

Elements of the digital economy in the world and Ukraine

Galyna Zhavoronkova, Vladimir Zhavoronkov, Natalia Kovalenko,
National Aviation University,
Kyiv, Ukraine
zhavor@ukr.net

Annotation. *The theory of information (post-industrial) society, revealing the main provisions of economy and society. The process of globalization is accompanied by the avalanche spreading information flows the phenomenon of information picture of the world as a scientific and methodological means of study of information reality reflects an important aspect of social life. Internet is a universal communication space, in which very different interests and values coexist. The purpose is a scientific and practical study of the problem of forming the digital economy. The structure of the section includes consideration of the following issues: formation of a virtual segment of the information market; the development of information and communication technologies; introduction of elements of the digital economy in Ukraine and the world; innovative business development and the startup ecosystem. During the study, various scientific methods were used, in particular: monographic, comparative, analytical, graphical, forecasting.*

KEYWORDS: INFORMATION, COMMUNICATION, INNOVATIVE BUSINESS, GLOBALIZATION, INFORMATION MARKET, DIGITAL ECONOMY.

1. Introduction

Innovative business is based on the constancy of the external environment, understanding it as a necessary condition for a stable organization and effective functioning of the economic system as a whole. It should be noted that most countries face the problem of lack of investment resources necessary for the development of innovative business, there is a structural imbalance between supply and demand in the field of financing innovative projects [1].

In international practice there is no harmonized definition of the digital economy. In most foreign sources, when describing the digital economy, the emphasis is on technology and related changes in the ways in which economic agents interact. At the same time, specific types of technologies or certain forms of changes in economic processes can be mentioned. Often the definition of the digital economy is replaced by a list of areas of its impact on the economy and social sphere.

When disclosing the meaning of the "digital economy", it should be noted that today there are different interpretations of this term, which depend on the point of view of a particular scientist and method of research.

The digital economy is a form of economic activity that arises from many examples of networking between people, businesses, devices, data, and processes. The basis of the digital economy is the growing interconnectedness of people, organizations and machines, formed by the Internet, mobile technology and the Internet of Things.

The key goal of digitalization of Ukraine is to achieve digital transformation of existing and creation of new branches of economy, as well as transformation of spheres of life of Ukraine into new, more efficient and modern ones. Such growth is only possible when digitalization-related ideas, actions, initiatives and programs are integrated into national, regional, sectoral and development strategies.

Increasing globalization and digitalization, the widespread use of big data analysis technologies are radically changing the organization of airspace management and the air transport market. The world's leading airlines are upgrading location systems to identify the location of aircraft, passengers and luggage as accurately as possible, speed up ground pre-flight preparations, automate and improve service [2].

2. The share of the digital economy in the world

The digital economy is much more mature in developed countries: among countries, the digital economy ranges from 10 to 35% of GDP in developed countries, and from 2 to 19% of GDP in developing countries. This gap reflects the progress made in developed countries in the accumulation of digital assets, the adoption of digital services, and the ability of any company to use digital technologies.

Digital assets of the services sector in the field of ICT, financing and technology production are, respectively, 21.5, 15 and 13.5%. However, even traditional sectors of the economy have accumulated large reserves of digital assets: they account for more than 5% of the sector's gross value added. The digital economy is expected to account for about 24.3% of world GDP by 2025. Digital platforms are playing an increasingly important role in the global economy. In 2017, the total value of platform-based companies with a market capitalization of over \$ 100 million. The United States exceeded an estimated \$ 7 trillion. USA, which is 67% more than in 2015 [3].

Some global digital platforms have gained very strong market positions in certain segments. For example, about 90% of the Internet search engine market is owned by Google. Facebook accounts for two-thirds of the global social media market, and its platform is the most popular among social networks in more than 90% of countries. Almost 40% of the world's online retail sales are made through Amazon's network, and its subsidiary AmazonWebServices accounts for about the same share of the global cloud infrastructure market. In China, the WeChat network has more than a billion active users, and its payment system, along with the Alipay system (owned by Alibaba), covers virtually the entire Chinese cellular payment market. At the same time, Alibaba accounts for an estimated almost 60% of the Chinese e-commerce market.

E-commerce in the modern world covers such operations as: online marketing; Internet contacts with suppliers of goods; after sales service; payment system; logistics and delivery of goods. Currently, the economic effect of the use of e-commerce technologies is positive and has a positive growth dynamics [4]. At the present stage of social development, this sphere of activity is an integral part of human life. E-commerce has a lot of benefits that lead to lower prices for services and goods. In turn, this helps to increase the volume of online commerce. The dynamics of e-commerce development in Eastern Europe is shown in Table 1.

Table 1 Dynamics of indicators of e-commerce development in Europe and Eastern Europe [5]

Indicator	2015	2016	2017	2018	2019
Volume of Internet trade in Eastern Europe, billion dollars	16,64	23,02	29,68	27,17	29,28
The volume of Internet trade in Europe as a whole, billion dollars	372,75	469,81	531,49	505,12	563,48
Volume of Internet trade in Eastern Europe, billion euros	12,95	17,34	22,45	24,49	26,50
The volume of Internet trade in Europe as a whole, billion euros	290,0	353,8	402,0	455,3	509,9
Annual growth index in Euro equivalent,%, Eastern Europe	32,58	33,91	29,45	9,09	8,23
Annual growth index in Euro equivalent,%, Europe	17,69	22,00	13,62	13,26	11,99

The development of e-commerce is based on attracting more and more users to the Internet, so it is not surprising that the share of e-commerce turnover in GDP and the share of e-commerce in retail trade correlates with the Internet penetration rate, is the population aged 14 to 74 that are regular Internet users. Thus, in the leading countries of Western Europe, this figure is close to 100%, while in Ukraine it is only about 63%.

3. Development of e-commerce in Ukraine

Digitalization has been identified as one of the main prospects for the development of the digital competitiveness rating of the IRF in Ukrainian economy. The share of the digital economy in Ukraine is only 3% (only \$ 2.6 billion), which is close to the characteristics of developing countries. In 2019 FY, Ukraine ranked 60th out of 63 countries in Europe, the Middle East and Africa.

The overall growth of e-commerce, in which Ukraine was the leader among European countries in 2015-2016, and the increase in the share of Internet shoppers allowed it to rise during 2014 - 2016 in the overall ranking of e-commerce UNISTAD by 4 positions, with 58th to 54th place [6]. It should be noted that this trend can be extrapolated only for the next 1-2 years, because, first, the growth rate of Internet penetration decreases as its absolute value increases; secondly, it is the countries with the lowest Internet penetration that show the best dynamics of Internet trade growth, with a correlation coefficient of -0.6.

The dynamics of indicators of e-commerce development in Ukraine, calculated by the authors taking into account the differences in methods of estimating and fluctuations in the hryvnia exchange rate against major world currencies, are given in table 2.

Table 2 Dynamics of e-commerce development indicators of Ukraine

Indicator	2014	2015	2016	2017	2018	2019
Retail trade volume in Ukraine, UAH billion	812	888,7	901,9	1031,7	1159,3	1228,9
Volume of retail trade in Ukraine, billion dollars	99,5	111,0	76,0	47,4	45,4	43,5
Retail trade volume in Ukraine, billion euros	79,1	83,7	57,4	42,6	41,0	42,3
Volume of Internet trade in Ukraine, UAH billion	4,6	7,0	12,3	25,5	38,4	48,0
Volume of Internet trade in Ukraine, billion dollars	0,57	0,88	1,04	1,17	1,50	1,70
Volume of Internet trade in Ukraine, billion euros	0,45	0,66	0,78	1,06	1,35	1,65
Annual growth index of retail trade in hryvnia equivalent,%	20,3	9,4	1,5	14,4	12,4	6,0
Annual growth index of retail trade in dollar equivalent,%	17,5	11,5	-31,5	-37,6	-4,3	-4,1
Annual growth index of retail trade in euro equivalent,%	29,9	5,9	-31,5	-25,8	-3,8	3,2
Annual growth index of Internet trade in hryvnia equivalent,%	46,8	53,3	75,2	107,6	50,4	25,0
Annual growth index of Internet commerce in dollar equivalent,%	45,9	52,9	18,3	13,2	28,0	13,1
Annual growth index of e-commerce in Euro equivalent,%	58,7	48,0	18,8	34,9	27,4	22,3
Internet trade penetration in Ukraine,%	0,6	0,8	1,4	2,5	3,3	3,9

Compiled by the authors from the source (Elektronn urad)

The growth of e-commerce in Ukraine is obviously due to the fact that for more and more of our fellow citizens, the Internet is becoming a natural habitat, within which more and more needs are met. The level of Internet penetration in Europe in 2019 was 75.3%, reaching 90-98% in most EU countries. In Ukraine, this level was 68% and increased by another 4% over the year, reaching, according to various data, from 69% to 80% [8]. At the same time,

the share of Internet users who are Internet buyers has rapidly increased (Table 3), however, only 9% of Internet users have never bought anything on the Internet, while in 2017 there were 18%.

Table 3 Dynamics of Internet penetration and purchasing activity of Ukrainian citizens [7]

Indicator	2015	2016	2017	2018	2019
Number and share of regular Internet users, million people	19,3	17,3	18,0	18,3	19,8
Internet penetration,%	51	54	58	59	68
Number of Internet buyers, million people	2,1	3,0	3,5	3,7	8,6
Average cost of online shopping, euros / person	210	220	224	286	285,5
Proportion of Internet users who shop online	10,9%	17,3%	19,4%	20,0%	44,0%

According to numerous opinion polls, the main motivator for buying in foreign online stores is the lower price, especially in the segment of electronics and home appliances, and in the segment of clothing, footwear, children's and sporting goods - even higher quality and more choice, the ability to control delivery.

In general, e-sellers in Ukraine use a variety of business models. Typical models for categories B2B, B2C, C2C are given in table 4.

Table 4 Business models of successful e-traders of Ukraine

Business models name	Interpretation	Income model	Foreign companies	Domestic companies
Electronic show-window (manufacturer's website)	Sale of goods of own production through own site	Manufacturer	Sony.com; Dell.com; Amazon.com (partly)	"Galant" factory online store: www.magazineperchatok.com.ua
Electronic bulletin board	A site where individuals or companies place advertising offers for goods or services	Mediation or advertising	Apartments; Monster; Craigslist; AllBiz	OLX (hybrid); Bezplatka; Kidstaff; Klubok; Klumba (today kloomba.com); Ria.com; Shafa.ua (hybrid)
E-shop / e-supermarket	Sale via the Internet of goods purchased from various manufacturers, on their own behalf at their own prices, mainly from their own inventories	Commercial Advertising	LandsEnd.com; Amazon.com (partly); asda.com; tesco.com	Allo; Foxtrot; Comfy; METRO Ukraine (www.metro.ua); Rozetka.ua (hybrid); Modnakasta; Leboutique; Eldorado; LaModa
Price aggregator	Search and compare offers from different companies with the establishment of appropriate links with the subsequent implementation of transactions directly between buyers and sellers	Subscriptions (from vendors); Referral payments; Mediation	Uswitch.com; GoCompare.com; Money Supermarket.com; CompareTheMarket.com	Hotline; Price; EK; MagaZilla.com.ua
Electronic auction	Internet platform for contacting sellers and buyers and transactions; the buyer and seller are traded in the transaction process	Intermediary (per transaction) Fee for using the platform	EBay.com; Priceline.com	bitok.ua; setam.net.ua

Most of the e-commerce market in Ukraine is occupied by companies that use 4 business models: e-shop (supermarket), e-bulletin board, e-marketplace and price aggregator, and many

companies use hybrid models such as "bulletin board + price aggregator" (Ria.com), "supermarket + marketplace" (Rozetka.com, Lamoda.ua). Elements of "hybridity" are demonstrated by the new Shafa.ua platform, which combines elements of a bulletin board and a vertical C2C marketplace in the "Women's Clothing and Accessories" category, taking on the functions of vendor verification, moderation and publication of reviews [9]. Among the most popular electronic sellers of Ukraine given - hybrid Internet-supermarkets-marketplaces Rozetka and Lamoda, bulletin boards OLX, Allbiz Ria, specialized online supermarkets electronics Eldorado, Foxtrot, working on the model «clicks and bricks», clean marketplaces Prom.ua, BigLua, Skidka .ua and online store of cosmetics and perfumes makeup.com.ua.

The most visited sites are the OLX hybrid bulletin board, Rozetka online supermarket / layout, Prom.UA marketplace and Alibaba Chinese marketplace (Aliexpress).

As for traffic generation, the most popular is access to sites through search engines (41.4% of traffic in Rozetka, 63.51% - in Prom.UA, 75.44% in Alibaba), direct links to the Internet address (OLX - 41, 46%, Rosette - 25.8%). Other types of traffic are much less efficient. This distribution of traffic correlates with the data of opinion polls on the sources of information used by Ukrainians when making online purchases. At the same time, according to a Google study, at least 76% of Internet users search for information about the product on the Internet and compare data on different sites, regardless of whether the purchase is online or offline, and 70% read tips on choosing another product that confirms the value of working with different sources of visitors to the site and the importance of having on the site of the online merchant customer reviews or recommendation chatbot [10].

4. Elements of e-business in airlines

Airlines around the world are experiencing the worst crisis for the industry in its history. The industry, the effectiveness of which

depends on the accuracy of demand forecasting, is in a state of uncertainty due to the high probability of the third wave of coronavirus and the restoration of slightly relieved constraints. In 2020, the international tour flow decreased by 70%. Unlike companies in many other industries, airlines cannot afford to take a wait-and-see attitude. In order to meet the new requirements, to emerge from the crisis stronger than before, it is necessary to introduce new technologies. Thus, the intensification of business processes in airlines through the introduction of relevant elements of e-business is becoming more important than ever.

Consider a promising direction that determines the future of the air transport industry - the Internet of Things (technological evolution of this e-business is shown in Figure 1) and RFID-marking (technological evolution of this e-business is shown in Figure 2).

The Internet of Things is a set of physical objects connected to the Internet and equipped with sensors - from smartphones, tablets to cars and jet engines, which collect data and exchange it over the network, including local or wireless. Thus, at airports, the technology allows to combine notification and monitoring systems for all objects, to make the stay of passengers more comfortable and safe by transmitting to their portable electronic devices (smartphones, tablets, etc.) data that are learning to navigate. Air hubs can more effectively control the number of passengers at any point of the airport and prevent the accumulation of large queues.

In air transport, RFID (Radio Frequency IDentification) technology plays an important role in reducing costs and increasing efficiency. By recording the necessary information on the RFID-tag resistant to adverse environmental conditions, you can trace the history of the movements of an object. This technology is used to identify employees, cargo handling, maintenance of ground equipment, automation of security systems, tracking the movements of passengers.

Technological evolution of the Internet of Things						
1999	2009	2010	2015	2018	2020	2030
Formulation of the concept of the Internet of Things by Auto-ID research group founder Kevin Ashton for Procter & Gamble	The birth of the Internet of Things (Exceeding the number of connected items over the population of the planet)	Copenhagen Airport for the first time used the collected data to track passenger traffic in Wi-Fi coverage areas	Testing of beacons that provide navigation applications in the development of the Internet of Things	Half of the world's airports use IT solutions in check-in and check-in areas, boarding areas and security checkpoints	80% of passengers use services for self-service based on IT technologies (flight check-in, baggage claim, document scanning) effects	Equipping 90% of all aircraft with IoT technology
Effects: Simplification of procedures Passenger control Optimization of passenger routes at airports Reduction of operating costs of airports Improving security at airports through tracking systems for mobile equipment		Market assessment: By the end of 2020, 16% of airlines will launch major Internet of Things programs, and another 41% will conduct research and development in this area. The Internet of Things market is expected to grow from \$ 170 billion in 2017 to \$ 561 billion by 2022 with an overall average annual growth rate of 27%.		Drivers: Development of cloud computing, technology between machine interaction and large data analysis Miniaturization of wireless sensors Distribution of high-performance networks Transition to IPv6 (Internet Protocol version 6) Barriers: Unresolved issues with sensor power supply Lack of uniform data integration standards Increasing the load on network resources due to the growing number of Internet of Things The difficulty in maintaining the security of the Internet of Things ecosystem		
Internet of Things market volume by major sectors of the world economy (forecast for 2025, billion euros): Transportation - 220, Industry - 120, Utilities - 33, Health - 26, Trade - 20, Security - 20, Smart City - 15, IT - 12						

Fig. 1. Technological evolution of e-business - Internet of Things, IoT

The amount of memory of an RFID tag (radio tag) is hundreds of times greater than the amount of barcode or QR code memory. Label data is recorded or automatically read by a radio signal, which allows the identification of people or objects at a considerable distance. The technology is most widespread in the field of luggage logistics: the introduction of radio tags controlling the movement of luggage has significantly reduced the risk of its delay or loss. Tracking the movement of passengers at the airport between check-in and departure can prevent traffic jams at checkpoints, generally increase security, and in emergencies - quickly determine the location of people to evacuate from the airport, search for lost children and notify passengers late for boarding.

IoT has already been used in airlines in many countries around the world. EasyJet uses the latest technology. Microphones are built into the staff's overalls for direct communication with passengers, pilots and crew members. The company used drones to inspect its fleet.

Helsinki-Vantaa Airport improves the quality of service with the help of Wi-Fi and ibeacons technologies. The operator of Finavia Airport together with Walkbase has installed dozens of sensors in the terminals to monitor the movement of passengers. In this way, companies prevent queues, send push notifications to passengers about advantageous offers.

Technological evolution of RFID tags							
1948	1970	1980-1990	2006-2008	2013	2017	2018	2020
Prototype of RFID-technology (Scientific work "Communications by reflected signal")	Application of RFID-systems in logistics, identification systems, on transport	Development of passive labels and expansion of their areas	Introduction of RFID-technologies in the aviation industry	Airbus has obliged suppliers of aircraft parts to mark them with RFID tags	Mandatory RFID-marking of aircraft parts	Introduction of RFID-marking of luggage (Resolution 753 MAPS)	Expanding the use of labels
Effects: Ability to read information outside the line of sight of the label, at a great distance and during the movement of the object Ability to simultaneously identify several hundred objects with RFID tags Reliable protection of parts from counterfeiting and ensuring "transparency" of supply chains of industrial products Improving maintenance and repair services Reducing the amount of lost luggage Optimization of production processes and increase of safety at production			Market assessment: Over \$ 3 billion will be saved by the airline industry in the next 7 years through the use of RFID tags		Drivers: Development of robotic and digital production systems Increasing the number of new routes and frequency of flights Barriers: Possibility of unauthorized reading of RFID-tags Lack of regulatory and organizational and technological documentation for the operation of new technology		
World market of RFID-technologies (2016-2022, billion dollars): Hardware - 13 (2016), 28 (2022) Software - 4 (2016), 10 (2022)							

Fig. 2. Development of the e-business element - RFID-tags

Virgin Atlantic has connected Boeing 787 aircraft to a wireless network to receive real-time data from IoT devices on the operation of aircraft components. Now Boeing planes have wireless connections to almost everything - from engines, flaps to the chassis.

London City Airport has developed an interconnected sensor network and data hub to track passenger traffic in order to provide customers with location-based services.

Lufthansa has launched a network of radio frequency tags and a mobile application that can track luggage from the terminal to the flight. Travelers can check information via Bluetooth.

Shenzhen Airport uses robots to respond to emergencies. The robot can autonomously patrol the terminal and conduct intelligent monitoring, answer passengers' questions about flight information.

The Market Research Report estimates the global market for airport smart devices by 2026 at \$ 31.10 billion. The average annual market growth rate will be 11.2%. Analysts attribute the growth of the market for smart devices to a number of reasons. The penetration of smartphones, which track various large amounts of data, the desire to personalize services, improve user interaction, modernize airports, as well as initiatives of governments in different countries to use energy, reduce emissions.

Analyzing the markets, we see that IoT opportunities have great prospects. Internet of Things technologies are integrating into an increasing number of industries. Now there is the concept of industrial IoT, its specificity in technology for the telecom industry, logistics or retail. In aviation, IoT technology is already helping to make flights more comfortable, and the service of both passengers and aircraft - more efficient.

The Internet of Things is being introduced to track cargo, organize navigation at airports, control passenger traffic, taking into account new requirements; systems are introduced that allow passengers to undergo self-service procedures. Transparency Market Research predicts that the segment of security systems will be a leader in the development of airport infrastructure.

The development of digital technologies and innovations has contributed to the emergence of a new segment of the financial market - the market of virtual currencies. Sometimes virtual currencies are identified with digital currencies. The main differences between virtual currencies and electronic money are their issuance, regulation and use. These aspects are studied in more detail in scientific work. An example of virtual currencies are cryptocurrencies. Despite the changing trends of cryptocurrency market capitalization and insignificant volumes compared to the capitalization of traditional financial markets, we should not ignore the emergence of a new segment of the financial market, which can develop rapidly.

5. Conclusions

Internet is a universal communication space, in which very different interests and values coexist. Of course, the spread of information and communication technologies is uneven across countries and sectors of society. It's should be mentioned prospect of transition to the information age depends primarily on the availability of education for all segments of the population, as well as the opportunities of operative learning and processing information.

Each of the directions of globalization in its own way affects the essence of international business and its form, liberalizes the movement of goods and services, capital, labor, facilitates the entry of national companies into international markets, promotes rapid dissemination of knowledge, reduces transport, telecommunications costs, significantly reduces costs. processing, storage, maintenance and use of information, equalization of business conditions for large and small companies.

The study of trends in the development of the Internet and the possibilities of its application in economic activity also revealed that along with the structural and quantitative changes in this sphere occur the social and economic impacts of telecommunications

development, as a significant gap in this area can lead to the outflow of the most qualified personnel to other countries [11]. However, all the advantages of the virtual market can and should be used by firms to improve their business relationships.

Digitalization has been identified as one of the main prospects for the development of the Ukrainian economy. The growth of e-commerce in Ukraine is obviously, due to the fact that for more and more of our fellow citizens, the Internet is becoming a natural habitat, within which more and more needs are met.

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