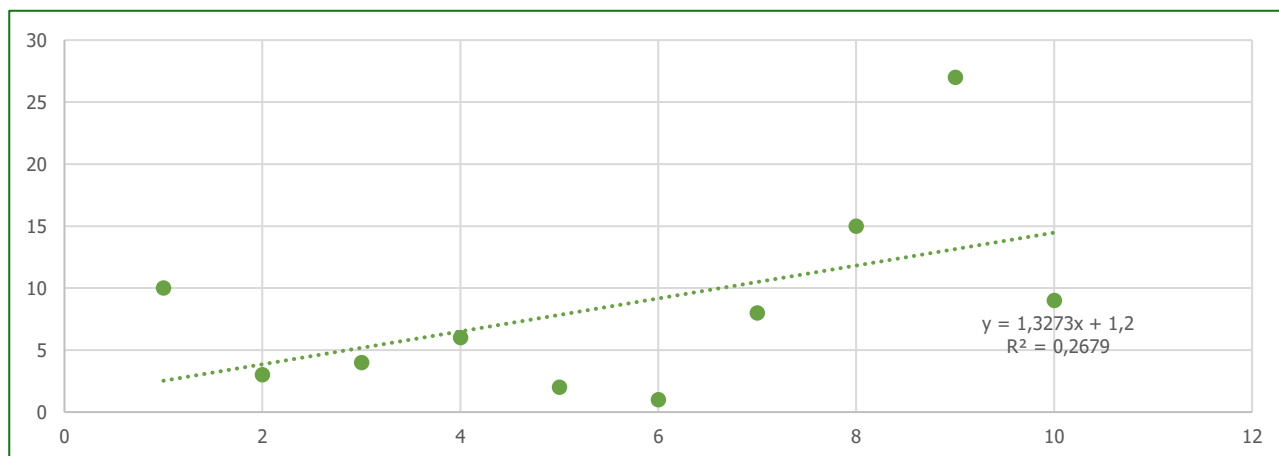
involves submitting documents in electronic form before the arrival of consignments at customs, as well as to increase transparency and speed up customs formalities. In addition, these same countries are unable to fully participate in e-commerce due to the lack of access to the Internet. They need to be more competitive in cross-border trade in digital products. One of the reasons for the technological asymmetry is that almost half of the countries in the African and Asia-Pacific region need legislation that would regulate e-commerce, which also makes it impossible to include relevant sections in the free trade agreements signed by these countries.

Technology has become an essential component of the modern world and the global economy. Spending on digital transformation technologies and services worldwide is growing rapidly from 2017 to 2026 (Figure 5). Here are the reasons: production efficiency, improvement of the quality of goods and services, development of new technologies and innovations, infrastructure development, new jobs and growth of a highly skilled workforce, and competitiveness in the global market.



**Figure 5. Forecast of spending on digital transformation technologies and services in the world from 2017 to 2026.** (Source: created by the authors on the basis of Statista, 2022b)

The competitiveness of countries is closely linked to their level of technological development. As the top 10 list shows, the Network Readiness Index 2022 confirms that developed economies in Europe, parts of Asia-Pacific, and North America are among the most network-ready societies in the world. In particular, 17 of the top 25 countries are located in Europe (mainly Northern and Western Europe), four countries in East and Southeast Asia, two in Oceania (Australia and New Zealand), and two in North America (Canada and the United States). To study this relationship, we calculated the correlation coefficient between the Network Readiness Index and the Competitiveness Index of 10 developed countries (Network Readiness Index, 2022; IMD, 2022). The value of the correlation coefficient ( $r = 0.5176$ ) indicates a statistically significant relationship between these two indicators. This means that countries with a higher level of network readiness tend to be more competitive. The regression equation is as follows:  $y = 1.327x + 1.2$  (Figure 6). A government must actively invest in improving its technological infrastructure, develop innovative solutions, support research, and create a favourable environment for technology startups to achieve a high level of international competitiveness and sustainable economic growth.



**Figure 6. Regression model of the dependence of Competitiveness Index from The Network Readiness Index.**



Ukraine needs to ensure integration with the largest digital markets. Unlike classical trade, where the subject of negotiations is the removal of tariff barriers, digital trade is primarily concerned with the commonality of principles on which the digital economy ecosystem is built. This is precisely what the Agreement Ukraine signed with the UK on March 20, 2023, on the fundamental freedoms of the digital economy, of which there are five. Areas and principles of cooperation between governments that will enhance the development of the digital economy: intergovernmental cooperation on digital innovation, digital inclusion, small and medium-sized business development, standardization, and cybersecurity. A number of the Agreement's provisions are focused on the digitalization of classical trade, such as the use of digital contracts, electronic signatures, electronic identification, and digital documents in logistics.

The war in Ukraine has had a significant impact on the e-commerce market, which saw a sharp decline in 2022 (down 12 times to USD 295.85 million) and a gradual recovery in 2023. In 2025, it is expected to grow above the pre-war period of 2021. It is difficult to predict at the moment, but it can be said unequivocally that after the war ends, Ukraine's economy and e-commerce will recover and grow (Ivanyna, 2022).

For Ukraine, one of the main vectors of development should be expanding the scope of the existing FTAs to cover services, e-commerce, and investment, given their significant potential, their compliance with global trends in the trading system, and the country's readiness to become an essential player in several services and digital trade markets, given the availability of an updated regulatory framework on these issues.

In addition, Ukraine should have a comprehensive approach to stimulating FDI, which should include three key components that define the digital economy and, accordingly, digital trade:

1. The traditional ICT industry - telecommunications infrastructure, ICT manufacturing, and ICT services. Typical multinational enterprises (MNEs) investing in this sector are telecommunications companies, software and service providers, and device and component manufacturers.
2. New digital services and technological innovations - purely digital activities and solutions. Examples of NDIs include search engines, e-commerce platforms, etc.
3. Digitalized industries - sectors that were not traditionally digital but have been transformed by introducing digital technologies. Relevant players offer digital solutions (e.g., eHealth services).

Thus, to be effectively integrated into the digital market and competitive globally, Ukraine needs to stimulate the development of digital transformations in the economy and trade. The main measures should include (Tsygankova et al., 2023):

- digitization of all sectors of the economy;
- development of blockchain technologies, in particular in the financial and banking sectors;
- development of mobile Internet infrastructure (4G, 5G);
- creation of new cybersecurity technologies;
- creation of an open database;
- creation of a technological base for e-commerce and e-business;
- development of financial infrastructure for broadband Internet.

## DISCUSSION

The results of this study confirm the existence of a "digital divide" not only between countries but also between regions, in particular, problems related to e-commerce and cross-border trade in digital products in the African and Asia-Pacific regions, where there is a lack of proper legislation on various trade aspects of e-commerce, which confirms the reliability of previous studies (Yatsenko and Tananaiko, 2023).

In today's rapidly evolving world, the digitalization of trade and business processes of international economic actors is a necessary factor for increasing efficiency, reducing costs, and enhancing competitiveness. Digitalization is one of the key factors of business success and means a transition from traditional ways of trading and doing business to the introduction and use of digital technologies. The digital transformation of foreign trade in the context of the country's global competition, integration into digital markets, and being an integral part of the post-war national economic recovery plan have become particularly important and relevant at the current stage of Ukraine's economic development. The country needs to deeply study the global experience of digital transformation the introduction of technological innovations, and determine investment priorities that meet the country's national interests.

The growing role of e-commerce in the global economy, its impact on the competitiveness of countries and their technological development and investment priorities increases the importance of political, economic, and scientific discussions at the national and international levels, including the fact that it is increasingly becoming a component (object) of regional trade agreements (RTAs) and is high on the agenda of the World Trade Organization (WTO). The digital transformation of international trade in the context of global competition is becoming an increasingly relevant and vital topic for the international community. For example, the declared new RTA trade rules apply to all corners of the world and serve as focal points for interstate cooperation, as well as incubators and testing grounds for new ideas and initiatives in the field of trade. At the WTO, discussions on eTrade are moving in two parallel directions, emphasizing the importance of technological innovation and investment priorities. The WTO's Work Program on Electronic Commerce, initiated in 1998, provides a framework for the development and regulation of this industry. At the same time, the Joint Statement Initiative (JSI) on Electronic Commerce was created to conclude a binding agreement between its members, contributing to the creation of stable and modern rules in the field of international trade. The growing importance of technological innovations and investments in digital solutions reflects the importance of adapting to the current realities of global competition. This evolution contributes to the efficiency, accessibility, and competitiveness of international trade, contributing to the economic growth and development of countries in the modern world.

Negotiations on e-commerce have increased not only in number but also in complexity. The digital trade agenda now covers both traditional trade topics (e.g., trade facilitation) and some digital policy issues, such as cross-border data flows and data localization; electronic signatures and authentication; network neutrality; online consumer protection and privacy; unsolicited commercial electronic messages (spam); open government data; customs duties on electronic transfers; cybersecurity; access to the source code of computer programs.

Despite the debate in academic and expert circles between supporters and opponents of RTAs, there is also a debate about the positive and negative impact of the digitalization of international trade and the long-term consequences of these processes. For example, J. Bhagwati is one of the critics of regionalism trends. He describes regional integration as "preferential" or even "discriminatory". Although many studies on international trade have noted that the net effect of global economic integration on economic welfare depends on the actual situation, Bhagwati believes that a negative net effect is more likely than a positive one and that regional integration is a stumbling block to global liberalization rather than a building block. In his opinion, economic integration entities such as the European Union lead to a significant diversification of trade rather than its development in quantity and especially quality. The economic synthesis among Western European countries was discriminatory towards third countries for two reasons: due to the elimination of customs duties and other trade restrictions between the Union members and due to unilateral changes in customs tariffs when the European Commission introduced a single customs tariff for all non-EU countries (Snježana and Adnan, 2005).

There are countless theories explaining this pattern: some focus on the pressure of lobby groups on exporters, others on the interests of developing countries in using RTAs as a tool for attracting foreign direct investment, and others on geopolitical considerations. Proponents of RTAs emphasize that these types of agreements offer a way out of the multilateral deadlock. They allow countries to expand market access, attract foreign direct investment, and develop new rules to meet new market needs. The very system of RTAs encourages the conclusion of new agreements: as more and more countries become parties to such agreements, other countries and individual customs territories face an urgent need to form their agreements in order not to lose the benefits that RTAs provide to others (Suominen, 2016).

Creating a digital single market simplifies and reduces the cost of cross-border electronic transactions and improves cross-border access to online markets and innovative digital products and services for businesses and consumers. The European Union is an excellent example of the implementation and creation of a single market. The digitalization of trade under European rules intensifies the overall trade in goods and services with the EU - simplifies export procedures, reduces exporters' trade costs, and creates new opportunities for trade with the EU, particularly for small and medium-sized businesses. As a result, the benefits of the single market with the EU include lower prices, a wider choice of goods and services, improved convenience for consumers and businesses, economies of scale for Ukrainian companies due to better access to the large European market, and enhanced consumer protection for online services. The components of the EU's digital single market that need to be improved in Ukraine are electronic identification, payment systems, electronic payments and settlements, protection of intellectual property rights on the Internet, cybersecurity, and personal data protection.

Currently, Ukraine needs to catch up to EU member states and even neighbouring countries regarding digital development. This is evidenced by international rankings such as EGDI, NRI, and WDCR. To reduce the gap (at least with neighbouring countries), it is necessary to accelerate digital transformation, particularly in the weakest areas: the regulatory environment, telecommunications infrastructure development, and the state's implementation of digital technologies. Such changes are necessary for Ukraine's integration or approximation to the EU's digital single market. According to experts at

the Trade+ Center for International Trade Research of the Kyiv School of Economics, a 1% increase in the digitalization of the Ukrainian economy and society could lead to a 0.42% increase in Ukraine's GDP (European Integration Portal, 2021).

Accordingly, depending on the level of digitalization, including in the trade aspect, which Ukraine will gradually approach within the framework of the EU's DSM, the positive cumulative impact on Ukraine's GDP could range from 2.4 to 12.1% (USD 3.1-15.8 billion) of additional growth over the entire period of approximation. In addition, Ukraine, like any other country, will benefit from reduced trade costs in bilateral trade with the EU due to the reduction of regulatory and digital barriers, which will have a positive impact on the welfare of citizens (potential improvement by 3.6-7.8%) and increase the country's competitiveness in the global market (European integration portal, 2021).

It is worth noting that when discussing the advantages and disadvantages of the digital transformation of international trade in the context of global competition, the process under study has signs of both. The advantages of digitalization include increased efficiency, improved quality of services, reduced costs; optimization of trade processes; dynamization and acceleration of response to market challenges and trends; automation of processes and increased speed and efficiency of data and information exchange; acceleration and simplification of online communication between trade entities, including all stakeholders (customers, partners, government agencies; increased protection against cyberattacks. The disadvantages include significant costs for digital infrastructure; the process of trade digitalization is long, continuous, complex, and resource-intensive; a significant need for highly qualified specialists in various fields; and the threat of a decline in employment in the relevant sector.

The research results can be helpful for representatives of public authorities, researchers, and students of all educational levels and can be applied in the practical activities of governments. The practical significance of the results obtained may be due to the formation of certain issues of the post-war plan for the restoration of the national economy, which will directly or indirectly contribute to the digital transformation of foreign trade in the context of increasing Ukraine's competitiveness in the world market of goods, services, intellectual property, attracting technological innovations and identifying investment priorities that meet the national interests of the country.

## CONCLUSIONS

The modern trading system is undergoing significant changes driven by the overall process of digital transformation of the global economy, which includes electronic payments, increased trade in digital products, globalization of all aspects of trade, and more. The COVID-19 crisis has further accelerated this process, forcing many people and companies to adapt to the digital environment quickly.

Digitalization is becoming a global trend, and its impact is felt in various spheres, from personal life to national economies. However, this process is unfolding slowly in some countries. Factors that influence the pace of digital transformation include the economic, political, and social context, as well as the level of digital connectivity, skills, and regulatory maturity. Despite the overall development, more than 2.7 billion people will remain offline in 2022, which indicates inequalities in this process.

The impact of the digitalization of international trade on the economic development of countries is primarily due to the technological and infrastructural asymmetry of global trade that has arisen as a result of the digital divide between developed countries (more than 90% of the population has access to the Internet) and LDCs (less than 20% of the population), as the latter countries, due to the lack of access to the Internet, are unable to be fully involved in e-commerce and cross-border trade in digital products. An additional barrier to the development of digital trade, particularly in the African and Asia-Pacific regions, is the need for more legislation on various trade aspects of e-commerce, including data protection and privacy. Governments in different countries realize the importance of digital transformation for social and economic development and are actively implementing digital and investment strategies.

Ukraine, according to international rankings such as EGDI, NRI, and WDCR, lags behind EU member states in digital development. This makes it necessary for the country to accelerate the digital transformation process, especially in weak segments, such as the regulatory environment, development of telecommunications infrastructure, and government adoption of digital technologies. Only through these changes will it be possible to reduce the gap, move towards integration, and bring Ukraine closer to the European Union's digital single market. Successful digital transformation will be a key factor in increasing the country's competitiveness and efficiency in the context of global competition and development in the digital age.

## ADDITIONAL INFORMATION

### AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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## ЦИФРОВА ТРАНСФОРМАЦІЯ МІЖНАРОДНОЇ ТОРГІВЛІ В КОНТЕКСТІ ГЛОБАЛЬНОЇ КОНКУРЕНЦІЇ: ТЕХНОЛОГІЧНІ ІННОВАЦІЇ ТА ІНВЕСТИЦІЙНІ ПРІОРИТЕТИ

У сучасному світі глобалізація та цифрові технології суттєво перетворюють ландшафт міжнародної торгівлі. Цифрова трансформація стала ключовим аспектом, що визначає конкурентоспроможність країн і підприємств на міжнародній арені. Метою дослідження є виявлення впливу цифровізації міжнародної торгівлі на економічний розвиток країн та їхню конкурентоспроможність, що базуються на технологічних інноваціях, які визначають майбутнє глобальної конкуренції на рівні країн і компаній та впливають на процеси торгівлі й визначення та обґрунтування інвестиційних пріоритетів для підтримки цифрової трансформації в Україні.

У дослідженні проаналізовано вплив цифровізації міжнародної торгівлі на економічний розвиток країн, що зумовлений цифровим розривом між високорозвинутими та найменш розвинутими країнами (НРК). Для розвинутих країн характерне покриття й доступ до Інтернету більше ніж на 90% на противагу НРК, де відповідний показник менший за 20%. У відповідних умовах, що склалися з доступом до мережі «Інтернет», країни НРК не мають можливості бути повноцінно залученими до електронної комерції та трансграничної торгівлі цифровими продуктами. Додатковим

бар'єром для розвитку цифрової торгівлі в окремих регіонах світу є відсутність законодавства з різних торговельних питань електронної комерції.

Визначено вплив війни в Україні на ринок електронної комерції. Зазначено, що ринок електронної комерції скоротився у 12 разів у 2022 році порівняно з довоєнним періодом та почав поступово відновлюватися у 2023 році. Очікується, що ринок досягне майже повного відновлення в Україні до кінця 2023 року чи початку 2024 року. Головним завданням для України буде розширення сфери охоплення чинних угод про вільну торгівлю на сфері послуг, електронної комерції та інвестицій. Україна має стати вагомим гравцем на деяких світових ринках послуг і торгівлі цифровими продуктами, урахувавши наявність оновленої нормативно-правової бази з цих питань. Передбачається, що електронна комерція буде швидко зростати після завершення війни в Україні.

**Ключові слова:** цифровізація торгівлі, міжнародна торгівля, цифрова трансформація, індустрія 4.0, глобальна конкуренція, інвестиції, технології, інновації, цифрова економіка

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