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Digitalization of Ukraine's Economy: Current State and Creating Competitive Advantages

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ABSTRACT
Recently, the transition to a knowledge-based economy and information society has become increasingly dynamic, and the countries that have succeeded in mastering digitalization demonstrate economic success in the international arena and attracting attention as countries capable of meeting modern globalization challenges. This updates the study of digitalization in order to take advantage of it, minimize its risks and improve the country's position in the global environment. The article analyzes the development trends and volume of the digital economy in Ukraine, identifies obstacles to its development and substantiates the directions of creating competitive advantages of the country in modern conditions. The need for the introduction of innovative technologies has been identified, which becomes crucial for the continued existence of the country's economy, which emphasizes the need to change the principles of functioning of the economic system. The conclusion on expediency of increase of personnel, intellectual and technological advantages, formation of a flexible regulatory base for introduction of digital technologies in all spheres of life is made.
Keywords: *Digital economy, innovation, IT industry, competitive advantages.*

1. INTRODUCTION

Rapidly spreading digital technologies are transforming many economic and social activities. However, the widening digital divide poses the danger of greater lag in developing countries, and especially in the least developed ones. Economic growth is inextricably linked to the new technologies' implementation, stimulating not only investment in digital processes, but also opening innovative opportunities for entrepreneurs to do business efficiently, increase revenue and reduce costs.

Our article focuses on the problems of Ukraine's digital economy in order to invent national competitive advantages that would improve the country's position in the global economic environment.

2. LITERATURE REVIEW

Various scientists nowadays study the problems of digital economy development and the formation of an innovative society, among which Amuso et al. [1], who analyzed the opportunities and challenges of digital economy; V. Bilozubenko et al. [2], who compared the digital economy development parameters in the EU countries; Semyachkov [3], who studied the digital economy in management of modern socio-economic relations; Nosova et al. [4], who studied the digital economy in Russia's modern economy. As to Ukraine, Dannikov and Sichkarenko [5] formed the conceptual principles of digitalization of Ukraine's economy; Zhekalo [6], Podolchak et al. [7] analyzed the problems and prospects of development of digital economy in Ukraine. Currently, the categorical apparatus and methodological approaches that allow determining the basic components of the modern model of socio-economic development have been scientifically substantiated; in turn, they have provided analysis of ways to implement the tools of the digital economy in modern life.

Despite the significant contribution of scientists to the study of the digital economy and the formation of innovative societies, the process of functioning of the digital economy and its impact on the institutional status of the country is not completely understood.

3. DIGITAL SPACE OF UKRAINE

The post-industrial economy has played an important role in defining telecommunications rules, setting technical standards, supporting research and innovation, which in turn has contributed to the emergence of a new sector of the innovation economy - the digital market (Figure 1). Therefore, the modern digital revolution is largely due to market and technological innovations.

The formation of a digital market space helps to increase competitiveness, especially in the industrial sector, through the creation of new products and their service system, which expands the market. In other words, the digital market is, in essence, a modern

mechanism that provides a rapid transition from limited national markets to a single global market.

Each branch of the Ukrainian economy has its own level of digitalization. For example, in the areas of financial services, communication services, logistics, the use of digital technologies is at the level of foreign countries. However, a number of other industries have extremely low levels of digital use (e.g mining), which leads to a significant reduction in productivity in the industry.

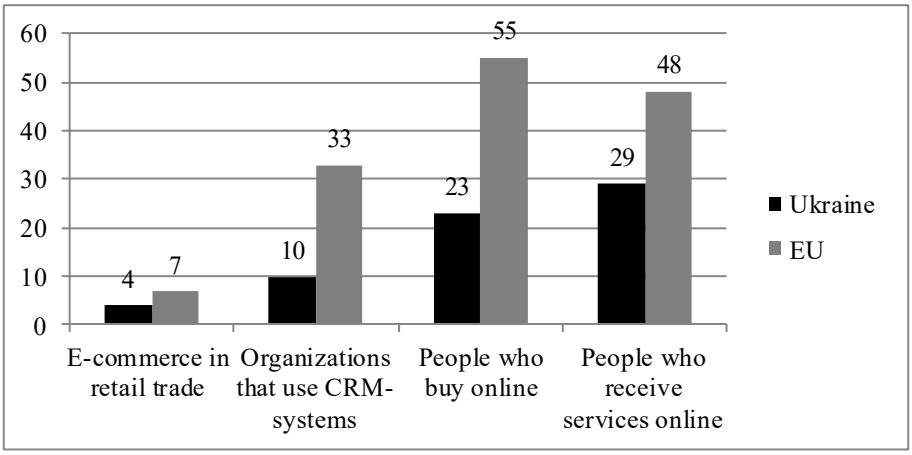

Figure 1 Share of some digital services in Ukraine and the EU, % [5]

The use of digital technologies in the industry of Ukraine is aimed at digitalization of technological processes, as well as ways of organizing production, digitalization of means of labor (equipment, devices, and machines) in order to improve quality characteristics.

Ukrainian industry has been rapidly slowing down in recent years. The country is not only technologically behind, but also in the process of preserving its position. Ukrainian industry practically does not use digital technologies, which does not allow it to make a technological breakthrough, and now has led to a complete loss of previously achieved positions.

Only Ukraine and Georgia among the post-Soviet countries still have a lower GDP level than it was during the existence of the Ukrainian Soviet Socialist Republic in 1990. In addition, Ukraine is the poorest country in Europe, which has now lost ground to many countries (Figure 2). The IMF Resident Representative in Ukraine Ljungman ranks Ukraine among the 18 countries that have reduced their economies between 1990 and 2017. Ukraine ranks fifth from the end and has an "average" result of minus 0,2 % every year [8].

In 2019, among the 100 countries studied at the World Economic Forum, Ukraine ranked 60th in terms of technology and innovation. And according to balanced indicators - the structure of production and driving forces of production - the country got 70th and 59th places, respectively. We can say that Ukraine lags far behind in development, even among neighboring countries (Russia, Belarus, Poland, Romania, Hungary), which got a much higher position in the ranking [9].

Our country inherited from the USSR a well-developed industry in the fields of its own microelectronics, computer equipment, satellite production and aerospace production, which is an industrial base, without the existence of which the Internet, digital technologies and the Fourth Industrial Revolution are impossible. The country had the opportunity not only exist with dignity due to the well-established production process, but also to take one of the leading positions in technological development in the world. Korablin [10] says: "China could only dream of the Ukrainian level of industry, the output of one employee was 6-7 times lower than in Ukraine, and the GDP was exceeding the Ukrainian only 4,4 times solely due to the giant army of labor: 642 million people in China against 25 million in Ukraine". However, with such potential, Ukraine not only failed to maintain it, but got in a position where its economic structure began to look like 100 years ago: grain, ferrous metals, ore, slag and labor.

The deindustrialization of Ukraine's economy is in progress quickly (Figure 3), negative changes have affected almost all branches of industrial production.

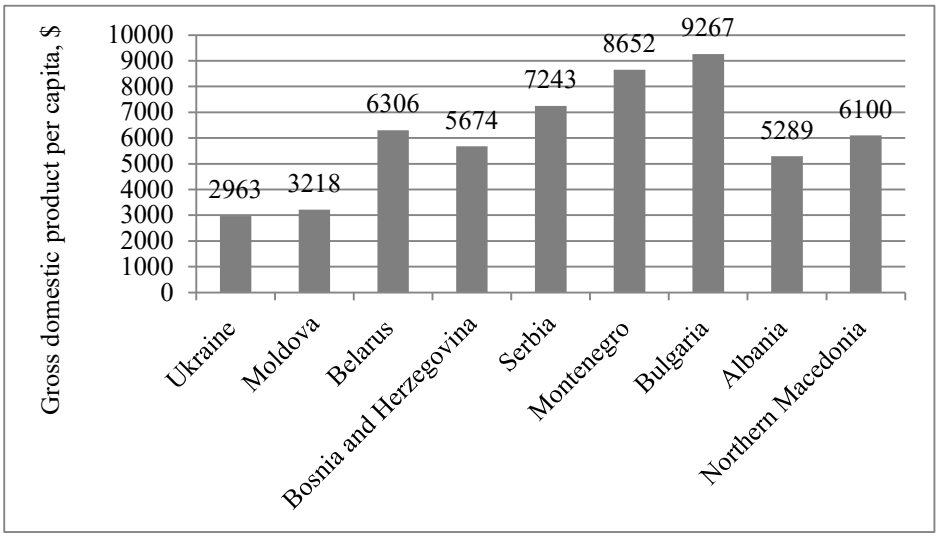

Figure 2 The poorest countries in Europe in 2019 [11]

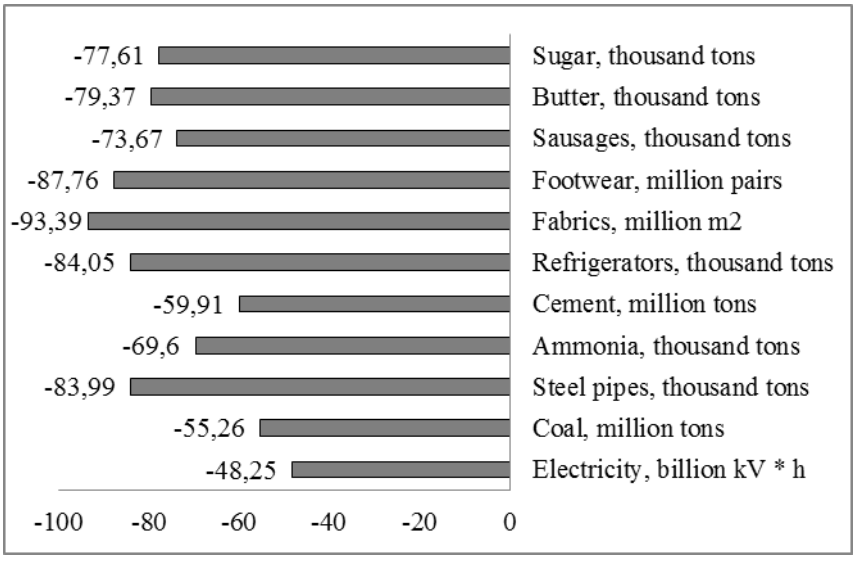

Figure 3 Decline in production of certain types of products in 2019 compared to 1990, % [12]

This led to such negative changes as: the share of manufacturing in Ukraine's GDP fell from 44,6% in 1992 to 11,5% in 2018, while the share of manufacturing in middle-income countries is 19,6%. This indicator is close to the share of agriculture, which was equal to 10,1% in 2018, that export revenue has a direct impact on determining the dynamics of the UAH exchange rate, inflation and the overall level of solvency of the country [12]. However, it should be noted that in the Eurozone there is a decline in industrial production (Figure 4).

According to Eurostat data [13] in December 2019, industrial production in the euro area decreased by 4,1%, while in Ukraine this figure for the same period was -7,5% [14].

Given that Ukraine has a sufficient number of specialists with higher education, as well as doctors of science and registered patent inventions, the development of the country's economy remains at the level of the third technological mode of the last century, while progressive countries plan to move to the sixth technological mode, that characterized by the use and development of nanotechnology, bioengineering and cognitive sciences [12].

The accelerated process of deindustrialization of Ukraine can be confirmed by comparing the economic development of Ukraine and Poland, in particular by presenting the dynamics and structure of exports of countries (Table 1) [15].

This analysis shows that it is currently impossible to implement Industry 4.0 technologies in Ukraine. In addition, the implementation of Industry 3.0 technologies is not yet complete. Industry in the country is automated by an average of 50% [16], so the issue of transition to level 4.0 is very acute. That is, the country should make an urgent digital leap.

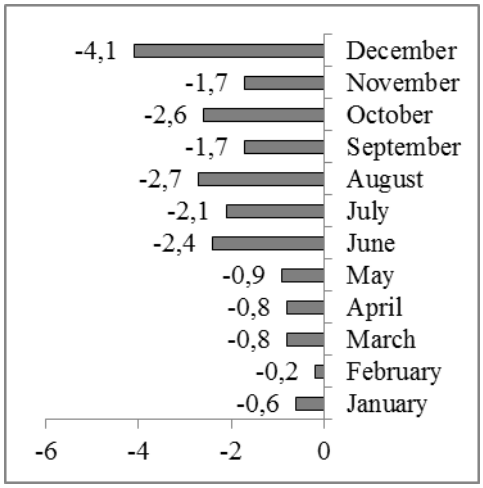

Figure 4 Industrial production in Europe in 2019, % [13]

Depending on the sector of the economy, the level of digitization varies significantly. For example, in the financial services, communication services, logistics national companies use information technology at the level of leading foreign countries. However, the level of digital technologies use in a number of other sectors of the economy is very low (for example, mining), that leads to a much lower level of productivity in these sectors of the economy

According to Girshfeld and Salikhova [17], Ukraine is in a catastrophic situation regarding the country's development prospects through the development of new technologies and products and the development of investment in innovation, which in turn is completely unsatisfactory.

According to the State Statistics Service of Ukraine, Ukrainian enterprises in 2017 spent UAH 10,954 million ($ 400-450 million) [18], while Amazon alone spent $ 16,1 billion on R&D and Volkswagen $ 12,5 billion. According to the "Global Innovation 100" report, in 2017 the largest 1000 companies in the world spent on R&D $ 702 billion. Data from the State Statistics Service show that there is a direct relationship between the size of the enterprise and the level of innovation.

There is a need for a certain number of staff who will be involved in research and development, which will lead to innovation. According to the data, the highest value of technologically active enterprises was 31% of the total, while technologically inactive enterprises – 28,1% [18].

Table 1 Comparison of the dynamics and structure of exports of Ukraine and Poland, $ billion

	Poland	**Growth**	**Ukraine**	**Growth**
Export				
1993	17,5		16	
2018	325	19 times	59	3 times
Export structure				
Export of equipment	51		4,5	
including	Computers – 3,5 Video displays – 3,8 Radio broadcasting equipment – 2,2		Insulated wire – 1,3 Gas turbines - 0,4 Electric heaters – 0,3	
Export of motor transport	31		0,7	
including	Auto parts – 13,2 Cars – 7 Transport and passenger ships – 1,5 Airplanes, helicopters and spare parts for them – 1		Cars – 21,9 Buses – 1,8 million	
Export of metals	21		11,4	
Export of chemical products	15		1,75	
including	Medications – 2,95 Makeup – 1,3 Detergents – 1,1		-	
Export of plant products	5		9,48	

Among the most important partners of innovative enterprises for cooperation suppliers of equipment, materials, components or software (26.1%), consumers (13,7%) should be identified [18].

Enterprises cooperating with scientific organizations (consultants, commercial laboratories, universities and research institutes) occupy only 8.4% of the total number of enterprises in Ukraine [18].

At the end of 2018, the share of industrial enterprises engaged in innovation of the total number of enterprises in Ukrainian industry was 16,4% [18], while in developed countries, innovations are implemented by 50-60% of enterprises, that is in 4-5 times higher [19]. Among the countries with the highest level of innovation implementation, the following ones should be singled out: Belgium - 68%, Portugal - 67%, Finland - 65%, Germany - 64%, Luxembourg - 64%. Lowest level: Romania - 10% and Poland - 22%

Only 3,9% of Ukrainian enterprises in 2018 spent on R&D. At the same time, the share of innovative products in recent years has a stable value at the level of 6-7%. The level of knowledge intensity of GDP in 2019 is less than 1%, which is almost 3 times lower than in 1990. Indicators of innovation of industrial enterprises have also undergone significant changes (Figure 5).

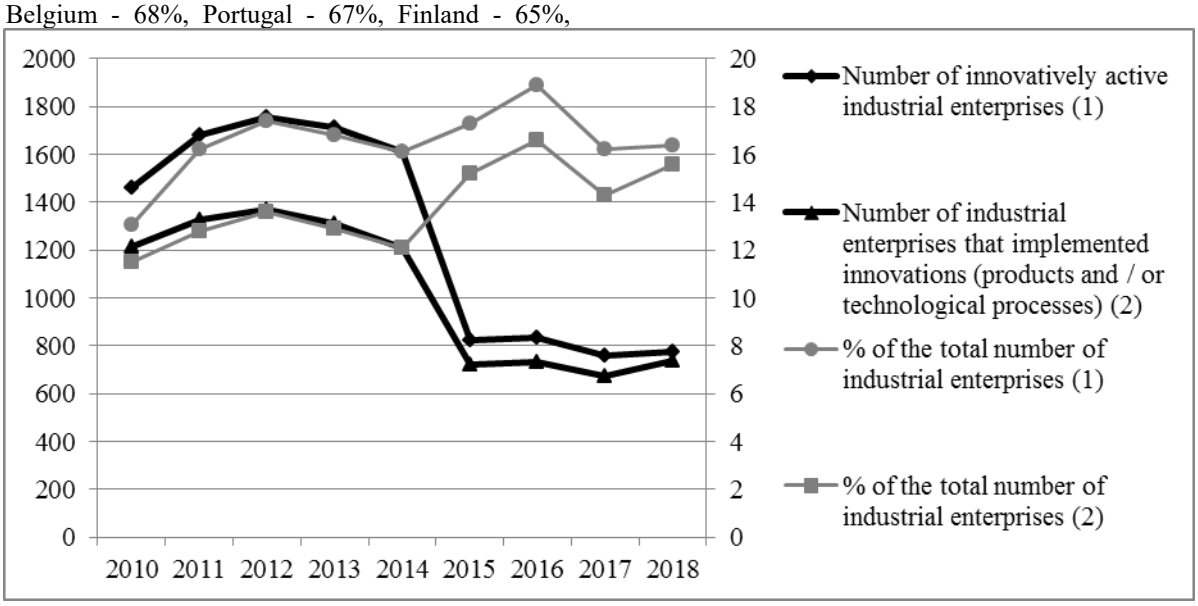

Figure 5 Indicators of innovation activity of industrial enterprises of Ukraine for 2010-2018 [20]

Despite the fact that Ukrainian enterprises are low-innovation, this does not mean that they do not have money for innovation. Ukrainian business maintains entire political parties, sports clubs, and participates in bribery, etc., without investing in the innovative activity of enterprises. That is, the cost of research is not a priority for Ukrainian business; it spends money in other areas. Manufacturers do not pay attention to the technical backwardness of production and do not worry about its innovation, because they are aimed only at making a quick profit instead of long-term investments in innovative development.

The state and business are constantly announcing an active transition to digitalization, but there is very little real action in this direction. Ukraine has a poorly developed digital infrastructure, cyber security, low investment activity and a significant shortage of qualified personnel. The Ministry of Digital Transformation has submitted a proposal, supported by the Government, to establish a quota for the immigration of 5000 foreign specialists who will be employed in Ukrainian IT companies. The quotas are divided as follows: Kyiv - 2500 people, Kharkiv - 700 people, Dnipro - 600 people, Odessa - 600 people. and Lviv - 600 people [21].

Despite the fact that every year Ukrainian higher education institutions graduate about 15-17 thousand specialists in the field of IT, while about 40 thousand relevant vacancies are opening, the country is in dire need of specialists in this field [21]. In addition, some of them still either go abroad or work as freelancers. Therefore, the need of the Ukrainian market for highly qualified specialists in the field of IT can be partially covered by these quotas.

According to the Office of the President of Ukraine, in 2018 the share of the IT industry amounted to 4% of GDP [22]. At the same time, the countries of Eastern Europe and the Commonwealth of Independent States are many times ahead of Ukraine in the development of the IT industry. International Data Corporation provides data according to which the level of IT spending per capita in Ukraine is $ 53, while the nearest neighbors are: Belarus - $ 90, Kazakhstan - $ 108, Poland - $ 278, Czech Republic - $ 522 [23].

PwC provides the following data: from 2011 to 2015, the Ukrainian IT market grew 2,5 times, it is projected that in 2020 it will amount to $ 5,7 billion (Figure 6).

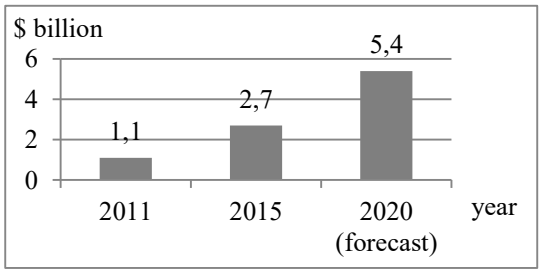

Figure 6 Growth of the IT market of Ukraine, $ billion [24].

In the Ukrainian IT sphere, the weakest point is the lack of large IT companies of Ukrainian origin, which is one of the main obstacles to the digitalization of the country's economy. At the same time, almost all of these companies operate in the domestic market of Ukraine.

Investments in the IT industry are insignificant: according to Voxukraine, in 2013-2016, IT companies invested $ 264 million in fixed assets and intangible assets [25], but this is less than 0,5% of total capital investment in the economy. Experts of this company claim that the amount of investment per one worker of the processing industry is 2,5 times higher than in the field of IT (Figure 7).

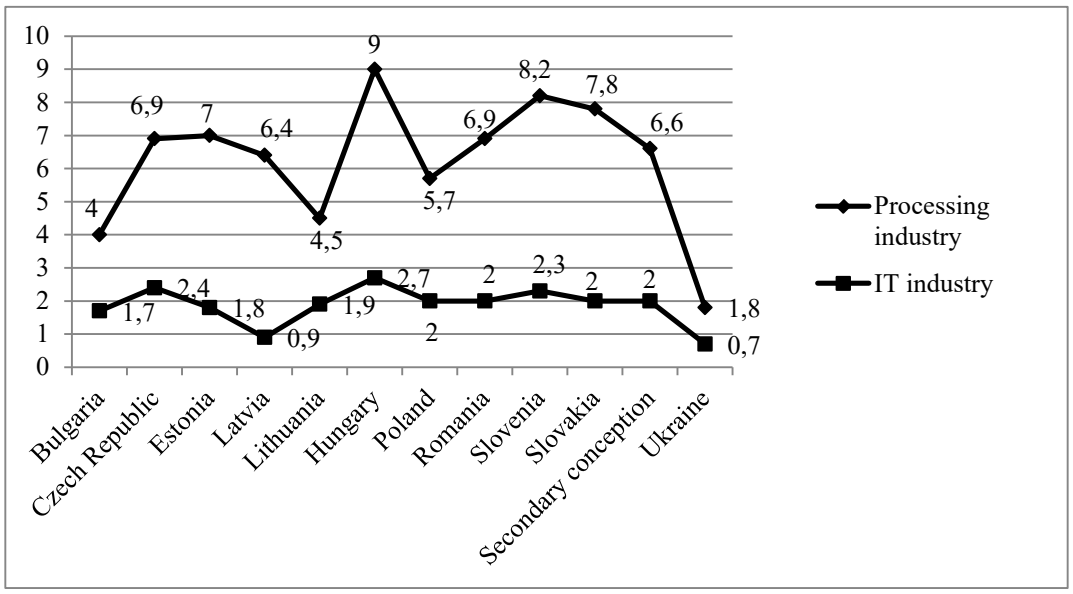

Figure 7 Investment per employee in manufacturing and IT, $ per year [26]

However, in the field of IT it is much easier to start a business. While there are barriers to starting business in another area, such as high-interest loans and the difficulty of obtaining such loans in general, the lack of space and a team of employees, IT business can be started by having only a computer with Internet access and space in co-working. That is, to start a small business in IT requires almost no investment.

In recent years, businesses are increasingly in need of IT. At the same time, the development of effective information systems is very complex, which leads to a constant decline in the provision of IT services over the past 10 years. Companies have small IT budget and sometimes insufficient competence in providing IT services for business at the required level. Since 2011, the number of provided IT services has been constantly increasing: by 27% in 2012, and by 30% in 2013, while in 2015 it was only 7% [27].

PwC experts predict that according to the optimistic forecast by 2025 the IT sector of the economy can grow to $ 8,4 billion and the number of jobs will increase almost 2,5 times - to more than 240 thousand people. But according to the pessimistic scenario, until 2025 the IT sector of the economy can grow to $ 4,1 billion and the number of jobs will be 165 thousand people. However, PwC experts say that the market for IT services in Ukraine will continue to grow, but its growth will depend on solving the existing systemic problems of the industry by strengthening investor protection, establishing clear tax rules and enacting effective laws on compliance copyright, etc. [28].

There is currently a lack of reliable statistics to assess the current situation with countries' digital information. With the help of preliminary analysis, we can say that Ukraine has significant difficulties and problems in the economy, while the prospects and benefits of digital reproduction of countries are clearly visible. Digital transformations are available to all industries of the country. Among the industries that make the most use of digital technologies are services, communications, software development, telecommunications, trade, the financial sector of the economy, media business, housing, construction and medicine. And among the industries with the lowest level of digitalization the manufacturing sector should be highlighted, in which the companies are highly inert and often use outdated technologies not only in production but also in management.

Given that innovation activity and the need for digitalization create institutional phenomena, the existence of which is due to the social system, the decision on innovative development of the enterprise is made by its owner. Most often it is individuals. Therefore, the country's economy can become an innovative, depends on the decisions of the owner of the assets of the enterprise. All owners aspire to get profits, so decisions about the feasibility of investing in innovation are made only when a clear prospect gets a quick profit. In Ukraine, the costs of innovation for sources of funding are distributed as follows (Table 2), so innovations are implemented by manufacturers at their own expense.

Table 2 Expenditure to innovation in Ukraine by sources of funding, % [29]

Source of funding	year		
	2015	2017	2018
Own funds	97,2	84,5	88,2
National budget	0,4	2,5	5,2
Local budgets	0,3	1,0	0,1
Resident investors' funds	0,5	3,0	0,9
Funds of non-resident investors	0,4	1,2	0,9
Credit funds	0,8	6,5	3,9
Other sources	0,4	1,3	0,8

In Ukraine, the dominant ideological principle is profit, so most business owners seek to maximize personal income, neglecting such important components of development as increasing productivity, profitability and environmental status of production, the introduction of innovations and new technologies in production, product improvement. In such conditions, innovation is more of a threat to manufacturers than a prospect of development, because it is often associated with significant costs and risks, which does not increase the personal income of the owner. And for the most part, Ukrainian manufacturers are not at all interested in growing social welfare.

4. CREATING COMPETITIVE ADVANTAGES

The economy on the way to creating competitive advantages distinguishes two main areas that are mutually exclusive and incompatible with each other: 1) innovation (technological), 2) maximization of economic profit (rent). Characteristics of the main ways to create competitive advantages in Ukraine can be presented as follows (Table 3).

To earn income in Ukraine it is not enough to be just an owner. One needs to have access to power structures, or get power. Moreover, it is impossible not to pay attention to the following paradox: in Ukraine, 40% of enterprises are unprofitable, but continue to operate [30]. This paradox has a simple explanation: the owner is trying to constantly increase their own profits, completely ignoring the growth of enterprise profits.

A Ukrainian oligarch is a person who is not just a businessman, but who conducts business through access to government by using it to redistribute existing resources for his own benefit, and assets - from the sphere of production to the sphere of own elite consumption (for example, sale of metal factories for the purpose of purchasing yachts, estates or cars for own use). That is, the Ukrainian oligarchy is practically not engaged in creating something new, but only destroys the national resource at an accelerated pace.

Doing big business in Ukraine is based on two components: minimizing tax liabilities when importing VAT and maximizing the tax credit (refund) of VAT when exporting. These two areas represent all the competitive advantages. Owners of large enterprises derive profits from the controlled enterprise, which allows to minimize both production costs and mandatory costs of state profits to the state, as well as to minimize the payments intended for minority shareholders.

The owners sell the company's products to intermediary firms, providing discounted (insider) prices, subject to resale. This scheme allows to obtain economic profit and withdraw it for own income through the seizure of status rent, but such a scheme has limited development opportunities, which are almost exhausted.

First, by artificially lowering prices for production costs, producers violate the conditions for the reproduction of resources necessary for stable economic activity. Recruitment of low-skilled labor provides an opportunity to reduce wages.

Secondly, reducing the physical costs of production through the introduction of innovative technologies, leads to the ability of domestic enterprises to maintain low prices for resources, but the use of innovative technologies in production allows producing goods of a new level that does not meet the capabilities of the domestic economy. Ultimately, this situation leads to a gradual decline in the quality "niche" of domestic products on the world market, which is a real threat of ousting from the markets at all.

At the same time, the country has inefficient legislative, law enforcement and judicial powers. Inefficient judiciary contributes to the disruption of economic relations, which makes it possible to distribute property and income not by law or by contributions to public welfare, but by the influence of power (monetary, political, criminal), which have the producers themselves, or which they own through ties with government agencies.

Given the current situation in the country's economy, we can say that the introduction of innovative technologies in production, or its improvement through innovation in the country is not the main condition for profit. Manufacturers only maintain the minimum required level of technology and production organization needed to create goods that are still in demand in both global and domestic markets.

Table 3. Characteristics of the main ways to create competitive advantages in Ukraine

Innovative (technological)	Maximization of economic profit (rent)
Formation of economic profit by sources	
Reduction of physical production costs (lower resource costs), which allows to generate economic profit of the enterprise due to lower unit costs compared to the costs of other manufacturers	Decrease in the unit price of production costs and increase in the price of the final product, compared to the market of free competition and enterprises producing products of similar quality, complete or partial waiver of social benefits (reduced tax or other income payments), or individual assignment of income, which leads to the owner receiving rent (income), which is larger than the power of this owner in production
Under what conditions it is possible to get profit	
Making economic profit, taking the position of a monopolist-innovator, through the production of goods that characteristics are different from the products of competitors, which will provide technological and organizational advantages in the market. This approach has a number of risks related to investing in the production of new technologies, and is unlimited in time, because it often brings profits in the long run (a clear example is investing in basic research) The main advantage of investing in new technologies is the guarantee in the long run of economic profits that will not be withdrawn, or appropriated, or sued, and will ensure the preservation of innovative business for the owner.	Negotiation of resource suppliers with the conditions set by the owners, based on access to administrative power, monetary power, access to sources of political and law enforcement power, criminal power, etc. Economic power - the main competitive advantage, the use of which leads to a status rent (economic profit for the company and, as a consequence, the personal income of the owner.
The main basis for profit	
The latest or improved production technologies. Improving the organization of production by introducing the latest knowledge.	Use of power or use of support of authorities. Maintaining the level of technologies for creating products and organizing production at the minimum required level
The time it takes to make a profit	
Long-term perspective, that leads to uncertainty of the time interval and an increase in the probability of risks	The effect that occurs almost immediately. The risks for the company are significantly underestimated, because they will begin to appear only over time
The main competitive advantage	
Increasing incentives to invest in innovative development	Increasing incentives to invest in government and decreasing incentives to invest in innovative development
The costs of the business	
Investing financial resources and attracting skilled workers, which incurs additional costs. Significant risk of financial losses due to the risk structure of both investments in the country and innovations in general	Investing in government is more affordable, cheaper, more profitable than investing in innovation, and leads to a steady return.

Therefore, now asset owners are faced with a choice (conscious or not):

- Choose an innovative rent or government rent;
- Reduce the cost of resources per unit of output or reduce the price per unit of output;
- Invest in new technologies or invest in access to the government system.

At the same time, it does not seem possible to combine these areas of profit due to the growing reduction of national resources and the fall of the national economy in the international arena. Therefore, the need for the introduction of innovative technologies becomes the main thing for the continuation of the country's economy, which requires a complete change in the principles of functioning of the economic system.

5. CONCLUSION

Thus, the digitalization of the economy leads to an inevitable change in the socio-economic paradigm, society and its individual areas. It is associated with the transition to a new stage of production management and the production of goods and services based on the use of modern information technology, which in turn leads to a change in the picture of competition, blurring of borders, changing business models.

Currently, the digital economy is one of the key factors influencing economic growth and has important implications for measuring GDP, productivity and household well-being in all sectors of the economy.

For the successful development of the digital economy and the reduction of the gap between the leading countries and Ukraine, it is necessary to increase human, intellectual and technological advantages, to form a flexible regulatory framework for the introduction of digital technologies in all spheres of life in Ukraine. The strategy of intensive digitalization of the economy and the focus on its full-fledged transformation, which provides for a fundamental restructuring of the state's approaches to decision-making, will lead to competitiveness in the global market and achieve positive results.

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