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Formation of the digital strategy of the enterprise to ensure its competitiveness

Introduction

Information technology continues to change the world. The emergence of the digital economy is the basic activities of the enterprise and its business strategy. Today, enterprises must transform themselves into changing operating conditions and the demands of consumer and market. ICT is the driver of the transformation of business, processes, products and services for the client.

The digital economy is determined by the existence of the digital industry (ICT as a branch of the economy); infrastructure; digitalization of business, industry; digital skills, competence and leadership, digital culture. Digitalization of enterprises is the main factor in the growth of the digital economy. Digital transformation of enterprises is carried out due to the expanded use of “cloud” computing, Big Data, new industrial applications, the creation of cyber system, “smart production”, robotics, 3D printing,

1. Global strategies for the digitization of national economies in the world

Digitization is „an economic activity caused by billions of everyday online connections between people, businesses, devices, data and processes. The basis of the digital economy is the hyperlink, which means the growing interconnection of people, organizations and machines that arise from the use of the Internet mobile technologies and the internet (IoT) (Bukht, Heeks 2017). At present, the digital economy is estimated at 12.9 trillion USD, Or 17.1% of global GDP. The outstanding performance of the digital economy in its current form is mainly related to the Internet-oriented consumer, that is to say, the Internet, as we know it at the present time. At present, the digital economy is based to a large extent on e-commerce, entertainment and online services. Although these sectors remain strong, growth has started to slow down, and the global economy has matured for a new wave of growth.

Today, developed and implemented in dozens of different countries of the world, as well as at inter governmental level, state programs and strategies for the

development and promotion of digital technologies and digitization of national economies and industrial sectors. Thus, only in the countries of the European Union, according to official data of the European Commission in March 2017, there are more than 30 national and regional industrial initiatives digitalizations (in the digital market) (Coordination of European, national & regional initiatives. URL: <https://ec.europa.eu/digital-single-market/en/cordination-european-national-regional->). At the national level, the following programs and initiatives are being implemented: Austria – Industrie 4.0 Oesterreich; Belgium – Made different – Factories of the future; Czech Republic – Průmysl 4.0; Germany – Industrie 4.0; Denmark – Manufacturing Academy of Denmark (MADE); Spain – Industria Conectada 4.0; France – Alliance for Industrie du Futur; Hungary – IPAR4.0 National Technology Initiative; Italy – Industria 4.0; Lithuania – Industry 4.0; Luxembourg – Digital For Industry Luxembourg; Netherlands – Smart Industry; Poland – Initiative and Platform Industry 4.0; Portugal – Indústria 4.0; Sweden – Smart Industry.

One of the pioneers of digitization and the main ideologue of the Industry 4.0 concept is Germany, which in 2011 officially introduced a state strategy called Industrie 4.0. In addition to the general concept of Industry 4.0 in Germany, at the state level, several other strategies and initiatives of a similar form and orientation are developed and implemented, including Smart Networking Strategy, based on which, in turn, the Digital Agenda program was presented. The Alliance of the Future Industry was created, linking various organizations in the fields of private business, the scientific community and a number of government institutions and institutions in France, in July 2015.

The new digital strategy (UK Digital Strategy 2017) was officially published 2017 in the UK (UK Digital Strategy 2017. Policy paper, URL: <https://www.gov.uk/government/publications/uk-digital-strategy/uk-digital-strategy>).

The Smart Industry Ambitious Program was adopted by the Government of the Netherlands. The national concept (strategy) „Internet +” (Internet Plus) was presented in the PRC China unveils targets for 2015: Li Keqiang’s speech as it happened //South China Morning Post. March 5, 2015. URL: <http://www.scmp.com/news/china/article/1729846/live-li-keqiang-unveils-chinas-annual-work-report>. This integrated strategy identifies several key areas for the further development of digital transformation, along with industry, agriculture, the financial sector and state institutions.

In Japan, the main government document defining the country’s long-term goals and objectives in the area of digital transformation development is the Smart Japan ICT Strategy, which was officially published in June 2014 (Smart Japan ICT Strategy. URL: http://www.soumu.go.jp/main_content/000301884.pdf).

The main current state document in Korea’s science and technology policy is the Third Basic Science and Technology Development Plan, which is being implemented from 2013 to 2017. It outlines a strategy for the accelerated development of so-called „13 future growth engines”, with virtually all of these new industries and sectors being „subversive digital technologies” (smart cars, 5G networks, smart robotics, smart portable devices, etc.). In parallel, the special Manufacturing Innovation 3.0 Strategy, which focuses on the Internet, 3D printing technologies and

BigData, is also being implemented (J. Kallio. Digital Disruption of Industry: case Korea. Disruption Brief No. 6 – 25.8.2016).

In the United States, there is no single state program for the development of digital technologies, but in different years, in conjunction with private business and the scientific community, special technological initiatives have been launched. Examples include, for example, the federal cloud computing initiative (in 2009) or the initiative of President Barak Obama to create a new network of advanced manufacturing partnerships (AMP) in 2011 with participation key federal ministries and major technology companies in the United States (Industrial Internet Consortium. URL: <https://www.iiconsortium.org/index.htm>).

In addition, in March 2014, the Industrial Internet Consortium (IIC) was created on the initiative of a number of leading American private business representatives (primarily GE, AT & T, IBM, Intel and Cisco), whose main mission is „the acceleration of development, industrial implementation and the widespread of machines, devices, and also intellectual analytics connected with each other, that is, the industrial Internet of things. Following the adoption of appropriate strategies for digital transformation, the following is recognized:

- the digital economy implies globalization;
- the digital economy is a super-competitive environment;
- the digital economy is developing at a rapid pace;
- the digital economy does not exist without skilled personnel and quality education;
- the digital economy kills many traditional areas of activity;
- the digital economy is a new quality of life, business and public services;
- the digital economy is largely virtual, elusive, but it is impossible without the connection with the material world;

Therefore, the basis of the digital economy is industrial development. EU countries in 2010, under the Europe 2020 strategy, the Digital Europe program were developed to stimulate the growth of the Pan-European Internet economy. The Digital Agenda for Europe was developed, which elaborated the common priorities of the EU member states for the development of digital sectors of the economy and the promotion of digital innovations in 2010. The European Commission published a program „Digital single Market – digitizing European industry”, aimed at digitizing the European industry and service sector in 2016 (Digital Single Market – Digitizing European Industry. URL: http://europa.eu/rapid/press-release_MEMO-16-1409_en.htm [2016]).

To estimate the level of technological development in the countries of the European Union and the degree of introduction of innovative technologies in society and, in particular, the economy uses the DESI Index (The Digital Economy and Society Index). The index is calculated from 0 to 1. Evaluated human capital, digital technology integration, digital public services, quality of communications and Internet use.

The DESI has a three-layer structure as depicted in Table 1. It is composed of 5 principal dimensions, each divided into a set of sub-dimensions, which in turn are composed by individual indicators (Digital Economy and Society Index 2018. URL: http://ec.europa.eu/information_society/newsroom/image/document/2018-20/desi-2018-methodology_E886EDCA-B32A-AEFB-07F59111DE975477B_52297.pdf).

Tab. 1. Structure of the DESI

DESI Structure	Dimension Sub-dimension	Indicator
1 Connectivity	1a Fixed Broadband	1a1 Fixed Broadband Coverage 1a2 Fixed Broadband Take-up
	1b Mobile Broadband	1b1 4G coverage 1b2 Mobile Broadband Take-up
	1c Fast Broadband	1c1 Fast Broadband Coverage 1c2 Fast Broadband take-up
	1d Ultrafast Broadband	1d1 Ultrafast Broadband Coverage 1d2 Ultrafast Broadband take-up
	1e Broadband Price Index	1e1 Broadband Price Index
2 Digital Skills	2a Basic Skills and Usage	2a1 Internet Users 2a2 At Least Basic Digital Skills
	2b Advanced skills and Development	2b1 ICT Specialists 2b2 STEM Graduates
3 Use of Internet	3a Content	3a1 News 3a2 Music, Videos and Games 3a3 Video on Demand
	3b Communication	3b1 Video Calls 3b2 Social Networks
	3c Transactions	3c1 Banking 3c2 Shopping
4 Integration of Digital Technology	4a Business digitization	4a1 Electronic Information Sharing 4a2 RFID 4a3 Social Media 4a4 eInvoices 4a5 Cloud
	4b E-commerce	4b1 SMEs Selling Online 4b2 E-commerce Turnover 4b3 Selling Online Cross-border
5 Digital Public Services	5a E- government	5a1 eGovernment Users 5a2 Pre-filled Forms 5a3 Online Service Completion 5a4 eGovernment Services for Businesses 5a5 Open Data
	5b E-health	5b1 eHealth Services

According to the DESI index, in 2017, Denmark, Finland, Sweden, the Netherlands, Luxembourg, Belgium, the United Kingdom, Ireland, Estonia, Austria are the leaders in the development of digital technologies among the countries of the European Union (Table 2).

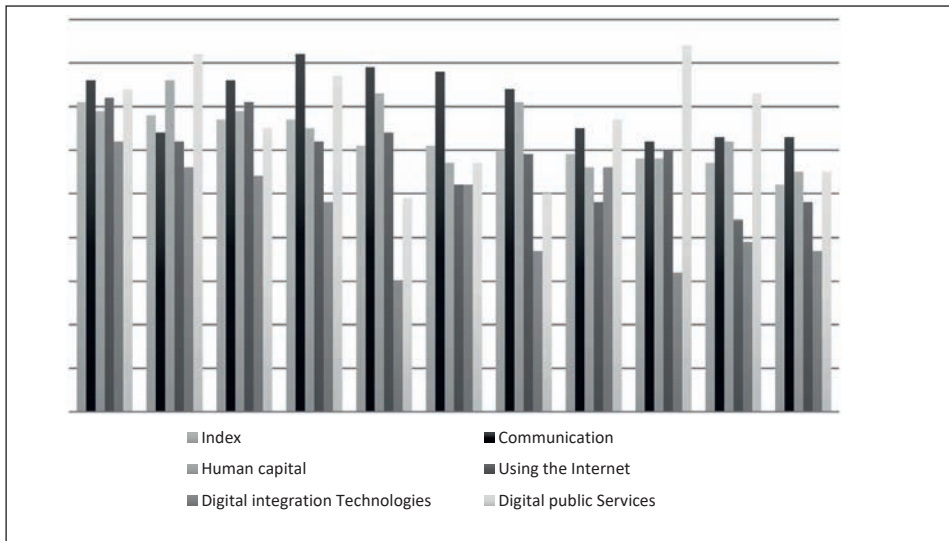
For the top 10 EU-leaders in the development of the digital economy, the overall DESI index and its components are significantly higher than the average for the European Union. In addition, the top 10-leaders of the countries included mostly small EU countries. To this cluster did not include countries such as Germany, France, Italy, Spain, etc. As can be seen from Picture 1, in 2017 the EU countries received the highest marks for the following components of the DESI index: communication (0.63), human capital (0.55) and distribution of digital public services (0.55).

Tab. 2. 10 EU countries with the most advanced digital economies

Country	Index		Communication		Human capital		Using the Internet		Digital integration Technologies		Digital public Services	
	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value
Denmark	1	0,71	4	0,76	5	0,69	1	0,72	1	0,62	4	0,74
Finland	2	0,68	12	0,64	1	0,76	5	0,62	3	0,56	2	0,82
Swiss	3	0,67	5	0,76	4	0,69	2	0,71	4	0,54	8	0,65
Netherlands	4	0,67	1	0,82	6	0,65	4	0,62	6	0,48	3	0,77
Luxembourg	5	0,61	2	0,79	2	0,73	3	0,64	22	0,3	19	0,49
Belgium	6	0,61	3	0,78	11	0,57	11	0,52	5	0,52	13	0,57
UK	7	0,6	6	0,74	3	0,71	7	0,59	15	0,37	18	0,5
Ireland	8	0,59	11	0,65	12	0,56	16	0,48	2	0,56	7	0,67
Estonia	9	0,58	17	0,62	10	0,58	6	0,6	20	0,32	1	0,84
Austria	10	0,57	15	0,63	7	0,62	20	0,44	14	0,39	5	0,73
Average by group		0,63		0,72		0,66		0,59		0,45		0,67
EU		0,52		0,63		0,55		0,48		0,37		0,55

However, it needs to improve the use of the Internet (0.48) and the integration of digital technologies into entrepreneurial activity (0.37).

Due to the development of the digital economy, small and medium-sized businesses (SMEs) have previously been unavailable to become global. This is what determines the peculiarity of the third wave of globalization, its inclusiveness. This again proves the peculiarity of the new wave of globalization and the Fourth Industrial Revolution: small and medium-sized enterprises and small countries can be successful and competitive if they actively implement digital technologies and develop the digital economy.



Graph. 1. 10 EU countries with the most advanced digital economies

2. Strategy of digital transformation of Ukraine

The key goal of Ukraine's digitization is to achieve the digital transformation of existing and create new economic sectors, as well as transform Ukraine's spheres of life into new, more efficient and modern ones. Such an increase is only possible if ideas, actions, initiatives and programs relating to digitalisation are integrated into national, regional, sectoral strategies and development programs. The key components that make up the „digital” economy, and accordingly, are in the focus of the „Digital Agenda of Ukraine -2020”:

- „digital” industry, that is, the sphere of ICT as a branch of economy;
- „digital” infrastructure;
- „digitalization” of business, industry;
- „digital” skills, competences and leadership;
- „digital” culture, Digitalization is aimed at accelerating the development of the information society in Ukraine, increasing productivity, economic growth, job creation, and improving the quality of life of Ukrainian citizens. Ukraine's digitalization should provide every citizen with equal access to the services, information and knowledge provided on the basis of information and communication technologies (ICTs).

One of the key factors in Ukraine's „digitalization” and the basics of its successful implementation is standardization, which is the basic element of the development and dissemination of digital technologies and guarantees compatibility, quality and GDP growth of the country. The processes of digitalisation in Ukraine should be ensured by increased security and trust in the use of ICT, including information security, cyber security, privacy protection of personal information, and rights of ICT users.

Development and implementation of the national „digital” strategy aimed at overcoming the barriers to the country's „digitization”, correcting market failures, maintaining fair competition, attracting investment, developing a „digital” infrastructure and a „digital” economy in order to achieve national priorities.

The goal of Ukraine's digitization is to ensure that all citizens, without limitations of technical, organizational and financial nature, can take advantage of the „digital” world and not be in the so-called segment of digital divide (digital divide). The telecommunications sector is at the forefront of such a transformation as an area that distorts large-scale changes in its market environment and is a key factor in the digitization of enterprises in any field of the economy.

Tab. 3. Comparative analysis of key indicators of telecommunication development, 2016 (ITU. URL: https://www.itu.int/en/ITU-D/Statistics/Documents/publications/ldb/LDB_ICT_2017.pdf [June 2017])

No	Indexes	Ukraine	CIS	World
1	Fixed telephone subscribers per 100 inhabitants	19,8	20,7	13,6
2	Mobile cellular subscribers per 100 inhabitants	132,6	141,2	101,5
3	Fixed broadband network for 100 inhabitants	12,0	15,8	12,4
4	Active mobile broadband subscribers per 100 inhabitants	22,6	59,7	52,2
5	Coverage 3G (% of population)	90,0	77,1	85,0
6	Coverage LTE /WiMAX (% of the population)	1,4	45,9	66,5
7	Prices for mobile cellular communication (% HPI pcs.)	1,2	1,7	5,2

8	Fixed Broadband Prices (% of total PC)	1,1	3,3	13,9
9	Prices for mobile broadband 500 MB (% of total PC)	1,2	1,4	3,7
10	Prices for mobile broadband 1 GB (% of GNP)	0,9	3,1	6,8
11	Percentage of households with a computer	65,1	67,4	46,6
12	Percentage of households with Internet access	54,8	68,0	51,5
13	Percentage of people using the Internet	52,5	65,1	45,9
14	Internet bandwidth for each Internet user (kbit /s)	79,9	59,0	74,5

In the world and in Ukraine, the demand for access to high-speed Internet is increasing (broadband access, SDI). The needs of the society are changing – increasingly frequent use of stationary and mobile digital devices, learning by electronic means, obtaining medical video services, interacting with government agencies, the use of various applications and automation systems, etc., fundamentally affects the amount and speed of data transmission. The state of the BSS in Ukraine shows that with a sufficiently high average and a uniform distribution of penetration of the SDAs, a clear gap between the city and the countryside is present at around 30%. Also, a significant number of rural populations (33–35%) does not have an SDI, but could join it. Due to the fact that the value of SDA in households' incomes in rural areas of Ukraine is roughly 2%, there are no market barriers.

3. The strategy of digital transformation of the enterprise

According to Ernst & Young, in 2016, 87% of companies include digital transformation into their development strategy, and 40% of the company leaders will be squeezed out for five years if digital transformation is not implemented (Global Center for Digital Business, 2016. https://www.accenture.com/t20150523T023959_w_/it-it/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_13/Accenture-Digital-Density-Index-Guiding-Digital-Transformation.pdf). According to the Forbs Global 2000 rating, by the end of 2017, two thirds of company directors or 65% will take digital-transformation as the basis of corporate strategy. It is projected that in the next five years on average four out of ten leaders of various industries will be pushed out by break through companies. Moreover, digital breakthroughs will occur in areas far from high technology. The main technological engines (trends) of digitalization used in corporate management by modern enterprises in 2017 are given in the table. 4. A clear understanding of the term „digital transformation” was formed and the idea of a set of relevant technologies emerged.

Tab. 4. The main technological engines (trends) of digitalization, which were used in corporate management of modern enterprises in 2017

No.Trend	Name of the trend	Comments for application in management
1	Artificial intelligence and in-depth machine learning	Intelligent devices based on intelligent models and deep neural networks (DPS)
2	Intelligent applications	Real-time services based on virtual assistants
3	Internet of Things („Smart Things“)	Industrial and household devices based on the Internet of things

4	Virtual (VR) and supplemented (AR) (AR) reality	Combining virtual and real objects Based on 3D technology
5	Digital „double“	Digital dynamic models of physical objects using sensory sensors for simulation modeling
6	Bloc chain and chain blocks	Distributed data chains and cryptography
7	Dialogue systems	Dynamic services based on networks between people, processes, services and things
8	Mechanics of applications and services	Synchronization of devices and technologies on the principle of „smart home“
9	Digital technology platforms	New platform combining information systems, customer experience, analytics and forecasting, Internet businesses and business ecosystems
10	Adaptive security architecture	A multi-level system of real-time information security, including on the basis of BlockChain technology

Huawei has proposed its Digital Transformation Analysis Index (GCI) (Global Connectivity Index) based on the following parameters (GCI. Global Connectivity Index. URL: https://www.huawei.com/minisite/gci/assets/files/gci_2018_whitepaperen.pdf?v=20180625):

- productivity (supply, demand, quality of service, potential);
- transformation (Large Data, Cloud, Broadband Access, Data Center and Internet);
- the proposal – the breadth of the dissemination of information and communication products and services, taking into account the bandwidth of the networks;
- investment in ICT;
- degree of development of cloud services;
- internet expenses;
- the level of development of data analysis technology and data centers.

Demand determines the need for ICT products and services, and takes into account the level of consumption of broadband by households, the number of mobile users, the number of downloaded applications, the frequency of access to e-commerce services, the degree of migration into clouds, the amount of data subject to analytical processing, the number of Internet devices things and number of servers in the data center, Quality of service, the level of availability of services, including fixed broadband services, broadband mobile communications, and convenience of use of services. Potential an assessment of the prospects for the development of the digital economy based on these indicators, including the expected costs of research, cloud technologies, technology of the Great Data, mobility and Internet of things.

Another study entitled „Digital Transformation. How to Become a Leader „was conducted by the analyst agency Arthur D. Little, specializing in consulting in the field of business strategies for the implementation of ICT, and it is devoted to assessing the impact of digital transformation on the activities of companies (Arthur 2015). Research on the digital maturity of about a hundred European companies from seven industries, which were ranked under the Digital Transformation Index (DTI) a cumulative (ten-point scale) benchmark, derived from comparative peer reviews of companies.

Digital transformation primarily affects the possibility of attracting new customers, followed in importance is „bold among competitors” and the third – „New sources of income.” Analysis of the distribution of the coefficient for vertical industries: the automotive industry (DTI 5.02) received the highest score at an average of 3.92 points, followed by a telecom (4.20), energy (4.11). The main barrier to digital transformation is the lack of specialists with appropriate knowledge, and the second – lack of understanding of the need for urgent business transformation based on digital technology.

The treatment of markets associated with the concept of „digital transformation” is still at an early stage, although analysts have already formed derivatives of this concept, reflecting the degree of influence of digital transformation on the economic efficiency of enterprises. Such indicators are difficult to compare – they make sense only in the context of a weighted assessment of various studies. However, despite the difference in the quantitative estimates of the impact of digital transformation on the efficiency of companies, there are a number of conclusions regarding which analysts are unanimous.

The dissemination of IT, initiated by business users, promotes the implementation of digital technologies, but the successful implementation of digital transformation is possible only with the centralized policy pursued by the company management, including through the IT departments. The digital transformation while more developed market B2C, but there are tremendous opportunities for the introduction of digital technologies to improve the efficiency of internal divisions of the company and its employees.

Today, there are plenty of examples from companies from traditional sectors of the economy that have upgraded their digital-based business processes and achieved impressive successes such as Square, Stripe, Landing Club, Prosper, SoFi Uber, FB, Alibaba. In 2018, according to Forbes observers, 67% of company leaders from the Global 2000 list will elect a digital transformation as the central focus of their corporate strategy.

Conclusion

The formation of a digital enterprise strategy becomes the main factor in the growth of the efficiency of enterprises, the basis of product and production strategies. Successful digital transformation programs are aimed at creating processes, products, services, including suppliers. To achieve significant results in all segments and life cycles of an enterprise, products and services, it is necessary to expand the scope of rights and opportunities concentrated where all resources of the organization are strategically directed to joint interaction in the modern market. The enterprise must take into account the needs of the client, the interests of the client or customer should be at the centre of adaptation of the organization and become a coordinating point for digital transformation initiatives.

The development of the company’s digital strategy is aimed at integrating information technologies into business, attracting investments in information technology and optimizing IT costs; the creation of an IT architecture and the provision of management based on information technology; clear description and control of IT

services when interacting with service providers; monitoring the satisfaction of the users with information technology.

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Abstract

The article presents the tendencies of development of the digital economy and its main components. The study of the development of the digital economy has shown that today it is determined by the development of Internet technologies, large data, robotics and 3D printing. The competitiveness of an enterprise today depends on the ability to apply digital technologies in its activities. The considered technology of forming the digital strategy of the enterprise is focused on digital transformation of the enterprise, expansion of use of digital technologies to increase the efficiency of such introduction.

Key words: digital economy, digital strategy, digital transformation, development, enterprise, competitiveness

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