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2/2022(45)

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IMPACT OF DIGITALIZATION ON THE MANAGEMENT OF INNOVATIVE PROJECTS

Introduction

One of the global megatrends of economic development at the present stage is digitalization. The global pandemic COVID-19 has further accelerated the process of digitization of various spheres of social and economic activity.

It is worth agreeing at this stage that digital transformation is “a process of transition to new ways of enterprise activity through the introduction of digital technologies and digital services, based on strategic partnership of all stakeholders and the simultaneous development of software, digital transformation and assessment of the level of digital transformation of the enterprise” (Nikitin, Kulchytsky 2019). Since in the English-language literature, in contrast to the Ukrainian one, where only one term “digitalization” is used, two concepts are used – “digitization” and “digitalization”, we analyzed both of them. Usually they are interpreted as “digitization is the conversion of an analog data format into a digital one. It refers to internal optimization of processes (eg automation of work processes, minimization of paper use, etc.) and helps to reduce costs”. In turn, “digitalization is a process that goes beyond technology adoption and provides for a deeper, fundamental change in the entire business model and the evolution of work to generate income and create new value; it is a process of transition to digital business” (Chapco-Wade Digitization, Digitalization...). It is worth noting that digitalization cannot happen without digitization. In our opinion, these categories in the context of our research can be considered as general and particular.

Various aspects of the digitalization of the economy and its impact on certain spheres of economic activity are studied by such scientists as: K. Andriushchenko et al. (2019), S. Grytsulenko, O. Umanets (2018), A. Kwilinski (2019), Yu. Nikitin, O. Kulchytsky (2019), N. Trushkina, N. Rynkevych (2020), J. Whyte (2019). Certain aspects of the issue of digitalization of agriculture and management of innovative projects of agricultural enterprises were considered in our previous studies [8-11]. This article is a logical continuation of the author's scientific research on the problem raised.

Purpose, scope and research method

The purpose of the article is to present the results of a study of the impact of digitalization on the management of innovative projects of agricultural enterprises.

The study used the following methods: bibliometric and graphic analysis (evaluation, visualizing and analysis of publishing activity in the field of digitization based on the Scopus database); economic-and-statistical (analysis of the positions of individual countries on the level of World Digital Competitiveness Index and the Networked Readiness Index); monographic (depth analysis of the issue under study); abstract-and-logical (theoretical generalization); analysis and synthesis (analysis and formulation of conclusions). A bibliometric analysis of the publication activity of scientists in this area of research was carried out over the past 50 years (1970–2019) and an extrapolation forecast of this activity in the world for the period up to 2025 was constructed. The object of analysis is publications indexed in the Scopus database according to the following key terms: “digitization” and “digitalization” in the category “title”. Data for 2020 included in geographic and industry analysis.

Results and discussion

At the first stage the results of bibliometric analysis are presented. Analysis of Fig. 1 indicates the intensive formation in recent years of a new direction of research related to digitization and digitalization. In total, in the English-speaking academic environment, the term “digitalization” (11002) is used much more often (29.8 times) than “digitization” (369). The largest number of publications was recorded in the reporting year – 71 works with the term “digitization” and 3069 works with the term “digitalization”. Given the exponential increase in the number of articles in recent years, there is every reason to recognize this megatrend as one of the most relevant and significant both for science and for management and economic practice in the agricultural sector. In the case of maintaining the existing growth rates, it is possible to predict a twofold increase in the number of publications in this area already in 2025.

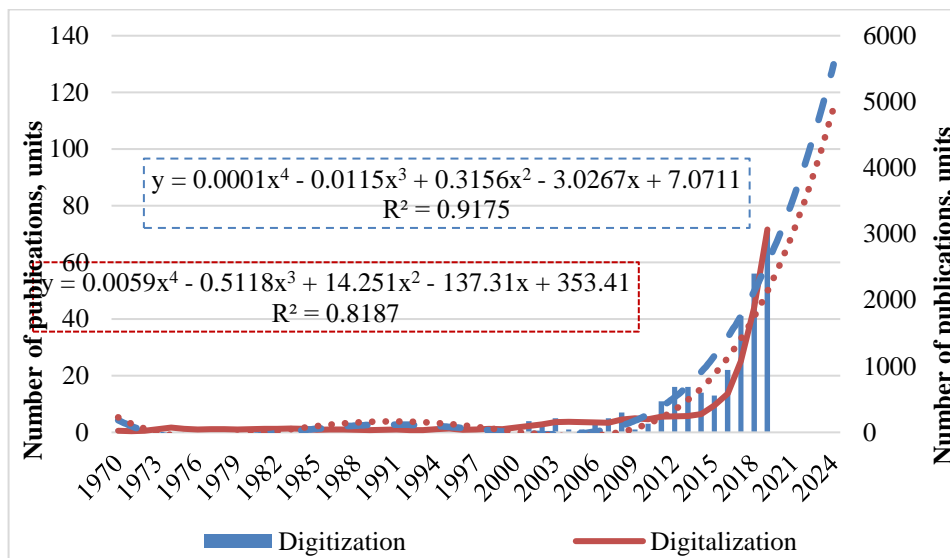


Figure 1. Dynamics and forecast of the number of publications indexed in Scopus containing the terms “digitization” and “digitalization” in the title
Source: built by the author based on data from the Scopus database.

Geographic analysis of the distribution of the selected works made it possible to identify the TOP-10 countries in which the issue of digitization and digitalization is being studied most intensively (Fig. 2). Thus, according to the term “digitization”, more articles were published by scientists from Germany (23.8%), USA (21.7%), England (8.9%), China (4.6%), Russia (4.3%), Italy (3.3%), Switzerland (3.3%), France (3.0%), Netherlands (3.0%) and Australia (2.7%). In terms of “digitalization”, the top ten countries mainly include the same countries, but in a different order: Germany (24.6%), Russia (13.3%), China (10.2%), USA (9.0%), Italy (6.1%), England (6.0%), Sweden (5.2%), Spain (4.8%), France (4.6%) and Finland (4.4%). In general, the TOP-10 leaders accounted for 78.6% and 88.2% of the world volume of publications, respectively, in terms of “digitization” and “digitalization”, and this is one of the few cases when the absolute world leader was not the USA or China, but Germany. It is noteworthy that Ukrainian scientists had only three works with the term “digitization”, indexed in Scopus, which is 0.8% of the world volume.

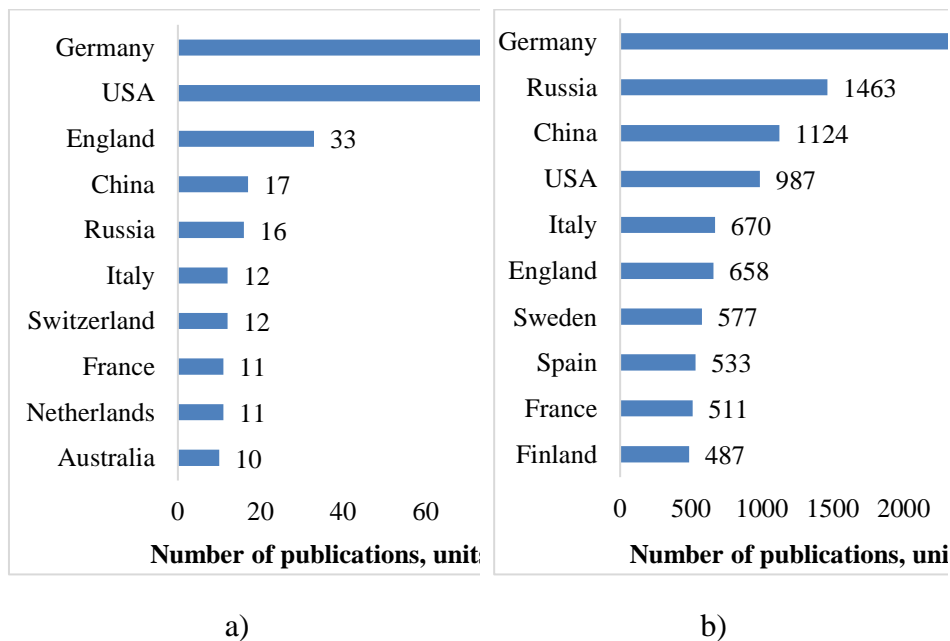


Figure 2. TOP-10 countries by the number of publications indexed in Scopus, which contain the terms “digitization” (a) and “digitalization” (b) in the title, 1970–2020
Source: built by the author based on data from the Scopus database.

The results of the analysis of the sectoral distribution of publications indexed in Scopus with the term “digitization” (Fig. 3) showed that the leading positions are occupied by such sciences: business, management and accounting (29.3%), agricultural and biological (11.2%), engineering (11.1%), decision making (9.2%), economics, econometrics and finance (9.2%). At the same time, the term “digitalization” became more widespread in the following sciences: engineering (18.7%), computer (18.0%), social (10.6%), business, management and accounting (8.4%), several less often it was used in economics, econometrics and finance (3.2%).

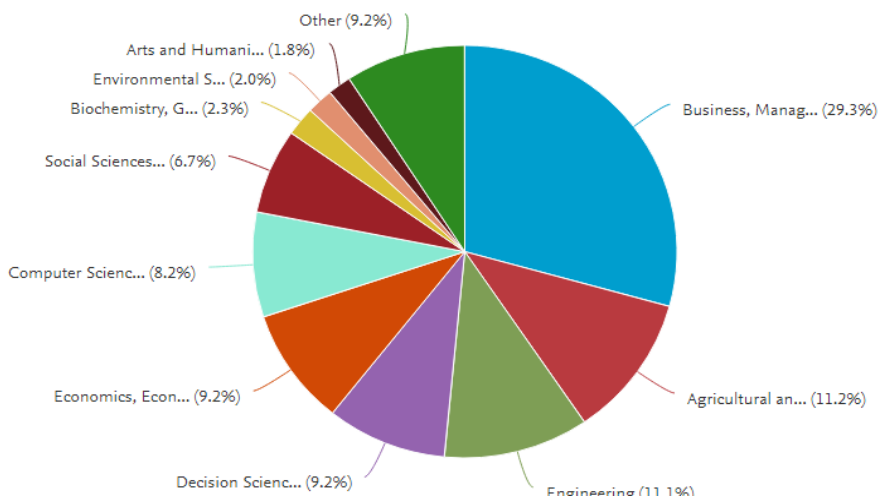


Figure 3. Distribution by fields of knowledge of publications indexed in Scopus, which contain the term “digitization” in the title, 1970-2020
Source: built based on data from the Scopus database.

The leading organizations in terms of the number of funded research on digitization belong to the National Science Foundation, Horizon 2020 Framework Program, National Natural Science Foundation of China and others (Fig. 4); on digitalization – National Natural Science Foundation of China, Russian Foundation for Basic Research, European Commission and other.

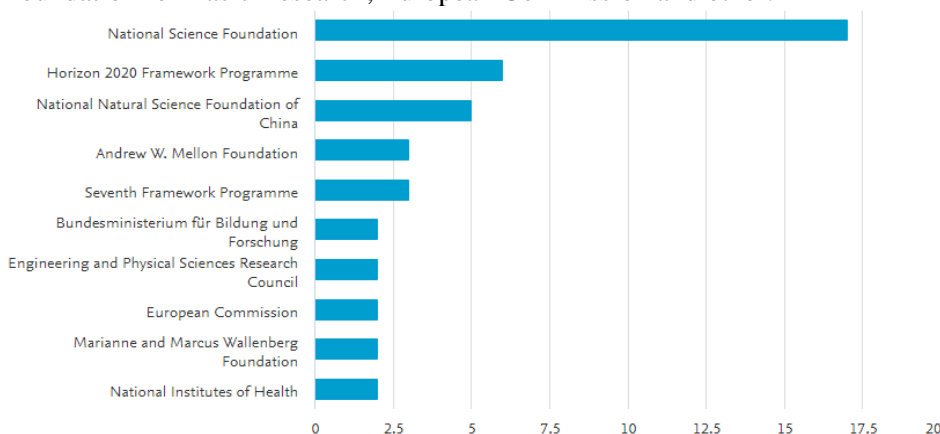


Figure 4. TOP-10 organizations by the number of funded publications indexed in Scopus, which contain the term “digitization” in the title
Source: built by based on data from the Scopus database.

It has been established that the low level of infocommunication development of Ukraine in comparison with geographically close countries

reduces the ability to achieve the key goals of digital strategies, placing the following tasks in the foreground: development of ICT infrastructure due to increased access and innovativeness of communication networks; ensuring access of the population, business and government to ICT; sustainable development of the ICT manufacturing subsector (Grytsulenکو, Umanets 2018).

Thus, one of the current megatrends of economic development is digitalization, but according to the World Digital Competitiveness Index, Ukraine does not currently have a leading position in the world and Europe (Table 1).

Table 1. The place of Ukraine and Poland in the ranking of countries according to the World Digital Competitiveness Index

Indexes	Years							
	2013	2014	2015	2016	2017	2018	2019	2020
<i>Ukraine</i>								
Digital Competitiveness Index	54	50	59	59	60	58	60	58
<i>Knowledge</i>	35	29	40	44	45	39	40	38
Talent	52	46	55	58	57	55	57	52
Training & education	8	4	15	20	26	22	21	19
Scientific concentration	40	42	39	45	45	40	49	50
<i>Technology</i>	58	58	60	60	62	61	61	59
Regulatory framework	54	47	55	55	56	54	54	54
Capital	57	56	60	60	62	61	62	59
Technological framework	56	58	60	58	60	57	60	58
<i>Future readiness</i>	57	58	61	61	61	61	62	61
Adaptive attitudes	57	60	60	60	58	53	59	56
Business agility	48	58	58	59	56	53	45	51
IT integration	59	61	61	60	60	61	61	62
<i>Poland</i>								
Digital Competitiveness Index	36	39	38	38	37	36	33	32
<i>Knowledge</i>	30	36	31	27	32	33	33	30
Talent	20	31	22	17	28	30	28	29
Training & education	40	33	34	22	23	35	35	32
Scientific concentration	42	43	41	39	40	38	31	28
<i>Technology</i>	34	37	36	36	39	37	37	37
Regulatory framework	36	43	38	45	47	46	45	46
Capital	24	35	28	32	32	32	38	36
Technological framework	39	34	34	39	39	37	30	23
<i>Future readiness</i>	52	50	49	51	39	37	33	35
Adaptive attitudes	54	54	52	51	38	33	37	29
Business agility	57	52	55	55	45	40	28	33
IT integration	43	40	41	41	41	40	36	38

Source: formed by the author based on IMD World Digital Competitiveness Ranking.

Analysis of the dynamics of changes in rating positions according to the World Digital Competitiveness Index of Ukraine indicates the absence of a clear trend both in general and in the context of specific components of this index. Comparative analysis shows that Ukraine's positions are almost twice as bad as those of neighboring Poland. A similar situation is typical for the positions of Ukraine and Poland in the network readiness index (Fig. 5). In the dynamics of the Networked Readiness Index of Ukraine, a generally positive trend was recorded, however, there are still significant opportunities to increase the network readiness at least to the level of Poland. It is obvious that the growth of digitalization of the economy and society will take place in the future, which will have an impact on the agricultural sector of the economy.

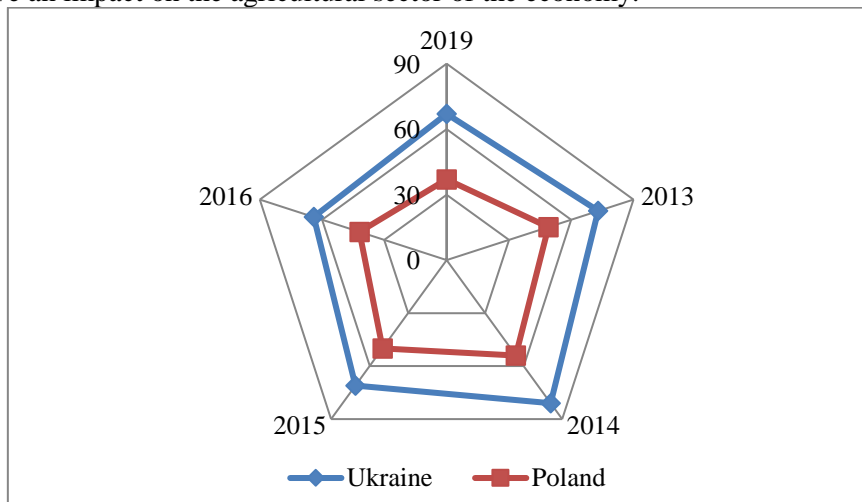


Figure 5. The place of Ukraine and Poland in the ranking according to the Networked Readiness Index

Source: built by the author based on Networked Readiness Index.

The results of the analysis of trends in project management in the context of innovation in the digital economy shows that social uncertainty and technological change require sophisticated methods based on information technology, deep economic analysis and the manifestation of soft behavioral skills to meet market needs (Pereira Araujo 2019). Digitalization is obviously one of the reasons for the growth in the number and proportion of employees working remotely, which will strengthen the trend towards using remote teams in project management in the near future. Therefore, we fully support the proposal of scientists to introduce the concept of “remote team” (in-house team), which is understood as “a group of persons, on appropriate conditions, attracted by the enterprise to implement the project and who are not united by a single workspace, are located in different places and work in a flexible manner schedule over specific

tasks for them to achieve a common goal, which initiated the formation of such a group” (Zachosova, Zhyvko, Zanora 2020). There are other approaches to typing and terminology of remote project teams Krasnokutska, Podoprykhina 2020). In the context of remote work, non-technical (personal and communication) skills (so-called “soft skills”) of project team members are of particular importance (Krasnokutska, Osetrova 2020).

The digitalization of the management of innovative projects in the agricultural sector presupposes “saturation of the physical world with electronic digital devices, means, systems aimed at enhancing electronic and communication exchange between business entities, in fact creating a cyber-physical space for the collaboration of agents of business agroecosystems with natural resource objects of concentration of stakeholder interests, carriers of forms of ownership, constituting legal and financial relations, while creating new sources of added value” (Digitization as an innovative direction of implementation of the spatial model of management of natural resource assets 2020). On the other hand, digitalization is an innovative direction for the implementation of a modern model of innovative project management.

The use of digital technologies is transforming the models of project implementation, in particular, the implementation process becomes shorter and cheaper; enhances the ability to share, remotely access, search and update information about the supply chain and relationships with owners, operators and end users; recognize the growing importance of digital workflows and analytics, rather than documents (Whyte 2019), provides information technology management support, include artificial intelligence, blockchain and advanced communication capabilities and speed.

Most managers are increasingly realizing, or at least in the near future, that the role of geographic information systems (GIS) in the management of innovative projects in the agrarian sector will grow, since activity here is directly related to location. For example, in the work of Chinese scientists, a case was demonstrated on the use of GIS in managing the quality of agricultural land. They developed two interconnected systems: the desktop GIS program “Map Draw Tool” and a program based on WebGIS. Experience has shown that the proposed system can effectively prevent inaccurate and duplicate phenomena in project management, and facilitates the supervision of their publication on the Internet using a web map (Ren, Hou, Lu 2013).

In today's digital society, there is a need to develop new intelligent project management methodologies that generate management methods in the environments of natural, artificial and combined intelligences. Currently, the most effective way can be hybridization and convergence of existing methodologies (Bushuyev, Bushuyev, Neizvestny 2020). Digitalization and intellectualization transform the content and roles of the subject (reducing the role of empathy, intuition), the object and processes for managing innovative projects (introducing

digital technologies into the sphere of making managerial decisions). So, V. M. Burkov, I. V. Burkova described two types of digital decision-making technologies: direct, or traditional, when a decision is made by a person, and a computer program acts as an “advisor”, and the opposite, when a decision is made by a computer program, and a person only observes and analyzes (Burkov, Burkova 2018). It is obvious that both of these types will become widespread in the management of innovative projects. A certain confirmation of this is the well-grounded A. Fuentes-Penna, J. A. Ruiz-Vanoye, O. Díaz-Parra, a new approach to project management based on the CPLEX-method, provides for project planning based on the integration of artificial intelligence with project management. For this, scientists have developed a mathematical model, the target function of which is to minimize the cost of resources (Fuentes-Penna, Ruiz-Vanoye, Díaz-Parra 2017).

With the formation of the digital economy, smart innovations emerge, are modified and spread, which can be distinguished into a separate class of innovations. Smart as a property of an object characterizes the integration through the use of the Internet in this object of previously incompatible elements. Smart property is manifested through: the ability to adapt to environmental conditions; self-development and self-control; effective solution of the task and achievement of the result (Yashchyshyna 2018). So, “it is already technologically possible to remotely in smart-mode (online) e-business infrastructure, e-business, e-commerce to cultivate agricultural land, to harvest” (Koliadenko 2020); to carry out online financial transactions, communications, exchange of experience and consultations, e-commerce, receive information in real time on weather and soil-and-climatic conditions, to manage precision farming systems (Voloshchuk 2019). It is clear that digital transformation includes purchases, sales, management of logistics, costs, promotion of advertising, production (Andriushchenko, et al., 2019). Thus, digitalization permeates production, sales and management processes in modern agricultural production.

Conclusions

Based on the study, the following conclusions were made:

1. The bibliometric analysis of the publication activity of scientists over the past 50 years (1970-2019) made it possible to identify the growing dynamics of the intensity of research in the field of digitalization as one of the main megatrends of economic development and to build a forecast of this activity in the world until 2025.

2. Analysis of the dynamics of changes in rating positions according to the World Digital Competitiveness Index of Ukraine indicates the absence of a clear trend both in general and in the context of specific components of this index. At the same time, a positive trend has been recorded in the dynamics of the

Networked Readiness Index in Ukraine, but there are still significant opportunities to increase the network readiness at least to the level of Poland.

3. Summarizing the results of a theoretical analysis of the impact of digitalization on innovative projects as objects of management, the need to take into account this global megatrend of economic development, in particular the focus of innovative solutions in agribusiness 4.0, in the development and implementation of a conceptual model for managing innovative projects of agricultural enterprises, is determined.

4. Digitalization will obviously have a positive impact on innovative projects as an object of management and will require project managers and personnel of agricultural enterprises to possess digital competencies, which requires special research in the future.

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Abstract

The article presents the results of a study of the impact of digitalization on the management of innovative projects of agricultural enterprises. A bibliometric analysis of the publication activity of scientists in 1970–2019 in the field of digitalization in the world was performed. A comparative analysis of the dynamics of changes in the rating positions of Ukraine and Poland according to the World Digital Competitiveness Index and the Networked Readiness Index is carried out. The main directions of the influence of digital technologies on the management of innovative projects in the agricultural sector of the economy are characterized.

Keywords: digitalization, innovative project, project management, agriculture.

JEL Classification: M2.