

www.jpis.az

14 (1)
2023

Activity characteristics and perspective development directions of electronic trade platforms in Azerbaijan

Alovsat G.Aliyev¹, Roza O.Shahverdiyeva², Ulker H.Hagverdiyeva³

^{1,2,3}Ministry of Science and Education Republic of Azerbaijan Institute of Information Technology,
B. Vahabzade str., 9A, AZ1141 Baku, Azerbaijan

alovsat_qaraca@mail.ru¹, shahverdiyevavar@gmail.com², ulker_haqverdiyeva@mail.ru³
orcid.org/0000-0002-1174-8036, orcid.org/0000-0003-0842-7300

ARTICLE INFO

<http://doi.org/10.25045/jpis.v14.i1.04>

Article history:

Received 8 August 2022

Received in revised form

14 October 2022

Accepted 28 December 2022

Keywords:

Digital Economy

Industry 4.0 Technologies

Digital Transformation

Innovative Technologies

E-commerce Models

Digital Cashless Payments

ABSTRACT

Improving e-commerce platforms and determining their prospective development trends is a global problem. This article indicates the relevance of expanding online transactions with the application of industry 4.0 platform technologies in business activities. The sharp increase in demand for e-commerce due to the pandemic has made it one of the key trends of the modern era. Modern electronic commercial systems and technologies are required to be applied in the organization of business activities. The work shows the significance of forming the necessary infrastructure for e-commerce in the country and solving the problem of integration into the global digital ecosystems. The characteristics of electronic commerce technologies in ensuring economic development are determined. The stages of its life cycle are displayed based on the results of the analysis of many research works related to electronic commerce. Aspects of the impact of the application of modern electronic commerce technologies and tools on economic development in commercial activities are explored. The article also highlights the main procedures of online purchase process in the main electronic trading systems on the Internet. It classifies the electronic commerce system according to various characteristics, and studies the aspects of its implementation in Azerbaijan. It proposes the methodology of comparative evaluation of the development rate of electronic commerce technologies and develops systems and relevant indices. In the end, the results of the final scores on the weighting coefficients of the indicators characterizing B2B electronic commerce are introduced. With the application of the latest information and communication technologies, recommendations are proposed on the operational characteristics and prospective development trends of e-commerce platforms in the Azerbaijani segment of the Internet.

1. Introduction

The rapid development of science and technology in the modern world, especially the application of innovative technologies of the Industry 4.0 platform in many fields of activity, has accelerated the process of digital transformation in the global society. Digitization, which is one of the important driving factors in the socio-economic development of countries, has created conditions for fundamental changes in the organization of purchase, trading, and for electronic commerce (e-commerce) to become an integral part of the global sales market. The acceleration of the global digital transformation process in e-commerce leads to its more dynamic

development. This process is radically altering the relationship between buyers and sellers around the world, increasing the possibilities of online trading [1]. As the scope of modern digital technological tools, mainly the Internet, expands, the number of consumers shopping online is also increasing day by day. Thus, in 2020, more than 2 billion people worldwide purchased goods or services online through the Internet, and during that year, the volume of retail sales through the Internet in the world exceeded 4.2 trillion USD [2, 3].

Simultaneously, restrictions on most economic and social activities due to the recent global problems faced by the society due to the COVID-19 pandemic have led to a change in the shopping

habits of consumers. The vast majority of consumers have switched from traditional shopping to online one. The emerging new reality has forced businesses to move online and use electronic commerce (e-commerce) systems and platforms to stay competitive in the global marketplace.

Currently, small and medium-sized businesses have begun to develop swiftly in the economy. In the conditions of digital transformation, effective implementation of consumer purchase processes through e-commerce systems has a special effect on the development of small and medium-sized businesses. The continuous and sustainable development of the economy, including the activity of competitive production and processing areas, will be supported by modern infrastructure.

Entrepreneurs will be given wide opportunities in the priority areas of the economy, tax and customs exemptions and preferential financing tools will be widely applied. A mechanism for insurance of loans and investments will be created [4]. The sharp increase in the number of people who prefer online shopping, as well as the number of enterprises engaged in e-commerce activities, has created conditions for e-commerce to become one of the leading forces in the economic development of countries.

The development of e-commerce is a key element of the digitalization of the economy. Due to the analysis of the data obtained as a result of the study of the digital footprint left on various e-commerce platforms as a consequence of the activities of individuals, social groups or businesses, the digital economy is developing rapidly today [5].

2. Related studies

[1] explores the effects of modern digital technologies on business models and proposes modern digital business models for e-commerce. The application of innovative technologies of industry 4.0 in e-commerce creates conditions for the development of modern marketing, improvement of data analysis, creation of safe interaction between consumers and formation of modern business models ensuring the development of international e-commerce. The author investigates the economic effects of the application of modern business models based on the Internet of Things technology in e-commerce and proposes recommendations for ensuring the stable and sustainable development of e-commerce enterprises in the long term.

[4] studies the development ways of e-commerce issues and digital cooperation in the BRICSA (Brazil, Russia, India, China, South Africa) countries. The

author highlights the development of e-commerce as the key element of the digitalization of the economy and explores modern e-commerce tools such as e-commerce, blockchain, chatbots, the Internet of Things, voice assistants, drones, etc. The author proposes recommendations for defining the areas and ways of digital cooperation for the countries of the Central African Republic and individual companies.

[6] indicates that in the study of scientific research works related to e-commerce, the application of big data analytics, cloud computing, the Internet of Things, mobile Internet, social media and other innovative technologies in e-commerce is quite relevant. With the application of these technologies, it proposes a unified architecture of intelligent e-commerce systems with higher operational efficiency and greater business opportunities. The author explores the main problems related to intelligent e-commerce systems and proposes recommendations on possible research fields.

[7] examines the current state of e-commerce systems and existing problems, their architecture, as well as the application issues of cyber-physical systems in e-commerce and touches upon trade development issues with the application of innovative technologies.

As a result of the 4th industrial revolution and its social impacts, the software that is currently at the center of business activity should enable the execution of multi-channel transactions in e-commerce. The author proposes a conceptual model of modern e-commerce systems that enables multi-channel operations introducing 5G in communication processes, blockchain in transactions and the IoT technologies in logistics.

[8] focus on the analysis of the current state of the ICT sector, which is one of the constituent elements of the economy of Azerbaijan, and the determination of its prospective development directions for the post-coronavirus pandemic period. It is indicated that in recent years, ICT, telecommunications and computer equipment has become the main production and service sector of the world economy in accordance with the challenges of the 4th industrial revolution.

As a result of the increased importance of these fields due to the coronavirus pandemic, the author presents suggestions and recommendations on innovative development trends of the ICT sector for the post-coronavirus era.

[9] evaluates the users' experience on five e-commerce platforms based on user feedback through online surveys. One of the main points to provide better service in e-commerce platforms is the

availability of the platform with an attractive and easy-to-understand design. The author presents recommendations for the improvement of e-commerce platforms.

[10] highlights the application of e-commerce technology in the development of the economy. The study explains formation and development of relevant infrastructure. It presents the development features of e-commerce are analyzed, and the opportunities created for purchase. The article displays advantages leading to the strengthening of the e-commerce position in the international economic space. It explains the functions of electronic business according to the stages of the commercial period of the enterprise's activity are introduced and regulation issues of its implementation.

[11] develops necessary tools for evaluating the development of B2C e-commerce in the member countries of the Eurasian Economic Union (EEU), including, an integral index. The developed index ranks the participants according to the readiness to use e-commerce, as well as to monitor the changes in the indices of the participants over time, keeping the normalized values of the indicators applied. The author also proposes methodological recommendations applicable in the development of similar evaluation tools for other regional groups.

3. Problem statement and research rate

Identifying the development problems of modern e-commerce systems and working out ways to solve these problems have a significant role in the country's economic development. The grouping of current e-commerce platforms in the country based on certain characteristics, analysis and assessment of their performance characteristics are important for identifying the mentioned challenges. Therefore, the analytics of hardware, software and technological features of the infrastructural platform of trade and commercial websites and portals operating in Azerbaijan and their prospective development trends is of particular interest.

Taking into account the abovementioned factors, this article explores the role of modern commercial technologies in ensuring the country's economic development. It studies the benefits of the application of e-commerce systems for the country.

The organization of e-commerce in Azerbaijan is also considered. This article analyzes the improvement trends of e-commerce systems and increase of operational efficiency with the application of the 4th Industrial revolution technologies.

In connection with the degree of study of problems on e-commerce systems, it is mentioned that the signs and characteristics of the formation of their development stages, scientific-technological foundations have been the subject of research by many foreign, including Russian, as well as Azerbaijani scientists.

For the development of scientific, technical and technological aspects of e-commerce systems, numerous fundamental scientific-theoretical and applied research works are conducted. Simultaneously, scientific-research works are carried out on the improvement of traditional economic processes in the e-commerce. In this regard, recently, the application of e-commerce systems models in new trade processes has been studied by various researchers. Therefore, in accordance with the challenges of the Industry 4.0 revolution, researchers focus on the determination of prospective development trends of e-commerce systems, which have become the trend of the main trade service sector of the world economy, in the post-pandemic period.

4. The main objective of studies in this field

The Azerbaijani segment of the Internet studies the characteristics of e-commerce platforms and prospective development trends. To achieve the objective set, the following issues are considered:

- Justification and analysis of the importance of electronic commerce processes at the global, international and national levels;
- Study of the operational features of existing global and country e-commerce platforms and their generalization;
- Comparative characteristics of e-commerce platforms in the country, their shortcomings, and the detection of problems to be solved.

In order to achieve the main goal, recommendations are developed on improving the effectiveness of trade-commercial technologies, e-commerce requests on the Internet and their types, e-commerce systems on the industry 4.0 platform. Attempts are made to implement and develop e-commerce systems based on the technologies of the Industry 4.0 platform. It is tried to apply modern Information and Communication Technologies (ICT) corresponding to the Industry 4.0 platform in the development of trade processes. The followings are among the objectives of the conducted scientific research: 1) Justification of increasing the efficiency

of e-commerce systems through digital technologies, such as payment and delivery on e-commerce platforms, the Internet of Things, artificial intelligence, machine learning, big data analytics. 2) Elaboration of recommendations on prospective solution mechanisms of e-commerce problems and their development.

5. Materials and methods

The technical and technological infrastructure of available e-commerce platforms is used in the process of determining the operational characteristics and prospective development trends of e-commerce platforms in Azerbaijan. The network equipment and relevant information-network materials included in the infrastructure are considered as basis. In addition, the data bases of relevant central and local organizations are used as a source of information. The methodology of the conducted analysis and research process is based on systematic analysis approaches, methods, statistical and multifactor analysis methods, decision methods, risk management theory, modern ICT systems and tools. International economic development trends, requirements of high and modern ICT technologies. The main trends of the industry 4.0 platform are taken into account in ensuring the stability of electronic commerce systems.

5.1. Applied methods. Based on the analysis of the performance characteristics of e-commerce platforms, systematic analysis, data analysis, correlation and regression analysis, econometric modeling methods, multi-criteria expert evaluation method, information theory, algorithmizing, CRM systems, ICT requirements and other methods are applied.

5.2. The main *research objects* of the article are the operational features and prospective development trends of e-commerce platforms in Azerbaijan.

5.3. The *subjects of research* refer to the specific features of e-commerce platforms in Azerbaijan and their effective use technologies.

Attempts are made to determine the operational characteristics and prospective development trends of e-commerce platforms and to examine the economic characteristics of electronic-commerce systems. In the Industry 4.0 platform of e-commerce platforms, the applications of the main development technologies to the digital economy development are considered. It is focused on the correct determination of the application of

electronic business models to the activities of enterprises, increasing the level of sustainability of e-commerce platforms.

6. Electronic commerce technologies in ensuring economic development

In modern times, the acceleration of development in e-commerce has made this sector one of the leading forces in ensuring the economic development of countries. On the one hand, the rapid development of electronic commerce is the consequence of scientific and technical, regional economic, social and geographical development. Moreover, e-commerce has become one of the main driving forces of regional economic growth. The impact of the application of modern e-commerce technologies and tools in commercial activity on economic development can be examined from various aspects:

1. The development of e-commerce creates conditions for reducing various costs incurred in commercial activities, saving time and increasing the efficiency of regional economic development in this area and expanding the scope of economic development [12].

2. The application of modern e-commerce technologies optimizes the production activity of enterprises by reducing the costs of enterprises and increasing the demand for goods and services [12].

3. Moreover, the application of modern e-commerce systems based on the application of innovative solutions, such as artificial intelligence and big data analysis, provides conditions for meeting the demands of consumers on a large scale, as well as providing an individual approach to customers.

Thus, e-commerce technologies and systems expand their scope by providing convenience to consumers, enabling not only large, but also small and medium-sized businesses to switch to e-commerce activities and become one of the driving forces of economic development. Especially recent expansion of access to information, the increase of information and the improvement of information processing capabilities enables the analysis of various data collected on e-commerce platforms. This develops successful marketing strategies and increases their efficiency in the macro and micro economic environment [13].

Currently, modern e-commerce technologies are widely used to ensure the economic development of countries all over the world [13]. Therefore, in the current era, when e-commerce activity has become one of the main elements of the digital economy, it is

significant to explore e-commerce technologies thoroughly, classify existing systems and improve them by applying innovative technologies to e-commerce platforms.

7. Electronic commerce systems on the Internet and their types

Electronic commerce, as a special form of traditional commerce, includes the process of electronically presenting, selling and purchasing products or services over the Internet with the application of ICT [14]. In addition, e-commerce enables buyers to view a wide range of product catalogs offered by various companies anytime and anywhere simply connecting the Internet and purchasing the desired product through online payment. On the other hand, it allows companies to display their products to more customers at a lower cost, engage in trade on a global scale, and respond more quickly to the modern demands of the market [15]. Therefore, presently, many enterprises use e-commerce systems to display their products on the Internet. E-commerce platforms are a complex system that includes ICT technologies and human resources, such as relevant technical tools, software products, Internet protocols, that provide the automation of numerous operations covering various stages of the online purchase process. There is a necessity for constant improvement of such systems. Thus, the formation and implementation of scientific and technological innovation policy is one of the foremost issues in the expansion of the economies in developed countries.

Digital transformation of the economy and society is one of the urgent issues in recent years [16].

There are two main types of electronic commerce systems in the implementation of the process of protocols products and services through the Internet [17]:

1. Direct or pure e-commerce. It is a form of e-commerce where both the payment and the delivery of the product or service are performed completely online by application of electronic tools. For example, the process of downloading various movies, e-books, tickets, and software files to the customer's computer with the electronic payment.

2. Indirect or partial e-commerce. Although a certain part of the process, including the payment, is carried out electronically, the product is delivered in a traditional way. For example, a business that sells books through its website accepts payment electronically, but the delivery of product from the

store or warehouse to the customer is not automated, but through human labor.

Subsequently, the electronic trading platform is a set of technical tools, software products and methods for the implementation of technological processes in commercial operations automatically. They are classified differently based on different characteristics:

- 1) According to the subjects and objects of the system and business model:

There are quite different types of e-commerce, such as B2B, B2C, C2C, C2B, G2G, G2B, G2C, B2G, etc., according to the subjects and objects of the system. Among them, the followings are the most widespread [18]:

- *B2B (Business-to-Business)* involves interactions between various businesses. In such systems, one company's products are sold to another company. www.alibaba.com, a very popular e-commerce platform in the world, operates with a B2B business model.

- *B2C (Business-to-Consumer)* differs from B2B in that the person who buys and pays for the products offered by the company through the Internet is not another company, but an individual. Such systems are the most widespread in the world in the field of electronic commerce. For example www.amazon.com.

- *C2C (Consumer-to-Consumer)* is partially similar to the B2C model in terms of its working principle. In such systems, enterprises create a platform whereby consumers (individuals) are able to purchase and sell their products and services. They gain various incomes from the operations performed here. www.ebay.com platform is an example of systems organized with this principle.

- 2) According to the business model:

- *Horizontal e-commerce*. This is the business model of e-commerce platforms that include a large number of different products and product groups. The management, logistics and marketing of a large number of product groups require a large team and strong investment. In this regard, in a situation where competition is increasing and investments in this field are becoming more difficult, it is not recommended to start e-commerce activities with this model for new companies that do not have a strong investment structure [19].

- *Vertical e-commerce*. It is a business model that focuses on selling a specific product or group of

products. This model, which is more recent than the horizontal e-commerce model, emerged due to the assessment of new needs in the market and is still developing.

- *Marketplace*. This model is built as a trading platform with agreements with numerous suppliers and offers extensive search capabilities. Thus, participating stores pay rent for the virtual trading space. The main advantage of this model is that it is not too complicated and expensive.

8. Aspects of electronic commerce regulation

During the last two decades, the economic reforms in Azerbaijan can be divided into three stages: 1) since 2003, economic development increased more than three times due to large oil revenues, state and army building developed, infrastructure improved and the middle class formed. 2) The second phase covering the years 2015-2021 marked by the adoption and implementation of Strategic Roadmaps for the minimization of external factors and the new course of the economy. 3) The beginning of the post-conflict, post-pandemic and post-oil construction works with the restoration of the territorial integrity of Azerbaijan is characterized by the third stage, i.e., the implementation of a new socio-economic development strategy based on the national priorities determined for 2022-2026 and following years [4].

By 2025, the main aim is to ensure an average annual real growth in GDP of more than 3 percent. In 2021, real GDP growth in the country was more than 5 percent, also, growth of non-oil GDP was 7.2 percent. In 2022, economic growth is predicted to be 3.9 percent. Exports in the non-oil sector increased from 170 USD per capita in 2015 to 270 USD in 2021. In other words, it is possible to achieve the goal of 450 USD in 2025. In 2021, the growth prediction in world trade was 10.8 percent, while Azerbaijan's non-oil exports increased by 47.2 percent. The economic reforms carried out in the country as a conceptual and functional model have been welcomed many times on a global scale. The Organization for Economic Cooperation and Development (<https://www.oecd.org/>) has presented the "Economic Reforms Management Model" realized in Azerbaijan as an exemplary innovative experience on a global scale on its official platform [20].

The economy of Azerbaijan will develop in an environment affected by various changes in the coming decades, which considered as a post COVID-

19 period. It is very essential to overcome the challenges that such influences will cause and take advantage of the opportunities they provide. Among them, significant effects of technological innovations and frequently changing oil and gas prices are expected to be more important. In addition, other processes in the global economy, complex external economic environment factors can affect the macroeconomic stability of the country. Such cases require increased attention to the innovative directions of shaping the development potential of e-commerce platforms. The scope of new technologies/services in this area should be significantly expanded. Digitization of many relevant economic and social processes should be achieved. It should enable the improvement of e-commerce platforms, their further development and efficient management in the private sector. Relevant reforms on the regulation of e-commerce platforms should be continued.

The legal basis for the implementation of electronic commerce technologies, platforms and processes is regulated by laws on electronic commerce and electronic signatures. The law "On Electronic Commerce" defines the organization of electronic commerce, the legal basis of its implementation, the rights and duties of its participants, as well as responsibility for violations of the legislation. Here following concepts and categories are used:

1) activities carried out on the purchase and sale of goods, provision of services and performance of works with the application of electronic commerce information systems;

2) participants of the electronic commerce process - legal and natural persons who act as sellers (suppliers), buyers (customers) and intermediaries of electronic document circulation during electronic commerce;

3) seller - electronic commerce participant who sells goods (provides services, performs work);

4) buyer - electronic commerce participant who purchases goods (orders services, works);

5) electronic document circulation intermediary - a physical or legal person who provides electronic document circulation services between the sender and recipient of an electronic document, etc. The e-commerce law applies to electronic commerce in all other areas excluding financial market, insurance and securities market.

The legal regulation of electronic commerce is based on the following principles:

1) legal equality and freedom of will of the participants;

- 2) property independence and inviolability of ownership of the participants;
- 3) freedom of contract;
- 4) unhindered entrepreneurial activity; 5) free and fair competition;
- 6) free movement of goods, services and financial resources; and so on. In general, special consent (license) is not required for the implementation of electronic commerce.

If electronic commerce is conducted in places where special consent is required, the seller must obtain a license for that activity. Contracts in electronic commerce are concluded in the form of an electronic document. The main reason for the distinctive features and advantages of e-commerce is the reduction of transaction costs of production. Here, the goal is not only to lower transaction costs. The main issue is achieving economic efficiency in lowering the cost of the final product, using new technologies in the development of innovative, more effective, consumer value products. Lowering prices, expanding the market, strengthening competition is an important condition.

E-commerce technology enables the emergence of the best ways of conducting business. It has a positive impact in the macroeconomic aspect of the modern international relations system. Electronic commerce processes have a rather large impact on the international division of labor, international movement of capital, labor migration, etc. [21].

It should be noted that the management of economic and business processes on the basis of modern ICT, both conceptually and from the point of view of application, is a global phenomenon, but has

national and regional characteristics. The impact of e-business and e-commerce on the development of the economy already covers all areas of society. With the establishment of the “Digital Trade Hub” portal [22] in Azerbaijan, appropriate measures are being taken in the field of strengthening the country’s position and expanding foreign trade operations. The fact that

Azerbaijan is one of the first countries in cross-border trade in the Asia-Pacific Ocean makes its positive contribution to the further improvement of its position at the global level. It is noted that according to the United Nations (UN) Global Report on Digital and Sustainable Trade Facilitation for 2021 [23], Azerbaijan is the leader in the region of Southern and Eastern Europe, Caucasus and Central Asia, having scored 86% according to certain criteria. Compared to 2019, in 2021, the transparency indicator had the maximum result, increasing to 7%. According to the report’s cross-border paperless trade indicator, Azerbaijan has achieved great progress with a 33% increase. In the report, the current situation of the country is compared with previous years. The report details the reforms that have led to progress.

The average indicators of implementation measures for trade facilitation in the world (transparency, formality, institutional regulation and cooperation, paperless trade, borderless, paperless trade) is expressed in Fig. 1.

The development of the “New Computerized Transit System” involves the European Union, the “European Free Trade Association” (Switzerland, Liechtenstein, Norway and Iceland), Turkey, North Macedonia and Serbia.

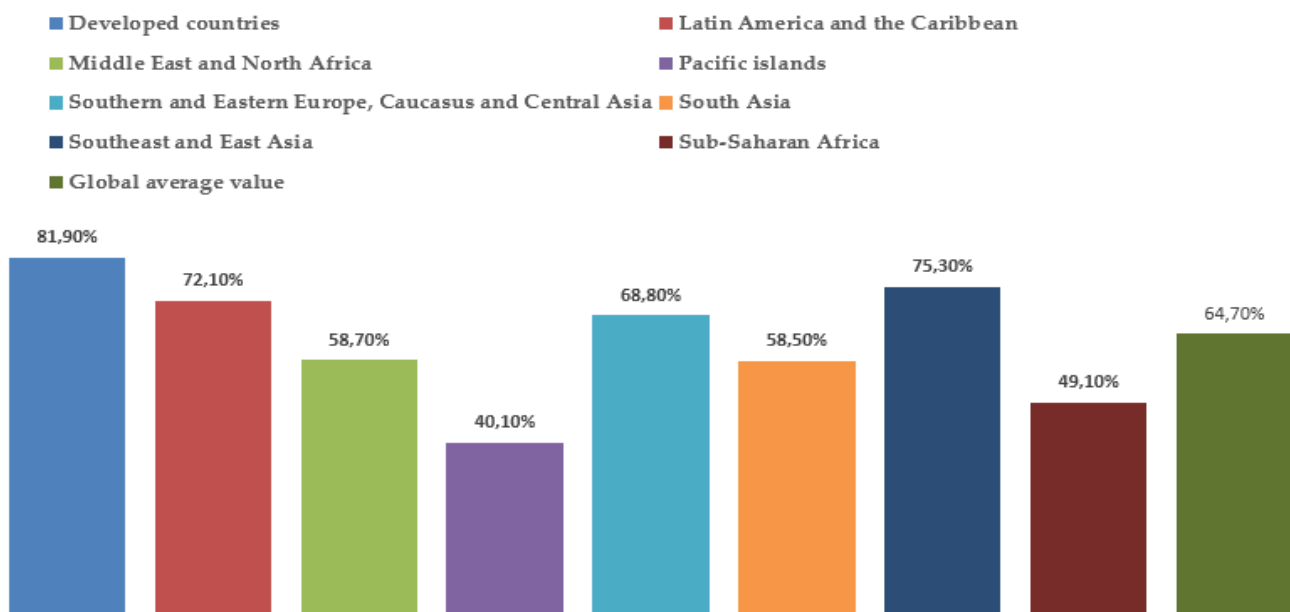


Fig. 1. Average indicators of implementation measures on trade facilitation in the world

This system also provides transit declarations as an electronic declaration and processing system. Other countries interested in participating in that system for transit include Albania, Azerbaijan, Bosnia and Herzegovina, Georgia, Republic of Moldova and Ukraine [23]. For transit shipments between participating states, this system provides a single procedure from the beginning of the shipment to the final destination by electronically coordinating all customs authorities.

9. Comparative assessment of the development level of electronic commerce technologies and systems

The characteristics of each of the B2B e-commerce development stages, as well as the priorities for its monitoring, are displayed in Table 1 [11].

Table 1: Stages of the e-commerce life cycle

Stages	Content	E-commerce development tracking priorities
Development stage	Forming the technological, commercial and social infrastructure necessary for B2B e-commerce	Identifying the driving forces and barriers to B2B e-commerce
Usage intensity stage	Practical application of B2B e-commerce tools	Tracking B2B e-commerce usage intensity
Impact stage	E-commerce goes beyond the substitution effect and forms new added value	Assessing the impact of e-commerce on the economy

One of the main requirements at the development stage of e-commerce is the formation of delivery and logistics infrastructure. A positive relationship is identified between logistics capabilities and firm performance in the e-commerce market. Wang T. and others indicated the high role of the national logistics system in the development of the country's e-commerce [24].

In the B2B e-commerce usage intensity stage, we can follow e-commerce turnover and its growth rate, seller activity, etc. The United Nations Conference on Trade and Development (UNCTAD) recommends that in evaluating the intensity of e-commerce use, the extent to which consumers and sellers are involved in B2B e-commerce should be considered, as well as commercial transactions within B2B e-commerce.

We can talk about the impact stage of B2B e-commerce on the economy when it has an economic and social impact at the micro and macroeconomic level, as well as forms a new added value [25]. High added value is usually achieved through cross-border e-commerce. The results achieved by Amazon, Taobao, and Alibaba are proof of this.

Among the e-commerce evaluation indexes, the B2B e-commerce index of UNCTAD is particularly noteworthy. *It evaluates whether countries are ready to take advantage of e-commerce based on 4 indicators:*

1. The degree of spread of the Internet (width of coverage);
2. Proportion of population using bank cards;
3. Secure servers;
4. Reliability level of postal services.

The main drawback of this assessment is that digital skills, the population's ICT skills, are not included in the indicators. The quality of the digital infrastructure of e-commerce cannot be adequately assessed by a single indicator of the degree of Internet penetration, where it is also necessary to control the quality of communication, the speed of the Internet, and the physical and material availability of Internet services. Experience indicates that the level of security may not always provide an adequate assessment, so the application of this indicator in assessment is highly controversial.

The research is based on the application of methods of constructing integral (composite) indices. The formation of the research methodology is based on the innovations in the OECD (Organization for Economic Cooperation and Development) and the set of technical principles on the formation of integral indicators and construction of integral indices, as well as the author's scientific work in this field [26].

The index formation process consists of 4 stages.

Stage 1. At the initial stage, a comprehensive study of the theoretical aspects of the development of electronic commerce is carried out. The life cycle concept of e-commerce is studied and its development stages are determined. Factors affecting the process are grouped by development and usage stages.

While determining the development factors of e-commerce are mainly referred to the indicators of the readiness index for B2B e-commerce, as well as the ICT readiness index developed by the International Telecommunication Union (ITU). Simultaneously, when selecting factors, the specific characteristics of advanced countries are taken into account to determine their importance.

Stage 2. Development and intensity factors for each of them are selected according to the indicators presented in Table 2. Those indicators can be used as a basis for the calculated scores of the B2B E-Commerce Readiness Index.

Table 2: B2B e-commerce readiness indicators

Readiness index subindex	Indices and indicators
Physical accessibility of the Internet	Share of households with Internet access
	Number of fixed broadband internet subscribers per 100 people
	Number of mobile broadband subscribers per 100 people
	Average download speed of fixed broadband Internet (Mbps)
	Mobile download speed of broadband Internet (Mbit/s)
Material accessibility of the Internet	The share of the average price of a fixed broadband Internet package in GDP per capita, %
	Share of average price of mobile broadband Internet package in GDP per capita, %
Digital skills of the population	Average length of education, in years
	Total admission to secondary specialized educational institutions, %
	General admission rate to higher education institutions, %
Rate of use of bank cards	Number of bank cards per hundred people
Delivery, logistics infrastructure	Postal reliability index

Stage 3. Their normalization is carried out to ensure the comparability of the values of the indicators. The following principles are used when normalizing data:

1. Normalized indicators should indicate the relative performance of countries.
2. Normalized indicators should allow monitoring their dynamics over time.

The normalized value of indicator X is determined based on the following expression (1):

$$N_x = \frac{R_x}{R_{max}} \tag{1}$$

where Rx denotes value of indicator x; Rmax denotes the maximum value for x.

To ensure the proportionality of the data, a linear transformation is performed on a scale from 0 to 100 depending on the data values.

Stage 4. Determination of indicator weights, sub-indices and composite indices. At this stage, the importance of the selected indicators is determined by determining the weighting coefficients. The weighting coefficients are determined by the method of expert evaluations, by the method of assigning points. The weight coefficients of the sub-indices are determined by the formula (2):

$$r_{ij} = \frac{h_{ij}}{\sum_{j=1}^m h_{ij}} \tag{2}$$

where rij is the weight of the j-th indicator determined by the i-th expert; hij — the score given by the i-th expert to the j-th indicator; m is the number of pointers.

Finally, the weighting coefficients of the indicators are determined by the formula (3):

$$w_j = \frac{\sum_{i=1}^n r_{ij}}{\sum_{j=1}^m \sum_{i=1}^n r_{ij}} \tag{3}$$

The values of the weighting coefficients range from 0 to 1 and express the relative importance of each indicator compared to the others. The sum of the weights of all indicators is equal to 1.

For the normal calculation of the readiness index, the initial values obtained statistically or in some form of the indices and indicators displayed in the table are used. Some materials can be obtained by appropriate alternative methods.

10. Discussion

Ensuring the innovative development of the country's economy on an inclusive basis requires wide application of electronic trade/commercial technologies and systems in all fields. Despite the acceptance of the results of such a development trend on a global scale, there is still a need to promote, discuss and use this problem in local conditions, at the national level, and to be trusted and used by large population groups.co

E-commerce systems and their types on the Internet development of recommendations on increasing the effectiveness of e-commerce systems on the Industry 4.0 platform, strengthening the prospective development directions of e-commerce should be the basis of future discussions and researches.

Application and development of e-commerce systems based on the technologies of the Industry 4.0 platform should be included among the main directions. In the development of trade processes, the application of modern ICT, which corresponds to the Industry 4.0 platform, should be stimulated. Payment

and delivery on e-commerce platforms, Internet of Things, artificial intelligence and machine learning, big data analytics as digital technologies and the benefits they can bring should be widely discussed for the improvement of e-commerce systems efficiency.

11. Conclusion

Improving the mechanisms of international, national and regional regulation of e-commerce technologies, developing prospective development directions, justifying the necessity of e-commerce platforms in the Azerbaijani segment of the Internet and developing new business models have become urgent issues.

Online operations have expanded with the application of Industry 4.0 platform technologies in business activities. Due to the pandemic, the demand for e-commerce increased dramatically and became one of the main trends of the modern era. The application of modern e-commerce systems and technologies in the organization of business activity has given positive results. Through ICT, intellectual potential has been strengthened by providing stable and sustainable development in the country. E-business is further progressed and the level of poverty and unemployment is reduced.

By increasing the level of efficient use of e-commerce systems following measures are being implemented. 1) strengthening the formation of a sustainable economic system; 2) acceleration of creation of social and market infrastructure network; 3) development of traditional production areas; 4) increase in export opportunities; 5) formation of new competitive production areas; 6) introduction of stimulating mechanisms; 7) development of investment cooperation between the public and private sectors.

Mechanisms for solving the problem of creating the necessary infrastructure for e-commerce and integration into global digital ecosystems was proposed. Possibilities of comparative assessment of the level of development of e-commerce technologies and systems by means of expert methods were considered. This approach can be considered a new methodology for comparative evaluation of the level of development of e-commerce technologies and systems in the country. The results of such evaluations provide a basis for comparing them with other regional e-commerce technologies and systems and for making relevant decisions. This approach is based on statistical data reflecting the national, regional and sectoral characteristics of e-commerce platforms in Azerbaijan. The data on the indicators and criteria of the research object management allowed to evaluate the

level of development of new e-commerce technologies and systems. Data grouping, selection, and determination of criteria were carried out based on the use of official statistical indicators, data of relevant central executive structures and scientific research results.

E-commerce platforms and systems are formed due to the digital transformation of real economic sectors and the development of the latest ICT tools. Development of new management mechanisms and concepts at different levels of e-commerce platform formation is also associated with many difficulties. Traditional methods and approaches cannot describe the current conditions. Since the indicators and criteria of the newly created field are formed and relevant information is not collected, problems arise in decision-making. Therefore, new approaches should be developed to clarify the gaps in the current management field as a result of analyses based on fuzzy logic and to solve them.

Studies have shown that the identification of problems on the progress of modern electronic commerce technologies and systems and development of their solutions will have a special role in the improvement of the country's economy.

The integration of e-commerce with the application of innovative technologies such as IoT, Big Data, 3D modeling, artificial intelligence, etc. is one of the important directions in the development of e-commerce. Ensuring the integration of e-commerce systems, establishing an effective mechanism of e-commerce, joint application of relevant innovations with big data and other components of the Industry 4.0 platform are among the means that stimulate economic growth and development. In the post-coronavirus era, the application of the latest ICT technologies will create additional opportunities to further increase the efficiency of e-commerce platforms in the Azerbaijani segment of the Internet in the future.

References

1. Kostin, K.B., Suboch, A.N. (2020). Modern e-commerce business models. *Issues of Innovative Economy*, 10 (3), 1623-1642 (in Russian).
2. Svetlana, Yu. Revinova, Ekaterina, A. Ivashchenko. (2021). E-commerce in China amid Covid-19 pandemic restrictions. *RUDN Journal of Economics*, 29 (4), 699-715 (in Russian).
3. Statista. (2021). E-commerce worldwide. Retrieved September 15, 2021. <https://www.statista.com/topics/871/online-shopping/>
4. Azerbaijan-2026. Strategy of socio-economic development of the Republic of Azerbaijan in 2022 – 2026. Baku, July 22, 2022, 83 p. <https://president.az/az/articles/view/56725> (in Azerbaijani).
5. Yampolskaya, D.O., De Conti B.M., Morozov, S.N. (2021).

- Problems and directions of development of e-commerce in the BRICS countries. Bulletin of the Peoples' Friendship University of Russia. Series: Economics, 29(1), 21-38 (in Russian).
6. Zhiting, Song, Yanming, Sun, Jiafu, Wan, Lingli, Huang, Jianhua Zhu. (2019). Smart e-commerce systems: current status and research challenges. *Electron Markets*, pp.221-238. <https://doi.org/10.1007/s12525-017-0272-3>
 7. Aisha, Mohdhar, Khaled, Shaalan. (2021). The Future of e-commerce systems: 2030 and Beyond. Springer Nature Switzerland AG, pp.311-330.
 8. Aliyev, A.G. (2020). Analysis of the current state of the ICT sector and its prospective development directions for the post-coronavirus pandemic era. *News of ANAS. Economics series*, 68-78 (in Azerbaijani)
 9. Babatunde, Akinbowale, Nathaniel, Abikoye, Oluwakemi Christiana, Falaju, Emmanuel, Olanrewaju. (2019). Usability Evaluaton of Users' Experience On Some Existing E-Commerce Platforms. *Library Philosophy and Practice (e-journal)*. 2485. Libraries at University Nebraska-Lincoln. <https://digitalcommons.unl.edu/libphilprac/2485>
 10. Aliyev, A.G., Abbasova, V.A., Abedini, M.A. (2010). Issues of regulating the implementation of electronic commerce technologies. *Information Society Problems*, 1, 41-48 (in Azerbaijani).
 11. Zhanbozova, A. B., Turgel, I. D., Azatbek, T. A. (2021). Integral index for assessing the development of B2B e-commerce in the EAEU countries. *Economics of the region*, 17(4), 1332-1345. <https://doi.org/10.17059/ekon.reg.2021-4-20> (in Russian).
 12. Xiaodong, Tang, Gangyi, Wang. (2020). Design and analysis of e-commerce and modern logistics for regional economic integration in wireless network. *Tang and Wang EURASIP Journal on Wireless Communications and Networking*. 208. <https://doi.org/10.1186/s13638-020-01816-z>
 13. Liu, Weiyue. (2017). Promoting role of Electronic Commerce on Economic Growth. *Archives of Business Research*, 5(4), 147-155.
 14. Atakanova, N.A., Sagynbaev, S.E. (2021). World turnover of e-commerce. *Science and Innovative Technologies*, 2(19), 43-47 (in Russian).
 15. Golubeva, A.S., Kozyrskaya, I.E. (2020). E-Commerce Market: Global Trends and Russian Realities. *Economics: Yesterday, Today, Tomorrow*, 10(6), 157-168 (in Russian)
 16. Decree of the President of the Republic of Azerbaijan on improving management in the field of digital transformation (2021), Baku. <https://president.az/articles/51299> (in Azerbaijani).
 17. Musayev, A.F., Garayev, I.A. (2013). Electronic commerce and taxation. *Tax Journal of Azerbaijan*, 65-82 (in Azerbaijani).
 18. Akbarov, M.G. (2011). "Electronic commerce / Textbook for high school students". Baku: "Economics University" Publishing House, 212 p. (in Azerbaijani).
 19. Umit, Buyukyldirim. "E-commerce for beginners". Long-Play (in Azerbaijani).
 20. Gasimli, V. On economic reforms. <https://azertag.az/xeber/V.Qasimli> (2022) (in Azerbaijani)
 21. Law of the Republic of Azerbaijan on electronic commerce (2005), Baku. <https://e-ganun.az/framework/10406> (in Azerbaijani).
 22. Decree of the President of the Republic of Azerbaijan on the Digital Trade Hub (2017), Baku. <https://president.az/az/articles/view/22892> (in Azerbaijani).
 23. Digital and Sustainable Trade Facilitation: Global Report (2021). United Nations. 73 p. <https://www.unescap.org/kp/2022/untf-survey-2021-global>
 24. Wang, T., Kang, J. W. & Valentine, V. F. (2020). A holistic analysis of national e-commerce and logistics development. *Maritime Economics & Logistics*, 22, 500-513. DOI: 10.1057/s41278-020-00151-w.
 25. Cardona, M., Duch-Brown, N., Francois, J., Martens, B. & Yang, F. (2016). The macroeconomic impact of e-commerce in the EU digital single market. Institute for Prospective Technological Studies Digital Economy. <https://ec.europa.eu/jrc/sites/jrcsh/files/JRC98272.pdf>
 26. Ahluwalia, P. & Merhi, M. I. (2020). Understanding Country Level Adoption of E-Commerce: A Theoretical Model Including Technological, Institutional, and Cultural Factors. *JGIM*, 28(1), 1-22. DOI: 10.4018/JGIM.2020010101.