

Information Security as a Digital Technologies Development Factor of Innovative Socially Oriented Economy

Bondar-Pidhurska O.^{1,*} Glebova A.²

¹*Higher Educational Institution of Ukoopspilka «Poltava University of Economics and Trade», Poltava, Ukraine*

²*National University «Yurii Kondratiuk Poltava Polytechnic», Poltava, Ukraine*

**Corresponding author. Email: bondarpodgurskaa@gmail.com*

ABSTRACT

The strategic role of information security as a basis for the development of digital technologies in an innovative socially oriented economy and one of the main types of vital interests of the individual, society and the state is substantiated. Informatization of society is seen as one of the decisive factors in modernizing the economy and the guarantor of the country's integration into the modern world community. The knowledge economy is positioned as a multidimensional concept associated with the development of information and communication technologies. The influence of information and communication technologies on the innovative socially oriented development of the economy as a factor and catalyst of structural changes is highlighted. Based on the causal analysis and characteristics of the trends of decreasing indices of innovative development and meeting the vital interests of the population of Ukraine during 2007-2017, it was emphasized the need to increase the level of information security of the country. The indices will be calculated using the principal components method and the slip matrix. The growing impact of information threats and their types on the basis of monitoring were highlighted and summarized.

Emphasis was placed on the need to strengthen information security measures at all levels of the national economy, which will increase the level of satisfaction of vital interests of the population, improve the comfort of life in the country through the development of digital technologies for the benefit of society.

Keywords: *information security, challenges, threats, innovative socially oriented development of economy, digital technologies, vital interests of the population*

1. INTRODUCTION

The today, the flow of information as the main reason for the creation of the universe is constantly expanding and becoming a major threat, leading to armed conflict and economic catastrophes. As a result, information and digital technologies have become one of the most important factors causing a dynamic transformation of the system "man - society - economy - nature". However, the results of the information revolution in different regions of the world in the coming decades may lead to the division of the world community into leaders and backward, and thus to a significant deterioration of human and interstate relations. The established system of international security (after the end of the Second World War) did not provide for measures to counter such threats, including threats from information and globalization.

2. PROBLEM STATEMENT AND PURPOSE OF THE RESEARCH

Nowadays, information security tasks are becoming increasingly important in the context of digitalization of business processes [1]. An additional argument is modernization [2, 3], when there is a growing need to use modern methods and approaches to business process development, and on the other hand, more and more companies are trying to protect information of commercial value.

V. Bazylevych points to the existing set of problems in Ukraine related to the creation of decent socio-economic conditions for global exchange of information and knowledge, development of a perfect intellectual property market, ensuring the transfer of new technologies, protection of economic interests and the right to innovation cycle [4]. It is also noted that the socio-humanistic dimension of the knowledge economy takes into account not only the socio-economic, but also the national and spiritual foundations of innovative society, characterized by democracy and progressive new ideas, spiritual enrichment of the nation.

In the context of globalization, internationalization, development of digital technologies, information turbulence, the problem of information security of both individuals and the socio-economic system (enterprises, region, states, corporations, etc.) is becoming increasingly important. Information becomes a strategic resource that not only provides competitive advantage, but also creates conditions for sustainable development. The value of information is determined on the basis of its accuracy, timeliness and accessibility. The latter characteristic makes the information the most attractive, as its confidentiality is determined by the established mode of access and is limited by the number of persons who have the right to own it [5]. V. Muntyan [6] considered the problems of information security and possible ways to solve them.

The purpose of the study substantiate the role and place of information security as a factor in the development of digital technologies in an innovative socially oriented economy in an increasing dynamics of challenges and threats to increase the level of satisfaction of vital interests of the Ukrainian population.

3. REVIEW OF LITERATURE SOURCES

The terms "knowledge economy" (V. Makarov) and "noosphere economy" (P. Nikitenko) are used to denote a new stage of economic development and are close in meaning to the concepts of "innovative economy", "high-tech civilization", "post-industrial society", "information society". Knowledge economy and noosphere economy are types (structures) of economy in which the sector of accumulated planetary and national knowledge of the human mind plays a crucial role, and their production is an important source of growth of the innovative economy [7, p. 190]. In this case, M. Chumachenko, O. Amosha, V. Lyashenko [8, p. 3] considered the informatization of society as one of the decisive factors in modernizing the economy and the key to the country's integration into the modern world community. Therefore, the knowledge economy as a multidimensional concept is associated primarily with the development of information and communication technologies. At the same time, L. Yakovenko [9] pointed to the "innovative nature of the knowledge economy" - a fundamentally new entity. This should replace the economy of destruction, depletion, exploitation of nature, the desire of man to receive the greatest dividends from it. It is based on the desire of man to meet their needs in such a way as not to harm nature, to facilitate its reproduction and reproduction. That is, it is the basis for the formation of a digital socially oriented market economy, where development is due to positive changes - innovations that make sense today as a cause of transformation in education, economics and science. At the same time, innovation is a cause and effect, which generates radical technological and structural changes, forming a new paradigm of social life.

Therefore, one of the directions of development of the concept of knowledge economy, which prevents a sharp conflict between post-industrialism and the "new

economy", should be a model of computer science economy based on completely new approaches, new thinking, perception, new philosophy. It is with his help that you can reveal the course of solving the problem, change the critical situation ... "[10, p. 480].

Thus, the knowledge economy is based on new knowledge, the nature of which is informational and is realized in innovations, which through the introduction of new digital technologies and new products ultimately provide the lion's share of GDP growth in highly developed economies. Accordingly, the innovative way of development in its content can be a project of modernization of both the economy and society as a whole. This way of development is connected, first of all, with the fundamental achievements created in the scientific and technical environment of a certain country [10, p. 474-475]. Economic development requires help, and this is possible only through information. Academician I. Yuzvishin, considering a new (quantum) model of the universe, considers "information a source of root causes, phenomena and processes" [11, p. 23]. Now it appears in a completely different plane, in a different dimension and understanding, and becomes a parameter of quintessence, capable of combining space, time and speed. V. Terekhov pointed out the uniqueness of information as a "factor of production" and noted that "aggregate information about a number of companies in a particular industry helps to produce national competitive advantages or advantages of one state over others" [12, p. 37]. Thus, if information is the root cause of phenomena and processes, it can be argued that nowadays information and communication, digital technologies can be considered as a factor and catalyst for structural change in innovative socially oriented economic development (Figure 1).

4. METHODS

Research methods: analysis, synthesis, induction, deduction, main components and method of sliding matrix, index method, observation, generalization.

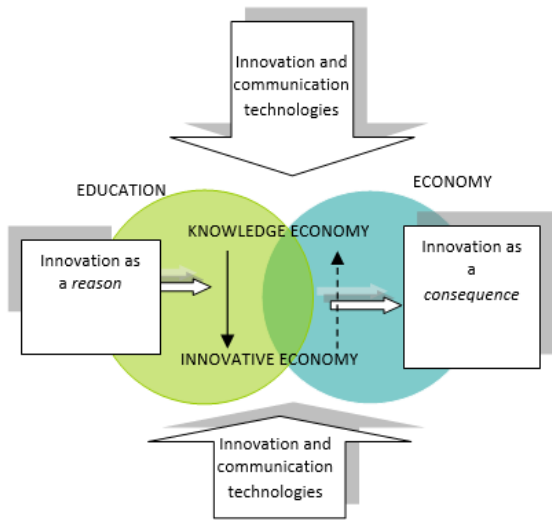


Figure 1 The impact of information and communication technologies (digital) on innovative socially oriented economic development as a factor and catalyst for its structural changes

Source: generalized, substantiated, visualized by the authors.

4.1. Data Analysis

It makes sense to talk about the need to increase the level of information security as a factor in the development of digital technologies at all levels based on the results of calculating the index of innovative development and vital interests of the population of Ukraine in 2007-2017 (Fig. 2) and the draft strategy of sustainable innovation [16].

4.2. Monitoring and generalization of the main types of threats to the development of digital technologies in an innovative socially oriented economy

All economically developed countries make extensive use of the benefits of digital technologies in the manufacturing, commercial and banking sectors. This is due to the fact that with the help of traditional methods it is impossible to navigate in today's fast flow of information and deeply analyze the dynamic processes of economic activity of enterprises. Technologies related to the global computer network of the Internet are developing the fastest and most efficiently, which has led to the emergence of new categories, such as e-commerce, e-business, e-government, etc. [5].

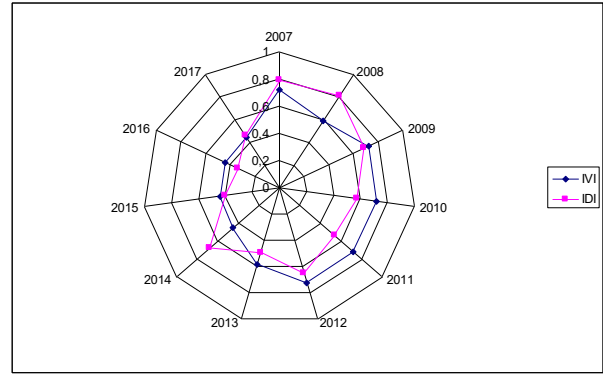


Figure 2 Dynamics of changes in indices of innovative development and satisfaction of vital interests of the population of Ukraine in 2007-2017: the reason for the need to increase the level of information security

Legend:

The following indicators have grown significantly during the calculation of the Innovation Development Index (IDI): X1 – the share of patents for inventions in Ukraine among the countries of the world (%); X2 – the percentage of scientists from the total number of employees (%), %; X3 – the share of volume of scientific and scientific work performed work in GDP (%); X4 – share of enterprises that implemented innovations (%), %; X5 – share of implemented innovative products in the volume of industrial (%), %; X6 – introduced new technological processes per 1 scientist, units per person; X7 – state share in finance innovative activity of industrial enterprises (%); X8 – % of GDP for R&D.

The following indicators were used to calculate satisfaction of vital interests of the population (IVI): 1. State of education level (level and quality), %; 2. Quality of medical care, %; 3. The standard of living, %; 4. Ideal work, %; 5. A sense of security, %; 6. Freedom of choice for women and men, %; 7. Perception of the local labor market, %; 8. People's trust (since 2013 - volunteer activity), %; 9. Community (satisfaction with city, village), %; 10. Efforts to combat poverty, % (since 2014 – trust in the judiciary, %); 11. Environmental measures, %; 12. Government confidence, %.

Source: Created by the authors on the basis of data of the State Statistics Service of Ukraine and its own calculations using the Microsoft Excel software package.

Computerization, development of telecommunications also provide ample opportunities for automated access to various sensitive, personal and other important, critical data in society (its citizens, organizations, etc.).

Naturally, in these circumstances, people are aware of the emergence of such a number of new risks and begin to worry about providing the necessary security for such information. After all, studies have shown, that ten years ago, about once a month, an incident occurs in businesses, which can be attributed to one of the 10 possible types of threats.

Most of all, there are cases of unintentional loss of data due to negligence of employees – such incidents occur –

15-20 a year. Internal malicious attacks and spying is 10 cases a year, abuse of access to information – 20 cases a year. Speaking of the field of activity, up to 20-30 incidents occur annually at the surveyed enterprises. Today, this dynamic is very stable. Over the last three years, the number has been increasing rapidly.

Trend Micro Incorporated, a global cyber-threat statistician, provided information in 2018 on the most popular types of attacks and "attacked" countries. Yes, in 2018 there were over 2.5 trillion requests. As a result, some 48 billion attacks were blocked, including email

threats, malicious files and URLs, and 222 new "families" of ransom ware were identified. In 2018, five of the most malicious programs worth highlighting are the cryptocurrency miner CoinMiner (1,350,951 attacks), the WannaCry solicitor (616,399 attacks), Powload (378,825 attacks), Downad (240,746 attacks) and Sality (166,981 attacks) [13].

Thus, the desire to possess information has led to the emergence of such a phenomenon as cybercrime, which gives rise to specific types of threats (Table 1).

Table 1 Generalization of the information threats main types of the 21st century

Types of information threats	Characteristic
Industrial espionage	Industrial espionage is a hidden, often illegal, practice of researching competitors to gain business advantage. The purpose of this activity may be to obtain a trade secret, such as a product specification or formula, business plan information, etc. In many cases, industrial spies simply look for any data that their organization can use to their advantage [14, p. 370].
Greenmail	A type of corporate blackmail that involves a set of actions that results in a minority shareholder forcing a company or major shareholders to buy back shares at an inflated price.
Phishing	Frauds that are perpetrated online by criminals using websites to retrieve their bank card details from users and subsequently withdraw cash from them.
Raiding	Hostile takeover of business in order to take possession of property, enterprise, property complexes on the basis of imperfect legislation.
Computer viruses	These are self-replicating programs that are targeted for destruction, corruption, data collection, and more.

A common feature of all these criminals is stolen information that allows them to achieve their goals by illegal means. The main benefits are obtained by a person who has access to information and can distort, manipulate, use it to make a profit, blackmail or even confiscate

property. These threats are growing every year and are damaging not only individual systems but also national security. Thus, in recent years, the number of cybercrimes is growing rapidly (Table 2).

Table 2. Monitoring of the largest crimes and acts of terrorism in the world cyberspace of 20-21 centuries [15]

Time	Means of committing a crime	Consequences of crime
August 2003	Blaster virus, also known as Lovsan, Lovesan, MSBlaster	Caused a light shutdown in New York
June 1982	Cyberattack against the Siberian pipeline by activating software to which Americans have previously entered erroneous data	The program ruined the pipeline's operation so much that it exploded
2003-2007	Attacks by the Chinese hacker group Hongke in the north of the US company Lockheed Martin	Hijacking Projects for F-35 Lightning II Fifth Generation Destroyer Destruction
2008-2010	GhostNet attack via email that triggered the malware to open	Designed for embassies and ministries in 103 countries to remotely control their systems
May 2012	Trojan Flame Program	Purposeful systematic collection of data in the Middle East (office documents, drawings, etc.), the ability to modify information
2014-2015	Mass DDoS attacks using botnets on resources of 76 countries	Victims spent an average of 32 days to repel an attack
2017	<i>Virus-Petya.A</i> , "Wannacry"	The largest Ukrainian enterprises were affected: Nova Poshta, Ukrtelecom, Inter, Channel 24, the Ministry of Infrastructure of Ukraine, the First National and so on.
2018	The VPNFilter virus has been detected in 54 countries	Controls over 500,000 routers and routers that allow access to all devices. Access to critical infrastructure

So, at the current level of complexity of social relations, when the economic function is transformed into social, even in the near future increases the uncertainty of forecasts, the importance of the state function, which aims to regulate social innovation processes, directs them to socially constructive vector of economic development.

Building a socially oriented state and ensuring the innovative development of the economy will remain uncivilized until the norms of morality that shape the system of values and determine the true interests of the individual, society and the state are restored. Due to the fact that state mechanisms manage to regulate no more than 50% of public relations, spiritual and information security is becoming one of the most important and most important unmet social needs.

5. FINDINGS

Therefore, it is advisable to apply the principle of information prevention of possible danger (protection against threats) in the current period (in particular, when modeling the management of innovative socially oriented economic development). This will protect the economic system from the most important external dangers, harmonize economic relations and create a basis for real progress.

Addressing information security issues requires changes in the management system of socio-economic institutions and corporate associations. In this case, they must perform the following tasks: 1) to form a unity of awareness of the situation and adequate actions of management staff; 2) select and implement appropriate organizational structures, strengthening the responsibility of both management and the entire team; 3) involve staff and all business entities in change management and digitization of processes (inside and outside organizations); 4) to develop and manage knowledge and information resources as a basis for safe sustainable development of enterprises, their associations, state and public institutions.

At the same time, national interests should be defined more clearly and concretely, a hierarchy of goals and objectives should be formed to support it and reasonable proposals should be developed for the implementation of a single state policy that would clearly define the inadmissibility of spiritual and motivational distortions.

Ideally, you should: 1) strive to balance all aspects and types of security; 2) the state should be considered as a tool that provides the best conditions for the development of citizens, society and the state itself; 3) state interests in the field of security (including information) must be consistent with the interests of the individual; 4) to ensure the simultaneous cooperation of representatives of the four main institutions of society: government, science, education, religion and to form noosphere thinking in order to achieve anti-crisis stability and strengthen economic dynamics.

An integrated approach to information and cognitive innovations determines the feasibility of positioning

information security as the root cause and factor in the development of digital technologies. This is due to the transit location of Ukraine and allows creating and using in the national interest of international communication channels, the information space of the country, the open influence of foreign radio and telecommunications, print media and the global computer network - the Internet.

It is unacceptable that the country's high level of dependence on foreign software, digital technologies and imperfect information legislation creates opportunities for information manipulation, negative impact on people's consciousness, culture, morals and spiritual foundations, which increases the risks of receiving information threats.

At the same time, the vital interests of the population of Ukraine in the information sphere should be considered: 1) providing information needs of the individual, society and the state in all spheres of life; 2) ensuring citizens' rights to secrecy of correspondence, telephone and other notices; 3) effective use of national information resources to create conditions to support conservation and systematic replenishment (reproduction); 4) protection of information which is a state, official, commercial and other secret protected by the law; 5) development of modern information technologies, national industry of information and communication means, expansion of participation of the country in the international cooperation of manufacturers of such tools and systems; 6) security of information systems and communication networks; 7) participation of the country in the work of international organizations that determine the principles and directions of cooperation in the information sphere.

In addition, it is appropriate to identify the main factors that threaten the information security of the country: 1) the dissemination of false or conditionally distorted information aimed at destroying public harmony, spiritual and moral values of society, as well as inciting national, religious and social enmity; 2) dependence of the information infrastructure of the country on the import of foreign information technologies, facilities and systems of informatization, communication and software; 3) insufficient availability of qualified personnel in the field of information technology and information security. Departure of highly qualified specialists and subjects of intellectual property abroad; 4) inconsistency of information support of state and public institutions with the requirements of managing economic, political and social processes; 5) insufficient development of the state licensing system, certification of products and systems of information technologies and certification of objects of informatization in accordance with the requirements of information security. Use in the process of creation and modernization of national infrastructure of non-certified domestic and foreign information technologies, information security measures, information and communication measures; 6) increase in the number of crimes committed with the use of information technologies, unauthorized development and distribution of programs that disrupt the operation of information systems and communications networks; 7) the absence in

Ukraine of an effective system for securing the storage of open information, in particular that which constitutes intellectual property.

6. CONCLUSIONS

Thus, the essence of information security as a factor in the development of digital technologies in an innovative socially oriented economy is highlighted: it is one of the main interests of every person and at the same time a need that always seeks to meet; this is one of the main tasks that managers need to solve today to ensure long-term operation and development of enterprises in the face of growing dynamic external threats.

Information is positioned as the root cause of phenomena and processes, and information and communication (digital) technologies as a factor and catalyst for structural changes in innovative socially oriented economic development.

The need to increase the level of information security at all levels of the national economy was justified on the basis of the calculation of the index of innovative development and the index of satisfaction of vital interests of the population of Ukraine in 2007-2017, which had a steady downward trend.

The growing impact of information threats during the 20th and 21st centuries has been tracked and generalized.

The vital interests of the population of Ukraine in the information sphere and the main factors threatening the information security of the country are highlighted.

The basic directions of minimization of information security as a factor of development of digital technologies in the conditions of innovative socially oriented economy are offered.

ACKNOWLEDGMENT

Elements of this work were supported by members of the Scientific Council of the Institute of Industry of the National Academy of Sciences of Ukraine, and the publication is carried out at the authors' own funds.

REFERENCES

- [1] A. Kasych, Y. Yakovenko, I. Tarasenko, Optimization of business processes with the use of industrial digitalization, Proceedings of the International Conference on Modern Electrical and Energy Systems, MEES 2019, pp. 522-525, 2019.
- [2] A. Kasych, M. Vochozka, Modernization processes in the modern world: methodology, evolution, tendencies, *Revista ESPACIOS*, 40(24) (2019).
- [3] A. Kasych, M. Vochozka, Y. Yakovenko, Diagnostic of the Stability States of Enterprises and the Limits of their Tolerance. *Quality Access to Success*, 20(172) (2019) 3-12.
- [4] V. Basilevich, Intellectual property. Kiev: Knowledge. 560 p., 2006.
- [5] M.O. Gutsalyuk, Provision of information security of business activity, *Legal journal*, 3 (2003).
- [6] V. Vuntiiian, Informatiology and economic security. Kyiv: CPIC, 2001, 560 p.
- [7] P. G. Nikitenko, Philosophy and Ideology of the Life of Belarus: Theoretical Foundations of the Anti-Crisis Model and Mechanisms for its Implementation, Nat. Acad. Sciences of Belarus, Institute of Economics. Minsk, Belarus, 2009.
- [8] M.G. Chumachenko, O.I. Amosha, V.I. Lyashenko, Prospects of neo-industrial transformation of economy of Ukraine and Donbass. Structural Reforms and Transformations in Industry. Conference. Donetsk, 2010, pp. 3-6.
- [9] L.I. Yakovenko, The innovative nature of the knowledge economy, *Bulletin of Poltava State Agrarian Academy*, 2 (2010) 141-145. (2010).
- [10] V.M. Heitz, V.P. Semynozhenko, B.E. Kvasnyuk, Strategic Challenges of the 21st Century to the Society and Economy of Ukraine: in 3 Vols. acad. Kyiv: Phoenix, vol. 2: Innovative and technological development of the economy, 2007, 564 p.
- [11] I.I. Yuzvishin *Information Science*. 4th ed. Moscow: Radio and Communications 1996).
- [12] V.I. Terekhov, B.M. Odyagailo, The role of the information factor in the form of overdrive on competitive markets, Here are the notes to the CROC University, 4 (52) (2018) 36-44.
- [13] Cyber threat statistics in the data world Trend Micro Incorporated. <http://www.dut.edu.ua/ua/news-1-574-6822-statistika-kiberzagroz-v-sviti-za-danimi-trend-micro-incorporated>.
- [14] Y.E. Yakubovskya, Targeted attacks in the context of industrial espionage, Problems of the development of foreign economic relations and the attraction of foreign investment: regional aspect: *Sat. scientific tr*, vol. 2 (2014) 368-372.

[15] V.V. Kovtunets, O.V Nesterenko, O.I. Savenkov
Security of decision support systems. National
Academy of Management, 2016, 190 p.

[16] O.V. Bondar-Pidhurska, V.P. Solovyov, The
strategy of sustainable innovative society-oriented
development of Ukrainian economy (by the example of
mineral resource industry), Scientific bulletin of
National Mining University, 4 (160) (2017) 122–132.