



INFLUENCE OF INTERNATIONAL ECONOMIC RELATIONS ON THE MANAGEMENT OF KNOWLEDGE AND INFORMATION SYSTEMS IN THE DIGITAL ECONOMY

Elena G. Popkova¹
Mavjuda K. Abdullaeva
Elena V. Karanina
Nikita O. Stolyarov

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ABSTRACT

We set a research hypothesis on the influence of the formation of international economic relations of countries on the effectiveness of knowledge and information systems management in the digital economy. We substantiate the features of the connection between these two components, which confirm the hypothesis. We consider the results of the manifestation of two forms of cooperation, which emerged due to the effect of the digital economy and due to the improvement of international economic relations between partner countries. Growth of investments in the implementation of these forms of interaction allows achieving significant results in case of favourable conditions for financial activities and R&D in countries in which businesses of partner countries are located (taxation, terms of rent, infrastructure, etc.). It is shown that activities of partner countries at the political level towards the creation of advantages for the integration of international business ensure mutual implementation of bilateral obligations in support and interaction.

The goal of this paper is to identify the connection between international economic relations and the level of implementing digital technologies in the sphere of knowledge and information systems management. To reach this goal, we use the following research methods: the complex method, the comparative method, the statistical method, and the trends method.

The scientific novelty of this research consists in determining the features of new forms of cooperation in the business environment in the conditions of transformation of international economic relations.



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1. INTRODUCTION

International economic integration offers many advantages for manufacturers, exporters, importers, and

the country on the whole. Countries with a closed economic system do not demonstrate technological growth, and, accordingly, cannot reach high GDP. The country's adopting a course towards the economy's

¹ Corresponding author: Elena G. Popkova
Email: 210471@mail.ru

openness involves intensification of external connections at the global, multilateral, and bilateral levels. Participation in various international partnerships involves certain preferences for the participating countries, while bilateral international relations involve the creation of attractive conditions for cooperation. Partnerships in the sphere of international relations include mutual support of commodity and technology trade. The digital economy involves the emergence of new directions for cooperation, which are established within international economic relations. These directions include the following (Qoblex, 2024): online commerce, based on the management of information systems of transactions, systems of the management of resources, and systems of the management of communication with customers and partners; management of data exchange between online customs; electronic knowledge management at the transnational or international levels (between the participants of international entrepreneurial networks and departments of transnational corporations (TNCs) in different countries).

The goal of this study is to identify the connection between the development of international economic relations and the level of implementation of digital technologies in the sphere of knowledge and information systems management. This goal envisages the achievement of several tasks, which are the determination of the features of transformations of the selected digital technologies under the influence of the change in international economic relations and the identification of prospects for the studied components in the selected countries.

2. EXPERIMENTAL SECTION

The following hypothesis is offered and checked: international economic relations influence the level of the technologies of the management of knowledge and information systems, which lies in the basis of new forms of cooperation between countries and the business environment.

The comparative method allows identifying changes in each of the studied components in the conditions of the digital economy. The statistical method allows revealing the indicators of each component's development in the selected countries. The trends method allows establishing the specifics of the development of the forms of cooperation that are based on digital technologies of knowledge and information systems management in the considered countries.

The research is performed by the example of Azerbaijan and Turkey (bilateral international economic relations); and the USA and Germany (bilateral economic relations with different countries, which facilitate the integration of TNCs). We analyse the results and conclusions of a

range of theoretical and empirical materials on the topic of this research.

Castro and Moreira (2023) presented a critical overview of approaches to the forms of organisation of digital management of knowledge in the economic activities of TNCs. At the current stage, these forms include the following: internal transfer of knowledge at the level of structural units (companies) or from one department to another; horizontal knowledge management (transfer of knowledge between members of departments of TNCs, which takes into account cultural and geographical features of the members but assumed the similar level of digital and professional readiness); traditional (or vertical) knowledge management, which is connected with knowledge transfer from the central office to subsidiaries located in other countries. The authors' important contribution is the statement that effective knowledge management at the level of TNCs requires the quality universal formatting of knowledge, which would be available for all members and personnel regardless of geographical or cultural specifics.

Bhagat et al. (2023) presented a methodology of using deep learning technology in the conditions of possible cyber attacks on wireless sensor networks, which allows avoiding problems of the traditional approach. The authors proposed an approach that is based on the combination of the methods of assessing the indicators of specificity, sensitivity, and precision of cyber intrusions. The relevance of this research is that such methods may be used to raise the level of technological support of online commerce in the context of authentication of a customer's electronic signature.

The report by Ezell and Koester (2023) contains statistical and analytical data on the impact of technologies on the level of the growth of global trade. The authors proved the link between countries' participation in the WTO's Information Technology Agreement and the growth of their IT sectors and trade. Ismail (2021) elaborated on the assessment of the influence of digital security and the application of digital technologies and the absence of the impact of the digital divide and digital infrastructure on the level of formation and effectiveness of digital trade. Herman and Oliver (2023) dwelt on the influence of the regulatory support of the provisions on interaction in the sphere of online commerce and Internet coverage on this process in case of bilateral relations between countries. The authors demonstrated that an insufficient level of Internet coverage, which is peculiar to certain developing countries, cannot be a barrier in the sphere of dissemination of online commerce.

Froese et al. (2021) established the direct (between the main office and branches in other countries) and reverse connection (from branches to the central office) in knowledge management in TNCs. The authors showed that the high level of organisational support allows

ensuring effective knowledge management in each process.

Jankowska et al. (2020) considered the features of the formation of knowledge in subsidiary companies that are located in developing countries. The authors revealed that the experience of subsidiary companies in the sphere of creation of new knowledge in the conditions of the digital economy is very valuable for main offices due to the possibility of adapting it in other countries, including in the technological sphere.

Susanti (2022) aimed at the establishment of the importance of regulatory support of norms and standards of organisation of online commerce and guaranteeing safety of its participants (national and foreign). The author assessed the level of such regulation in Indonesia, using the conceptual approach given the main legal provisions that are necessary for the regulation of the economic process in the digital economy.

3. RESULTS

Further in this paper, we shall study the features of the change in main technologies, presented in new forms of cooperation that emerged due to the transformations of international economic relations.

We must distinguish online commerce between partner countries, the emergence and development of which owes to the intensity of international economic relations. Online commerce involves the management of information systems at the customer–seller level. Transition to this direction for the adaptation of the digital economy is connected with technological support (AI, digital payment technologies); and regulatory support (adoption of norms on the use of online commerce).

Let us consider the influence of international economic relations on the development of online commerce between Turkey and Azerbaijan.

Table 1 presents the indicators of transformations of bilateral economic cooperation between the selected countries.

Table 1. Dynamics of international economic relations between Azerbaijan and Turkey

	Aspect of international economic relations	Description
1	Start of the trade and economic cooperation	The signing of a bilateral agreement between the countries – 01.11.1992
2	Improvement of legal, regulatory, and institutional conditions for cooperation in the trade and economic sphere, including the following:	1994-1996
2.1	Creation of an inter-governmental commission on the economy	1996
2.2	Partnership in the oil and gas sector	1998, 2018
2.3	Preferential trade agreement	31.05.2020 Regulates preferences in the tax sphere and creates of favourable environment for mutual trade between the countries
2.4	Bilateral Action Plan in the Economy	19.02.2021
2.5	Memorandum on mutual understanding in the sphere of online commerce	April 2021 Creation of favourable conditions for mutual online commodity trade
3	Indicators of international economic relations	
3.1	Direct foreign investments between countries	Over 2011-2021, Turkey was ranked 2 nd by the volume of investments in the economy and infrastructure of Azerbaijan. In this period, the volume of direct foreign investments from Turkey in Azerbaijan equalled USD 13.3 billion). The period of 2011-2021 marked the general growth of direct foreign investments in Azerbaijan: 2011 - USD 4.4 billion, 2017 – USD 5.7 billion, 2018 – USD 4.1 billion, 2019 – USD 4.2 billion, 2020 – USD 4.5 billion, 2021 – USD 4.7 billion, and 2022 – USD 6.3 billion. From 1995-2021, Azerbaijan was among the leaders in direct foreign investments in the economy and infrastructure of Turkey (USD 20.3 billion)
3.2	Bilateral trade	Turkey is ranked 2 nd in the export and import of products (services) in Azerbaijan. The aggregate commodity turnover between the countries was USD 4.7 billion in 2021, and USD 7.5 billion in 2023.

Source: Prepared by the authors using the materials of Ankara.mfa.gov.az (2024), E-qanun.az (2020), Invest.gov.az (2024), Report.az (2024), and TRTAvaz (2023)

As shown in Table 1, the development of international economic relations between the two countries stimulates the growth of the volumes of mutual trade and investments. Improvement of partnership in this sphere was due to an increase in regulatory and programme support. Let us consider the level of influence of the transformation of bilateral economic partnership on e-commerce between the two countries. In 2021, there was signed a bilateral partnership agreement on the formation of a favourable climate in this sphere. This was caused by understanding the necessity of ensuring the institutional infrastructure for mutual online commerce, including the prevention of problems faced by businesses and consumers during the COVID-19 pandemic.

The volume of online commerce in Turkey in 2023 equalled 1.6 trillion Turkish liras (USD 49 billion), and it is expected to reach 2.7 trillion Turkish liras (USD 82 billion) in 2024. In 2024, the volume of electronic export of goods (services) will grow by 1.5 %, and in the next 10 years, it will increase by 10 %. Turkey has 40 large online trade platforms, which sell their products domestically and abroad. Improvement of the regulatory support of this sphere at the bilateral level stimulated an increase in mutual online commerce. Commodity turnover between the countries increased by USD 2.8 billion in 2021-2023 (Report.az; Ankara.mfa.gov.az, 2024), which was largely due to the growth of the volume of online commodity turnover. In the context of the total volume of Turkey's online commerce and its commodity turnover with Azerbaijan, trade cooperation in the online form has a large potential for further growth.

The volume of online commerce in Azerbaijan also demonstrated growth. It is expected that this indicator will reach USD 1.672 billion in 2024, with an annual growth of 10.47 % until 2029 (Statista, 2024).

Improvement of the regulatory basis of economic cooperation and interaction in the sphere of online commerce ensured the implementation of a range of structural changes in this sphere. At the end of 2023, the Azerbaijani brand ABAD (production of handicrafts) began promoting its products via the Turkish online trade platform Trendyol (which is very popular in Central Europe and the Middle East) (Abad.gov.az, 2023). It is expected that many other Azerbaijani brands will be selling their products via Turkish online trade platforms.

Trendyol is the leader in online commerce in Turkey. Since its appearance in the market, its technological features have constantly improved. Technological characteristics of this platform include the following (Akyildirim, 2024): a team of technological developers of 2,000 people; 7,000 micro-services; 464,000 processors; and 3 data processing centres. By technological features, Trendyol is behind such trade

platforms as Alibaba (89 data processing centres) (Dgtlinfra, 2024a), Amazon (124 data processing centres) (Dgtlinfra, 2024b), and eBay (12 data processing centres) (Raritan, 2024). At the current stage, Azerbaijan does not have online trade platforms that are similar to the Turkish Trendyol. Accordingly, the integration of Azerbaijani brands and companies into the Turkish market of e-commerce is an important stage of development.

Attention should be also paid to the influence of international economic relations on knowledge management in modern TNCs or international entrepreneurial networks.

The given entrepreneurial structures are the main subjects of knowledge management in the corporate environment. Their capabilities and focus on the improvement of competitive positions allow producing, transferring, and transforming new knowledge, which influences the achievement of goals at the multinational level. Countries with the highest number of TNCs as of 2024 are as follows (Internationalwealth, 2024):

- China (more than 140 TNCs, the leaders by the volume of capital and level of technological management among them are Haier, Lenovo, and Huawei Technologies Co. Ltd.);
- USA (more than 130 TNCs, including Apple Inc., Microsoft Corporation, Amazon.com, Inc., Nvidia Corporation, etc.);
- Japan (more than 40 TNCs, including Keyence Corporation, Sony Corporation, Toyota Motor Corporation, and others);
- France (30 TNCs);
- Germany (more than 20 TNCs, including Volkswagen Group, BMW, Schwarz Group, Siemens, SAP, etc.);
- UK (more than 15 TNCs).

Apple Inc. has many subsidiaries in five regions of the world: South and North Americas; Japan, China, and other countries of the Asia-Pacific region; and countries of Europe. Such international integration is caused by the fact that the USA has international economic relations with most countries of the world. Despite certain political and trade differences with China, Apple Inc. has retail stores, online stores, and production in China. Attempts at diversification of production by Apple Inc. are far from completion, and the company continues using Chinese production capacities.

The USA has international economic relations with more than 200 countries, regional associations, and territories of the world (Ustr.gov, 2024). Thus contributes to the development of trade relations and transfer of technologies. Integration of capital is realised through the creation of TNCs and international entrepreneurial networks. General analysis of transformations of the US foreign economic policy shows that interrelations with regions of the world in

which American corporations have affiliated companies remain at a stable good level, which contributes to the development of the economic activities of American corporations in foreign territories. Other countries are interested in the presence of American TNCs in their territories due to the following reasons:

- Economic component, namely payment of taxes and influence on the well-being of people who work at TNCs affiliated companies;
- Technological component. TNCs use certain models of digital management of knowledge and information systems, which contribute to standards of production and services. These standards are integrated into the territories where American TNCs are located, which, in turn, raises the level of intellectual capital of these countries in the conditions of the digital economy;

- Infrastructural component. The contribution of American TNCs to an increase in the level of technological infrastructure of countries of companies' location is an advantage for the integration of TNCs of other countries from the adjacent spheres.

Similar to the USA, Germany has a stable foreign policy, including in the economic sphere. Germany has bilateral agreements on economic activities with 190 countries (Auswaertiges-amt.de, 2024).

Let us consider the features of the systems of knowledge management of Apple Inc. (USA) and Volkswagen Group (Germany) (Table 2).

Table 2. Characteristics of the systems of knowledge management of Apple Inc. (USA) and Volkswagen Group (Germany)

	Indicator	Apple Inc. (USA)	Volkswagen Group (Germany)
1	2	3	4
1	Model of knowledge management	Vertical. All innovations are developed at the level of special departments, which is a guarantee of high quality and control at all stages of development and implementation of products. Knowledge management is centralised: - Hardware conforms to the corporate standards, technological lines are universal for all manufacturers of the company; - Software is universal for all types of corporate products; - Product maintenance is universal (testing, repairs, etc.).	Horizontal. Employees of the corporation's branches in Germany and other countries presently their inventions (technologies) individually to the main office. The main office deals with the patent issues. The inventor (or group of persons) become, together with the corporation, the owners of such technologies according to the agreed terms. In 2022, registration bodies received 5,305 patent applications.
1.1	Using the digital economy tools	Vertical	Horizontal
2	Results of the implementation of knowledge management technologies	Development, implementation, and production are executed within a system of centralised knowledge management. While developers, shareholders, and management are interested in the high quality of the products, the personnel who are involved in the production processes do not have high motivation. R&D expenditures (mainly improvement of software and implementation of VR tools) are the responsibility of special departments with centralised management. In 2021, this indicator equalled USD 21.9 billion, in 2022 – USD 26.3 billion, and in 2023 – USD 29.9 billion. The share of R&D expenditures in the sales revenues was as follows: - 2020 – 6.8 %; - 2021 – 6 %; - 2022 – 6.7 %; - 2023 – 7.8 %.	The process of creation and implementation of technologies created in the corporation is presented by a system of collective management of knowledge. Developers and corporations are interested in high results. Implemented innovative technologies are used in the corporation's activities. Their implementation is connected with R&D expenditures: in 2022 - USD 18.9 billion. The effectiveness of the implementation of innovations in the system of knowledge management in the corporation is as follows: - Profit from the use of innovative technologies, which were implemented in 2022, equalled USD 14.3 billion.

Source: Prepared by the authors using the materials of Finbox (2024), Macrotrends (2024a), Macrotrends (2024b), and Volkswagen AG (2023)

As shown in Table 2, the indicators of effectiveness of the systems of knowledge management with Apple Inc. (USA) are higher and more stable compared to

Volkswagen Group (Germany). This is due to a range of reasons, which include the following:

- Higher effectiveness of the vertical model of knowledge management, compared to the horizontal one, in the context of corporate activities in the sphere of creation and implementation of inventions. In this case, an exclusive approach to knowledge management in all technological, maintenance and technical processes is used, which involves unification and focus on unified quality standards for all affiliated companies;
- Diverse and wide international economic relations with the USA, compared to Germany, which contributes to advantages (including in technological infrastructure) for Apple Inc. (USA);
- Larger expenditures for knowledge management (R&D), which stimulates the creation of better competitive advantages and growth of sales.

4. DISCUSSION

In the course of the research, we proved the hypothesis about the connection between the improvement of the two studied components – international economic relations and the development of digital technologies in the management of knowledge and information systems. The second component at the current stage of the digital economy is formed with a focus on new forms of cooperation.

The considered features of such a form of international economic interaction as e-commerce demonstrated its high dependence on the improvement of the relations between partner countries in the context of an increase in indicators. We did not consider the reverse effect, connected with the possible deterioration of international economic relations and dynamics of growth of online trade turnover between countries. We assumed that the first component may lead to a range of obstacles, namely in the sphere of payments and product delivery (including customs clearance); creation of storages of online trade platforms in the territory of the country with which international economic relations have deteriorated; in the sphere of taxation and administrative regulation of the economic activities of online trade platforms. Accordingly, improvement of foreign economic interaction is a precondition for the achievement of synergetic effect in the sphere of online commerce, including for the effective implementation of technologies of information systems management.

Noting the gradual development of online commerce in Azerbaijan, which is behind the rates of this process in Turkey, it is possible to distinguish factors that stimulate its positive transformations (Navigator.az, 2024; Privacyshield.gov, 2024):

- Emergence of the electronic signature system Easy Sign, which is used during the interaction of the participants of online trade platforms of the B2B category. An electronic signature is used for remote signing of agreements within an information system of communication management with partners. This system ensures online communication and is used for

confirmation of personality in relations with banks during payment and credit operations. It is important for the improvement of cyber security of online trade and financial operations;

- Emergence of national systems of electronic payments for trade operations within the country: Payhub / Dinarpay, Hesab.az, Goldenpay Azerbaijan, and E-PUL. These systems are based on AI technology and machine learning (acceptance of electronic payments based on the set parameters of payer identification). The development of these tools of the digital economy is an important factor, which is equal to the enhancement of the regulatory basis of online commerce, adoption of programme agreements on international economic relations, etc.

Assessment of such forms of international economic cooperation as knowledge management in TNCs showed its connection with the level of international economic relations of countries in which the main offices of corporations are located. Accordingly, support of the high level of this component is necessary for the advantages of entrepreneurial activities of TNCs in countries that have capital and production. To preserve the presence of TNCs and enhance their integration, these countries can create more attractive conditions for functioning. Such parity of international economic relations is ensured by the USA and Germany and the countries in which their TNCs work.

The existing forms of knowledge management can have pros and cons for TNCs in the conditions of the digital economy. The use of the vertical form by Apple Inc. (USA) is connected with the company's traditions regarding comprehensive control of all processes and spheres and compliance with strict corporate norms. The vertical centralised approach does not involve the possibility of the participation of personnel or individual branches in the creation of innovative digital technologies (which is possible in the case of Volkswagen Group). The focus on certain decentralisation in knowledge management, demonstrated by Volkswagen Group, is also effective, though it does not ensure the global coverage that is peculiar to Apple Inc.

5. CONCLUSION

As a result of this research, the following conclusions can be drawn.

First, to improve the effectiveness of online commerce in the conditions of enhancement of international economic relations between Azerbaijan and Turkey, we could offer an increase in investment in technologies for the management of information systems of communications with customers and partners. In this case, international and domestic investors might reconsider the directions for financing both economies. Preferential directions for investing in Azerbaijan and

Turkey are connected with the oil and gas sector, which, though accounting for a large share of GDP, is connected with the use of fossil fuels, which negatively impacts environmental development. Quick growth and effectiveness of online commerce require the improvement of technological support (creation of new data centres and attraction of new developers). Accordingly, differentiation of the directions for investment flows in favour of financing of online commerce technologies of the national subjects will allow raising effectiveness and promotion of commodities of the two countries.

Second, a relevant direction for improving international economic relations is the initiation of offers within subjects of the main sectors regarding new forms of

their implementation. These initiatives could be proposed at e-government platforms by all interested parties. Given the close historical, political, economic, and social ties between Azerbaijan and Turkey, such initiatives have good potential.

Third, improvement of knowledge management of the digital economy subjects and R&D subjects in countries in which branches of foreign TNCs are located. Here clustering could be used to create the necessary infrastructure or achieve tasks in various spheres of functioning. This will facilitate the openness and globalisation of the digital economy and will help reduce barriers to the creation and use of new productive knowledge.

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Elena G. Popkova

Armenian State University of
Economics,
Yerevan,
Armenia
210471@mail.ru
ORCID 0000-0003-2136-2767

Mavjuda K. Abdullaeva

Fergana Polytechnic Institute,
Fergana,
Uzbekistan
mavjuda.umarxab@gmail.com
ORCID 0000-0001-7366-9758

Elena V. Karanina

Vyatka State University,
Kirov,
Russia
karanina@vyatsu.ru
ORCID 0000-0002-5439-5912

Nikita O. Stolyarov

Plekhanov Russian University of
Economics,
Moscow,
Russia
Stolyarov.NO@rea.ru
ORCID 0000-0003-2731-7596
