

Ensuring sustainable development of enterprises in the conditions of digital transformations

Maryna Demianchuk^{1,*}, Viktor Koval², Volodymyr Hordopolov³, Valentyna Kozlovtseva⁴, and Dzintra Atstaja⁵

¹Odesa I.I. Mechnikov National University, 2 Dvoryanska Str., Odessa, 65026, Ukraine

²Odesa Institute of Trade and Economics of Kyiv National University of Trade and Economics, 6 Inglezi Str., Odessa, 65056, Ukraine

³Kyiv National University of Trade and Economics, 19 Kyoto Str., Kyiv, 02156, Ukraine

⁴Odesa State Environmental University, 15 Lvivska Str., Odessa, 65016, Ukraine

⁵BA School of Business and Finance, Krišjāņa Valdemāra iela 161, Vidzemes priekšpilsēta, Riga, LV-1013, Latvia

Abstract. Modern enterprises are dynamically developing due to the fourth industrial revolution, contributing to the introduction of innovative infocommunication technologies in most business processes, thereby shaping and developing the digital economy. The aim of the article is to substantiate the concept of sustainable development of enterprises in the context of digital transformations. The theoretical and methodological foundations of sustainable development at different levels of the hierarchy have been determined. The concept of sustainable development of enterprises has been developed, the implementation of which is aimed at harmonizing the economic, environmental and social activities of the enterprise. The stages of the process of implementing the concept of sustainable development of enterprises are highlighted, providing for the justification of an inert, neutral, progressive or forced vector. Ensuring the implementation of the concept of sustainable development is expected through the use of applied models, in particular, the implementation of a parametric model of joint deployment of enterprise infrastructure with other infrastructure facilities in economic activity, taking into account technical, geographical, organizational and socio-economic factors to strengthen financial stability; building a model for ensuring a balanced balance between economic efficiency and environmental and social responsibility of an enterprise using a mechanism for managing transformation processes in the process of transition to sustainable development in the context of digitalization.

1 Introduction

Modern enterprises are dynamically developing due to the fourth industrial revolution, contributing to the introduction of innovative infocommunication technologies in most business processes. Given the conditions for the transition of the Ukrainian economy to a digital development strategy, where the main driving force is digital trends, smart products and services, the issues of sustainable development of enterprises are being actualized. The implementation of the concept of sustainable development of enterprises is due to the constantly growing needs of consumers of telecommunications services in the global digital revolution, the need to comply with the goals of sustainable development of Ukraine, modification of the economic, social and environmental activities of enterprises.

Therefore, there is a scientific and applied problem of theoretical substantiation, methodological support and practical implementation of the process of sustainable development of enterprises for their harmonized evolution, reducing the existing digital divide and the

qualitative development of the economy in the context of digital transformations.

2 Analysis recent research and publications

The possibility of enterprises' transition to sustainable development is associated with the solution or mitigation of a number of fundamental contradictions between the interests of the world community, the interests of individual countries and regions, national-state interests and the interests of enterprises in various spheres of economic activity. Therefore, such a transition requires the formation of effective models or mechanisms for ensuring sustainable development of enterprises [1-3].

The theoretical aspects and practical approaches to the essence of the balanced development of enterprises, the prerequisites for the transition to sustainable development, the problems of ensuring the social and environmental responsibility of enterprises, the directions for ensuring the sustainable development of economic systems are devoted to scientific works: K. Andriushchenko, A. Buriachenko, O. Rozhko et al. [1],

* Corresponding author: ma-demyanchuk@ukr.net

R. Sharma, A.-R. Fantin, N. Prabhu, C. Guan, and A. Dattakumar [2], J. Mao, C. Li, Y. Pei, L. Xu [3], Y. Zalognova, N. Trushkina [4], T. Osburg, C Lohrmann [5], I.W.E. Arsawan et al. [6] and others. Paying tribute to the importance of scientific achievements of foreign and domestic scientists, it should be noted that the issues concerning the features of ensuring sustainable development of enterprises in the context of digital transformations remain insufficiently studied. The complex and multifaceted issue of ensuring sustainable development of enterprises should be investigated on the basis of economic efficiency and environmental and social responsibility.

3 Methods

The conceptual and methodological basis of the work is formed by the fundamental provisions of foreign and domestic scientists on the theory and practice of the concepts of sustainable development of enterprises. The study is based on a set of general scientific and special methods of cognition of the theoretical, methodological and conceptual foundations of sustainable development of enterprises: The article uses methods of dialectical cognition, generalization, scientific abstraction, formalization of structures and a system-situational approach in substantiating the concept of sustainable development of enterprises in the context of digital transformations through the definition of a set of prerequisites, motives and goals for the transition to this concept.

The aim of the article is to substantiate the concept of sustainable development of enterprises in the context of digital transformations.

4 Results

The globalization ecological transformations of the last century made it possible to understand that society has overcome the permissible ecological boundaries and, over time, human dependence on the laws of the biosphere is increasing, which affect the use of natural resources, the course of the ecological and social crisis [7-8].

With the beginning of the development of digital technologies and the formation of the digital economy, a new round of globalization transformations began, based on electronic products, the sale of which is carried out by a network of business entities through the flow and process of "digitizing" objects and the creation and exchange of digital assets (virtual assets) using electronic means, which are the backbone of the digital economy. The activities of business entities are subject to significant perturbations of the rapidly changing states of international markets, since the impact of globalization and digital transformations is directed not only to the microeconomic systems themselves, but also to the existing and emerging interconnections between them, leading to their unpredictable behavior [9].

The ICT development index (IDI) [10] has been used to measure the information society in the world for over 10 years 66; it is intended to be global and reflect changes

in countries with different levels of development (Table 1, Table 2) and is a composite an index that combines 14 indicators (covers 81 indicators for telecommunication / ICT services).

Table 1. Dynamics of the ICT Development Index according to ITU regions and countries with different levels of development (based on data from [10]).

Regions	Years				
	2013	2014	2015	2016	2017
IDI by ITU Region					
Africa	2,31	2,31	2,30	2,48	2,64
South and North America	4,86	4,88	4,89	5,13	5,21
Arab countries	4,55	4,59	4,63	4,81	4,84
Asia and the Pacific	4,57	4,46	4,35	4,58	4,83
CIS	5,33	5,45	5,56	5,74	6,05
Europe	7,14	7,17	7,19	7,35	7,50
IDI by countries with different levels of development					
World	4,77	4,76	4,74	4,94	5,11
Developed countries	7,20	7,23	7,25	7,40	7,52
Developing countries	3,84	3,85	3,85	4,04	4,26
Least developed countries	–	–	–	2,07	2,2

Table 2. ICT development index of some countries of the world (based on data from [10]).

Countries	Years			
	2014	2015	2016	2017
Iceland	8,74	4,86	8,78	8,98
Hong Kong, China	8,50	8,52	5,47	8,61
Korea	8,90	8,93	8,80	8,85
Netherlands	8,47	8,53	8,40	8,49
Switzerland	8,32	8,56	8,66	8,74
Norway	8,44	8,49	8,45	8,47
Denmark	8,87	8,88	8,68	8,71
Luxembourg	8,44	8,59	8,40	8,47
Great Britain	8,60	8,75	8,53	8,65
Japan	8,38	8,47	8,32	8,43
France	8,01	8,12	8,05	8,24
Belarus	7,03	7,18	7,29	7,55
Russian Federation	6,82	6,91	6,91	7,07
Georgia	5,02	5,25	5,59	5,79
Ukraine	5,18	5,23	5,31	5,62

IDI as a comprehensive indicator measures the level and evolution of ICT development in countries to build a ranking of countries and is used as a tool for comparative analysis of progress in ICT development, digital divide etc. [10]. That is, IDI can be used as an indicator for determining the information technology support of business entities.

The IDI is on the rise in many countries, but the constraints are the link between levels of ICT development and income levels, which requires better government policies and legislation for developing countries to stimulate competition and promote foreign direct investment.

Considering the convergence of communications and informatics, which led to progressive changes both in the production and consumption of goods and services, it provided a new stage in the development of not only all sectors of the national economy and relevant economic entities, but also social life in various directions.

Infocommunications have a system-forming role in the formation of a single digital economy and ensuring sustainable development of enterprises in various spheres of economic activity. At the same time, considerable attention should be paid to the issues of ensuring the sustainable development of these enterprises from the standpoint of their compliance with the global and national strategic goals for sustainable development.

For the first time, the UN was engaged in the search for ways out of the crisis and determination of the further movement of civilization, created the International Commission on Environment and Development in order to develop a “global program of changes”, which pointed out the connection between economic and social development problems with environmental problems.

At the same time, an important contribution was made by the scientific reports of the Club of Rome, which formulated the ideas of the transition of civilization from exponential economic growth to a state of “global dynamic equilibrium”, from quantitative to qualitative growth and a “new world economic order.”

All this served to form a new the institutional component – the ministries and departments responsible for environmental policy and the environment. As a result, there was a large-scale spread of “sustainable development” in order to long-term satisfaction of basic needs with the rational use of natural resources and formations go down to 2030, within which 17 Sustainable Development Goals Based on the principles of sustainable development defined by these documents, the world has begun the process of approving its own program initiatives to ensure it, taking into account national characteristics.

In Ukraine, the processes of forming a regulatory framework on environmental policy and ensuring sustainable growth began with the adoption of certain legislative initiatives in the field of environmental protection. Important legal documents in this direction are the Concept of Sustainable Development of Human Settlements, according to which socially, economically and environmentally balanced development of urban and rural settlements is assumed, and the Comprehensive Program for the Implementation of Decisions at the National Level was adopted directly. It should also be noted the approval of the National Action Plan for Environmental Health for 2000-2005, the Program for the Use of Production and Consumption Wastes for the Period until 2005, the Ukraine-EU Action Plan, which contains important initiatives to harmonize Ukrainian legislation with norms and standards. EU, ensuring the country's economic, social and environmental growth, and then the National Environmental Action Plan for 2011-2015. and a range of other fragmented initiatives towards environmental and social sustainability.

In addition, several legislative attempts were made to approve the concept of sustainable growth in Ukraine, in particular in 2001, 2004 and 2012. Now the achievement of balanced sustainable growth is identified as a strategic development priority both at the level of the national economy and regional and business ecosystems. Therefore, at the state level, the strategic guidelines for the balanced development of the country are outlined in

the Sustainable Development Strategy “Ukraine 2020”, which defines the implementation of 62 reforms and development programs of the state within four vectors of movement: development, security, responsibility and pride. It should also be noted on the Concept of Ukraine’s transition to sustainable development, the purpose of which is to ensure a high quality of life for current and future generations based on a balanced solution to the problems of socio-economic development, preservation of the natural environment, rational use and reproduction of the state's natural resource potential. The modern transformation of the Ukrainian economy in the process of integration into the world society and the country's active participation in globalization processes necessitate a balanced development of domestic enterprises based on the preservation of their structural features, potential and capacity. This requires the participation of various stakeholders and stakeholders in order to develop balanced consumption in view of the principles of consistency and the like.

4.1. Justification of the concept of sustainable development of enterprises in the context of digital transformations

The content of the concept of sustainable development of an enterprise should be formed on the basis of a system-process approach. It should be based on the synthesis of three basic components: economic, social and environmental, and represent a model of economic growth of an enterprise, in which the use of resources is aimed at meeting the needs of the enterprise while ensuring a stable balance of the socio-ecological-economic system (Fig. 1).

The general idea of the concept is the sustainable development of the enterprise (SDE), the object is the economic, environmental and social activities of the enterprise, and the subject is the management system for the economic, environmental and social development of the enterprise under the influence of external and internal factors. At the same time, the paradigm is the provision of sustainable development of the internal and external environment through the harmonization of economic, environmental and social activities through the phased implementation of the concept in order to substantiate the development vector and its most overwhelming trajectory.

Since the concept is a systematization of all generated ideas for understanding the development and has to answer the question of how to achieve the general idea, it is advisable to present the process of its implementation, consisting of the following stages [11-13]:

1. Determination of the regulatory and information base regarding the legal framework and strategy of the country for the transition to sustainable development, the main trends in the world of enterprise development in the use of digital technologies.

2. Identification of factors of positive and negative influence on the activities of the enterprise of the processes of globalization and identification of existing problems in ensuring sustainable development.

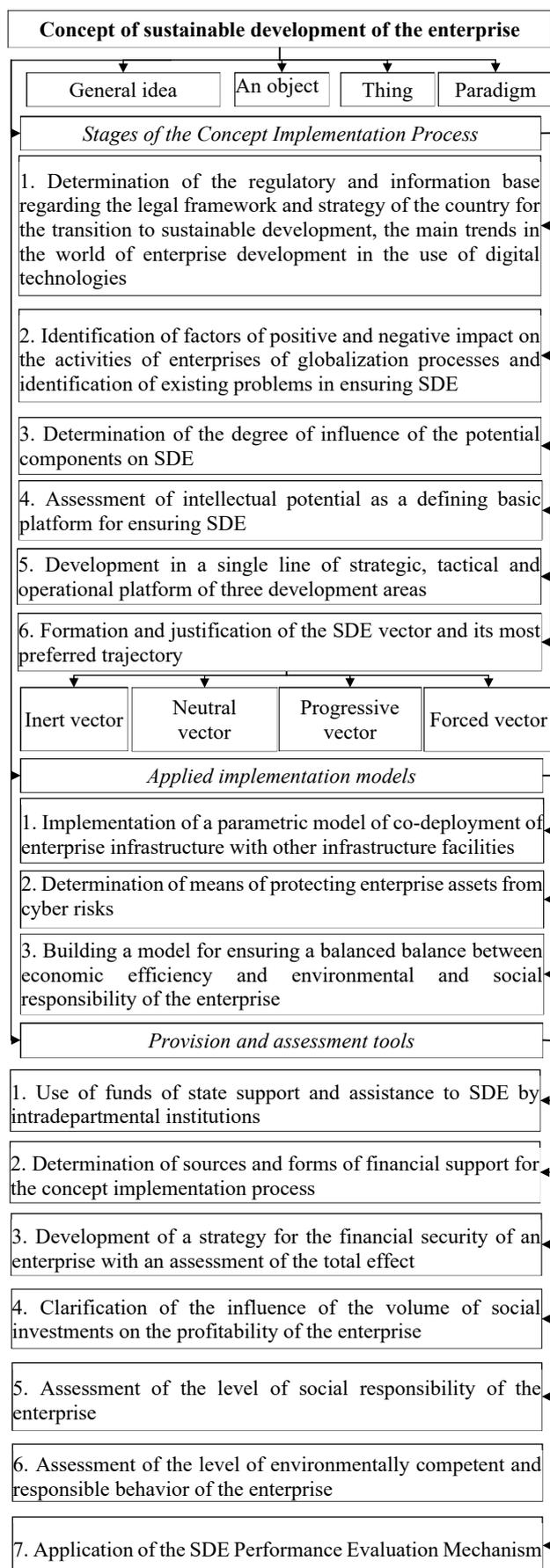


Fig. 1. Concept of sustainable development of the enterprise.

3. Determination of the degree of influence of the components of the potential on the sustainable development of the enterprise to determine the synergistic effect of sustainable development, taking into account digital transformations and the uniqueness of the communication and informatization sphere, taking into account the degree of economic, environmental, social, technological and intellectual potential. This analysis provides background information for identifying the benefits of the current state of the enterprise and modeling future states in a space-time aspect.

4. Assessment of intellectual potential as a determining base platform for ensuring sustainable development of the enterprise.

5. Development in a single channel of a strategic, tactical and operational platform of three directions of development – economic, environmental and social with modeling of possible states: the potential for survival, the potential for sustainability and development. They should provide for a set of strategic and tactical measures to implement the transition from an initial level to a new quality one in accordance with the chosen vector along a certain trajectory.

6. Formation and substantiation of the vector of sustainable development and its most overwhelming trajectory, that is, the direction of the enterprise. Sustainable development of an enterprise as a projection of its goals and capabilities in the context of the need to adapt to transformational changes can occur by:

- the inert vector, which is characterized by the situation of resistance to the process of sustainable development of the enterprise from the stakeholders of the near and far circle, consists in reducing the performance indicators of the enterprise, weakening the internal and external positions, the significant influence of unfavorable factors requiring immediate elimination of threats and restoration of the dynamic consistency of business processes

- a neutral vector, which can be considered as a transitional / waiting state in the short term for the formation of the necessary basis for further development, which is characterized by a controlled delay in development and a local concentration of the enterprise's activities aimed at forming sufficient financial support for the implementation of appropriate social and environmental investments;

- a progressive vector, is determined by the transition to frontal development, which provides for both economic development and fundamental socio-ecological development and covers various functional subsystems of the enterprise, based on the intensification of the use of the development basis, maximum use of existing opportunities in order to gradually achieve hierarchical strategic goals and the formation qualitative potential state;

- a forced vector, which provides for the transition to a comprehensive sustainable development of the enterprise, aimed at ensuring, maintaining and maintaining the balance of qualitative development in order to repel negative and absorb positive impulses from the external environment with the aim of further sustainable functioning and performance of economic,

social and environmental functions within the formed harmonious space by focusing the enterprise not only on internal business processes and building internal potential, but also on ensuring the development of society.

Determining the trajectory of the enterprise's development allows us to find out how realistic it is to approach the upper limit of dynamic equilibrium in the process of enterprise development, for which it is necessary to establish a list of economic, social and environmental measures that contribute to this, without losing stability and reducing the level of security of the enterprise (staffing, information protection). The plane of socio-ecological and economic sustainability changes in the process of enterprise development, providing the necessary level of flexibility and adaptability, which is due to the variability of external and internal conditions of functioning. The concept of sustainable development of the enterprise provides for the implementation of applied models in the activities of the enterprise, in particular [14-16]:

1. Implementation of a parametric model of joint deployment of enterprise infrastructure with other infrastructure facilities into economic activity, taking into account technical, geographical, organizational and socio-economic factors to strengthen financial stability and security.

2. Determination of means of protecting enterprise assets from cyber-attacks (based on the identification of the most vulnerable assets and the formation of a matrix for systematizing cyber threats by determining the degree of cyber-attacks.

3. Building a model for ensuring economic efficiency and environmental and social responsibility of an enterprise using a mechanism for managing transformation processes in the process of transition to sustainable development in the context of digitalization of activities.

4.2 Implementation and assessment tools

The tools for ensuring the implementation of the concept and assessing its effectiveness are:

1. Use of funds of state support and assistance to sustainable development of enterprises by intradepartmental institutions. Support and promotion of sustainable development by enterprises should take place on the principles of public-private partnerships to form social dialogue, the widespread introduction of corporate social responsibility, which, in turn, will facilitate effective cooperation and fulfillment of obligations to ensure sustainable consumption and production. That is, government regulation should stimulate the activation and actualization of the use of all types of available resources, revealing modern potential market and social opportunities, organizing stimulating conditions for intensification, maintaining a favorable environment for increasing the efficiency of business and improving the quality of services provided [17].

2. Determination of sources and forms of financial support for sustainable development of enterprises. The sources for the implementation of the concept can be as

own financial resources: profit, income, depreciation charges, insurance funds; and attracted financial resources on various terms of return: credit funds of financial institutions and other organizations, issue of shares, investments, sponsorship; while the forms of financial support can be external financing and self-financing. Financial support for the sustainable development of enterprises should occur through constant analysis of the compliance of the financial condition of the enterprise with a certain plane of sustainable space. The choice of each source and form of financial security must be justified in accordance with its characteristics, taking into account the disadvantages and advantages that can significantly affect the functioning of the enterprise. Depending on the vector of development and its trajectory, the volume of each source of financing will change in the total volume of financial resources of the enterprise.

3. Development of a strategy for the financial security of an enterprise with an assessment of the total effect of its implementation. Financial resources are one of the basic conditions for ensuring sustainable development of the enterprise and the formation of positive results of its functioning. Therefore, the existence of an effective financial security strategy that will protect the enterprise from threats requires careful consideration by the enterprise. The strategy of the economic security of the enterprise is an integral part of the formation and implementation of the general strategy of the enterprise development, since it is responsible for the goals, directions, sources and objects of financing. It provides all the main directions of the development of financial activities and financial relations of the enterprise.

4. Clarification of the influence of the volume of social investments on the profitability of an enterprise in order to form more perfect and effective ways to increase the competitiveness of enterprises and their value.

5. Assessment of the level of social responsibility of an enterprise involves taking into account the basic, corporate and higher levels of social responsibility in order to determine the effectiveness of the path of social investment.

6. Assessment of the level of environmentally competent and responsible behavior of the enterprise, taking into account the management's policy in helping to maintain the desired state of the environment by: implementing measures aimed at motivating changes in the behavior of its stakeholders, aimed at reducing the negative impact on the environment and human health; search for solutions that do not contradict the goals of sustainable development of the country.

7. Application of a mechanism for assessing the effectiveness of sustainable development of an enterprise in the context of digital transformations, based on the principles of building neural networks and aimed at determining the generalized multiplier of the effectiveness of sustainable development of an enterprise.

Thus, the scientific and practical meaning of the concept of sustainable development based on the system-process approach is substantiated, it is contained in the triad "existing initial state – development potential – change in the qualitative state" and makes the

management of individual subsystems of enterprise development, constitute a single integral socio-ecological economic system of sustainable development [18-19]. This approach will optimize the methods and tools used, increase adaptability to fluctuating conditions, and will also serve as a guarantee of responsibility to the owners of the enterprise (receipt of dividend income), employees (a decent level and timeliness of remuneration, career growth, socio-cultural development), partners (successful and effective long-term cooperation), local and state authorities (ensuring long-term development and participation in charitable events in the regions of presence, replenishing the budget with tax revenues), as well as consumers (ensuring and raising people's awareness of the possibilities of using IT services, promoting the popularization of services, training citizens, environmental and socially responsible business) [20].

5 Conclusions

Using the system-process approach as a scientific basis, the content of the concept of balanced development, taking into account the peculiarities of the activities of a telecommunications enterprise, is generalized, based on the synthesis of three basic components: economic, social and environmental, and is aimed at ensuring their harmonization. The process of implementing the concept is aimed at choosing the most optimal (in existing conditions) trajectory of balanced development, is selected from inert, neutral, progressive, forced vectors. The concept of balanced development of enterprise is implemented through the use of applied models and tools to ensure and assess the effectiveness of sustainable development. Ensuring the implementation of the concept of sustainable development is expected through the use of applied models, in particular, the implementation of a parametric model of joint deployment of enterprise infrastructure with other infrastructure facilities in economic activity, taking into account technical, geographical, organizational and socio-economic factors to strengthen financial stability; building a model for ensuring a balanced balance between economic efficiency and environmental and social responsibility of an enterprise using a mechanism for managing transformation processes in the process of transition to sustainable development in the context of digitalization.

References

1. K. Andriushchenko, A. Buriachenko, O. Rozhko, O. Lavruk, P. Skok, Y. Hlushchenko, Y. Muzychka, N. Slavina, O. Buchynska, V. Kondarevych, Peculiarities of sustainable development of enterprises in the context of digital transformation. *JESI* **7**, 2255 (2020)
2. R. Sharma, A.-R. Fantin, N. Prabhu, C. Guan, A. Dattakumar, Digital literacy and knowledge societies: A grounded theory investigation of sustainable development. *Telecommunications Policy* **40**, 628 (2016)
3. J. Mao, C. Li, Y. Pei, L. Xu, *Circular Economy and Sustainable Development Enterprises* (Springer Singapore, 2018), pp. 201–221
4. Y. Zaloznova, N. Trushkina, Management of logistic activities as a mechanism for providing sustainable development of enterprises in the digital economy. *Virtual Economics* **2**, 64 (2019)
5. T. Osburg, C Lohrmann, *Sustainability in a digital world* (Springer International, 2017)
6. I.W.E. Arsawan, V.Koval, I. Rajiani, N.W. Rustiarini, W.G. Supartha, N.P.S. Suryantini, Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage. *International Journal of Productivity and Performance Management* (2020 in press) doi:10.1108/IJPPM-04-2020-0192
7. O. Pappas, P. Mikalef, Y. K. Dwivedi, L. Jaccheri, J. Krogstie, M. Mäntymäki, *Digital Transformation for a Sustainable Society in the 21st Century* (Springer International Publishing, 2020)
8. Bokolo Anthony Jnr, Managing digital transformation of smart cities through enterprise architecture – a review and research agenda. *Enterprise Information Systems* **1**, 1-33. (2020) doi:10.1080/17517575.2020.1812006.
9. N. Shmygol, F. Schiavone, O. Trokhymets, D. Pawliszczy, V. Koval, R. Zavgorodniy, A. Vorfolomeiev, Model for assessing and implementing resource-efficient strategy of industry. *CEUR Workshop Proceedings* **2713**, 277-294 (2020)
10. ICT Development Index. International Telecommunication Union (n.d.). ITU-D ICT STATISTICS. <https://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx>. Accessed 21 Mar 2021
11. S.A. Bello, S. Johnson, Role of ICT in managing higher education for sustainable development. *Makerere Journal of Higher Education* **3(1)** (2011)
12. N. Bostel, P. Dejax, Z. Lu, The Design, Planning, and Optimization of Reverse Logistics Networks, in *Logistics Systems: Design and Optimization*, ed. by A. Langevin, D. Riopel (Springer, Boston, 2005)
13. Yu. Ivanov, N. Tyshchenko, N. Drobytko, O. Abramov, *Enterprise competitiveness: assessment, diagnostics, strategy* (Kharkiv, 2004)
14. V. Heiets, M. Kizim, T. Klebanova, O. Chernyak, *Modeling of economic security: state, region, enterprise* (Kharkiv, 2006)
15. R. Tamošiūnienė, C. Munteanu, Current research approaches to economic security. Paper presented at the 1st international conference on business management, Valencia, Spain, 2-3 July 2015
16. R. Grundke, et al., *Which skills for the digital era?: Returns to skills analysis* (OECD Publishing, Paris, 2018)
17. M. Zaki, M.H. Ismail Abdelaa, Digital Business Transformation and Strategy: What Do We Know So Far (Working Paper, 2018)

18. D Kowalski, B Kowalska, T. Bławucki, P. Suchorab, K.Gaska, Impact Assessment of Distribution Network Layout on the Reliability of Water Delivery. *Water* **11**, 480 (2019)
19. C. Matt, T. Hess, A. Benlian, Digital transformation strategies. *Business & Information Systems Engineering* **57(5)**, 339-343 (2015)
20. E. T. Meyer, R. Schroeder, *Knowledge machines: Digital transformations of the sciences and humanities* (MIT Press, 2015)