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Mykola Rudenko

D.Sc. in Economics, Professor, Head of the Department of Management, Information Technology and Law of the Cherkasy Educational and Scientific Department, Ivan Franko National University of Lviv, Cherkasy, Ukraine; e-mail: mykola_rudenko@ukr.net; ORCID: [0000-0002-1966-7695](https://orcid.org/0000-0002-1966-7695) (Corresponding author)

Tamara Berezhanko

D.Sc. in Economics, Professor, Head of the Department of Labor Economics and Management, National University of Food Technologies, Kyiv, Ukraine; ORCID: [0000-0001-9228-4239](https://orcid.org/0000-0001-9228-4239)

Ihor Halytsia

D.Sc. in Economics, Professor of the Department of Labor Economics and Management, National University of Food Technologies, Kyiv, Ukraine; ORCID: [0000-0002-1276-5743](https://orcid.org/0000-0002-1276-5743)

Mykola Dziemulych

PhD in Economics, Associate Professor of the Department of Economics, Lutsk National Technical University, Lutsk, Ukraine; ORCID: [0000-0003-3714-5062](https://orcid.org/0000-0003-3714-5062)

Olena Kravchenko

PhD in Economics, Associate Professor of the Department of Management and Civil Service, Bohdan Khmelnytsky National University of Cherkasy, Cherkasy, Ukraine; ORCID: [0000-0002-8776-4462](https://orcid.org/0000-0002-8776-4462)

Vladyslav Krivorychko

PhD Student, State Tax University, Iripin, Ukraine; ORCID: [0000-0002-9834-9387](https://orcid.org/0000-0002-9834-9387)

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INTERNATIONAL EXPERIENCE OF CAPITALIZATION OF KNOWLEDGE IN TERMS OF INNOVATION ECONOMY

ABSTRACT

The article examines the problems of knowledge capitalization in the innovation economy paradigm. The modern globalized world is characterized by the commercialization of educational and scientific activities, the formation of educational ecosystems, as well as the capitalization of knowledge as a resource. The paper describes the theoretical basis of knowledge capitalization and defines the stages of the formation of academic capitalism. It is defined that the capitalization of knowledge is an increase, the maximization of the value of own and engaged intellectual assets, as a result of the increase in the influence of higher education institutions and scientific institutions on the scientific-technical and socio-economic development of society, and commercialization is the process of turning knowledge into a commodity.

A system of statistical indicators of capitalization of knowledge within the economy has been established (expenditures on education; the number of patents; share of costs for scientific research and development; costs for innovative activities; share of innovative enterprises in the total number of enterprises; share of income from the sale of innovative products to the total volume of products sold). The methodology for calculating the model of the change in GDP per capita has been developed, taking into account the indicators of knowledge capitalization, and the algorithm of necessary actions regarding its application has been described. The hypothesis about the impact of capitalization of knowledge on the economic development of the state, namely the change in macroeconomic indicators, such as GDP (gross domestic product) per capita, has been confirmed.

The author's formula for determining the coefficient of the economic effect from the capitalization of knowledge is proposed, which reflects the ratio of investments in knowledge-creating (innovative activity) to the income received from the implementation of an innovative product. Investments in knowledge-creating activities are the number of expenses for scientific research and development, so the innovative product is a patent, as a formalized unit of knowledge. The calculation of the coefficient of the economic effect of knowledge capitalization for Ukraine and the Republic of Poland was carried out, which clearly showed the expediency of implementing the knowledge capitalization experience of Poland and the need for a balanced internal policy to stimulate educational, scientific and innovative activities with the attraction of appropriate investments in Ukraine.

Keywords: capitalization of knowledge, innovative economy, scientific activity, experience, macroeconomic indicators, economic effect

JEL Classification: I250, O320

INTRODUCTION

The post-industrial economic model is increasingly based on the key role of knowledge as the main resource in ensuring economic growth [1]. The economic development of the state directly depends on the quality of education, and then capitalization of knowledge - this is the basis of the knowledge economy, the transition to which is an inevitable process. Under modern conditions, education and science are gradually becoming advanced branches of production and are significantly influenced by the market.

This influence appeared primarily through the formation of a competitive market environment of education, the use of market tools and approaches to the management of educational and scientific institutions, the development of a network of partnerships between educational institutions and business structures, the commercialization of educational and scientific activities, the formation of educational ecosystems, as well as the capitalization of knowledge as a resource.

As a result of global reforms in higher education, a peculiar environment of commercial education appeared, which requires the formation of new rules of interaction, status-role relationships, and value-normative formations. Today, the education system in Ukraine is at the stage of adapting to new global requirements, changing value orientations, and transitioning from industrial approaches to education and conducting research to post-industrial ones. The duration of this stage of development depends on how well each institution of higher education will be able to capitalize on and manage its knowledge. Accordingly, he will be able to maintain such a highly competitive position in both the national and global markets [2]. Nevertheless, there are scientific disputes in society about how large-scale this process is, in what form it takes place, and how it affects the quality of the provision of educational services. An important aspect remains the formation of a set of indicators for assessing the level of knowledge capitalization, formation of the commercial value of a unit of knowledge, design of knowledge management business processes, etc.

The above-mentioned trends in the development of the education system require not only theoretical but also quantitative research for the possibility of improving the strategy for the development of the education system in Ukraine in the future. First of all, it is necessary to investigate the level of influence of the education system, in the aspect of capitalization of knowledge, on the economic development of the state with the help of quantitative and qualitative statistical indicators. It is necessary to find out at what stage of the transition to the knowledge economy the education system of Ukraine is in comparison with countries with similar socio-economic models, as well as to analyze the indicators of capitalization of knowledge in the economy and the significance of their influence in dynamics.

LITERATURE REVIEW

The problem of capitalization and commercialization of knowledge has been the subject of scientific discussions since the beginning of the 2000s. S. Slaughter and L. Leslie are key researchers of the topic of academic capitalism, in particular, in the aspect of commercialization of knowledge [3;4]. In their writings, scientists reveal the key essences of capitalization of education, the integration of economic laws into the educational space, the formation of the education market, and the competitive struggle of universities in the market. In particular, R. Burton is the theoretician of the term "entrepreneurial university" [5]. The scientist B. Jessop (B. Jessop) identified the key stages of the formation of academic capitalism and also analyzed in which direction the capitalization of knowledge turns into a utopian one. The works of K. Lynch [6], actualizes the issue of responsibility for the quality of education in the market system. The scientist believes that the tendencies of academic capitalism are inevitable in the market economy.

Among domestic researchers, it is worth identifying O. Romanovsky [7], whose writings revealed the essence of the concept of "academic capitalism" from a global point of view as a socio-economic phenomenon of the 21st century. The scientist characterizes the academic community as capitalists operating within the public sector – they are entrepreneurs subsidized by the state. Paying tribute to respected scientists, we emphasize that the capitalization of knowledge in the paradigm of building an innovative economy requires in-depth research in the aspects of international experience analysis and the determination of clear indicators of knowledge capitalization, taking into account the domestic practice of statistical accounting.

AIMS AND OBJECTIVES

The purpose of the study is to analyze the theoretical aspects of knowledge capitalization, refuting or confirming the hypothesis about the impact of knowledge capitalization on the economic development of the state, namely the change in macroeconomic indicators, such as GDP (gross domestic product) per capita, as well as the development and further calculation of the coefficient of economic effect from capitalization of knowledge.

METHODS

In the process of implementing the set tasks, a comprehensive toolkit for conducting economic research was used, namely the following methods were used: analysis and synthesis (when disaggregating indicators of capitalization of knowledge into component elements, as well as determining their impact on the state's GDP); the method of abstraction (when

researching the theoretical bases of capitalization of knowledge and describing the stages of the formation of academic capitalism); comparative method (a selection of countries for the analysis of knowledge capitalization experience); statistical (when a set of statistical indicators is defined for the analysis); econometric (when conducting an econometric analysis of capitalization of knowledge and the influence of indicators on changes in the gross domestic product); graphic (when determining the dynamics of changes in the real and projected value of GDP per capita) and other methods of economic research.

RESULTS

The first step of the research is the analysis of the theoretical aspects of knowledge capitalization, namely: the definition of the main concepts, the theoretical bases of knowledge capitalization, and the description of the stages of the formation of academic capitalism to prepare a theoretical foundation for determining indicators and calculating the economic effect of knowledge capitalization.

Knowledge is the driving force of the modern economy. The interpretation of knowledge as an economic resource in the modern realities of digitization and globalization is no longer a new concept [8]. The knowledge economy as a system did not replace the traditional material economy, on the contrary - it supplemented it with new resources, tools, and methods, accelerated and improved production business processes, reassessed the value of education, science, the service sector, and human capital [9;10]. Thus, it is advisable to use economic laws, concepts, and methods of calculating key performance indicators to knowledge as a resource. Knowledge becomes a resource that is suitable for production, acquisition of value, exchange, sale, depreciation, and destruction [11].

Education and science cannot be separated from the economy, its needs, and its requests [12]. These two areas are the key producers of new knowledge today. The knowledge economy forces universities to "think" like a business: evaluate the external environment as a competitive market, analyze the internal environment with indicators of economic efficiency and evaluate their competitive advantages in the market, look for new development opportunities, produce new educational programs according to market requirements, evaluate other institutions of higher education as competitors in the educational market, and companies should be evaluated as business partners. A vivid example of such a partnership is the development of dual education. At the same time, the knowledge economy forces enterprises to continuously invest in knowledge and education: from systematic personnel training to the formation of innovation offices and the development and implementation of new technologies, products, and services. As a result, corporate universities are created within enterprises that "sell knowledge" externally in the form of educational courses, training, and retraining programs. In addition, under the influence of the knowledge economy, such categories as "entrepreneurial university" and "research university" emerged within higher education institutions.

The commercialization and capitalization of knowledge within the framework of the education system, as well as the phenomenon of the spread of entrepreneurial universities, should be considered an integral part of the scientific theory of academic capitalism. The approach of the theory of academic capitalism is not limited to the transformation of knowledge into a commodity but also considers changes in the relationship between universities and their social environment [13;14]. According to Cantwell (2015) [15], academic capitalism is one of the most influential areas of research in the field of higher education. Fundamental studies of this were carried out in the United States, Great Britain, Australia, and Canada [16], developed more intensively in the United States, and recently spread to Europe [17] and Asia [18]. However, there is a gap in the literature regarding its use in developing countries. For example, in Brazil, scholars used the term "academic capitalism" or "university capitalism" to denote neoliberal changes in higher education, primarily implemented at the legislative level, at the same time, no one investigated the theory of academic capitalism from an economic point of view [19].

Academic capitalism in a broad sense is a concept that reveals the activities of institutions of higher education aimed at the creation and transfer of knowledge between the institution and the subjects of the external environment to create economic and social value for both the final beneficiaries and the producer of knowledge, and in which the institution of higher education retains the main role. The concept of academic capitalism includes several key concepts that reveal its essence: intellectual capital, educational market, student markets, knowledge capitalization, knowledge commercialization, knowledge management, knowledge inflation, and entrepreneurial university [20;21]. In a narrow sense, academic capitalism is a form of entrepreneurship and commercialization of the results of activities in the field of science, education, and scientific and educational services in the conditions of market relations, which is carried out by institutions of higher education [22]. Author B. Jossep [23] defines several stages of the formation of academic capitalism in the market economy: 1) commercialization (educational products and research results are turned into goods); 2) initial capitalization (free

trade in knowledge, rationalization of their production); 3) increased capitalization (separation of intellectual labour from means of intellectual production, appropriation of traditional knowledge, privatization of intellectual property, etc.); 4) financialization of knowledge (flow of investments in education and science); 5) profiting of knowledge (knowledge is transformed into capital as an object of ownership).

The economic essence of the concept of "capitalization" includes various interpretations: the transformation of additional value into capital; assessment of the value (cost) of the asset based on the received economic benefits (yield, usefulness, value); use of income to expand the organization's activities; assigning costs to the growth of capital assets and including them in the calculation of the financial result of the following reporting periods through the calculation of depreciation.

Capitalization of knowledge - building up, and maximizing the value of own and engaged intellectual assets, based on the results of increasing the influence of higher education institutions and scientific institutions on the scientific, technical, and socio-economic development of society. Commercialization is the transformation of knowledge into a product. Increasing the influence of market relations on the purpose and tasks of higher education and science increases the value of knowledge as a resource of economic development, which is focused on the concept of the knowledge economy.

Authors Slaughter and Cantwell define five theoretical bases of capitalization of knowledge:

- knowledge networks (connect state institutions, corporations, and universities in conducting market-oriented "entrepreneurial research and training" (Slaughter and Cantwell, 2012) [15;16];
- new funding streams (aimed at financial support of activities that promote a scientific institution or university on the market, namely: patents, licensing, royalties, the publication (open access), translations, editing, divisions, technology parks, and university incubators (hubs);
- interdepartmental (network) organizations (special offices designated for management, promotion, and regulation of distance education services, technology transfer, public-private partnership and intellectual property, scientific and technological development funds, innovation agencies, etc.);
- educational intermediary organizations (formation of networks between the public and private sectors - professional associations, foundations, events, forums, and analytical centres);
- university restructuring offices (process offices), whose activities are aimed at researching the internal state of the university management system and finding ways to reduce costs and capture new parts of the educational market.

The practical application of the above knowledge capitalization mechanisms can contribute to the implementation of market behaviour, which in turn will lead to a capitalist policy of knowledge dissemination.

The next step of the research is to refute or confirm the hypothesis about the impact of capitalization of knowledge on the economic development of the state, namely the change in macroeconomic indicators, such as GDP (gross domestic product) per capita. To implement the formulated task, we will calculate the economic effect of investments in a unit of knowledge and search for a correlation between the costs of educational and scientific activities and the volume of innovative products of enterprises.

The conducted research allows us to assert that the capitalization of knowledge can be monitored dynamically and statistically investigated. Accordingly, we will use the tools of economic and econometric analysis to confirm the above thesis. We will use the statistical indicators of Ukraine and the Republic of Poland as the basis for calculations regarding the capitalization of knowledge and the comparison of data in dynamics. We believe that the comparison of Ukraine with its western neighbour Poland is the most appropriate due to the presence of common features of socio-economic development and educational systems.

The methodology for calculating the model of changes in GDP per capita taking into account indicators of knowledge capitalization involves the following algorithm of actions: 1) determination of indicators that can statistically characterize knowledge capitalization; 2) development of a statistical linear multifactorial model of changes in GDP per capita built based on indicators of capitalization of knowledge defined in the previous paragraph; 3) calculation of linear correlation coefficients between variables and regression analysis of the model for each of the studied countries; 4) checking the adequacy of the model according to Fisher's criterion.

Within the limits of the statistical indicators available for comparison, which can be attributed to the indicators of capitalization of knowledge, the following indicators were used by the authors in the research process: expenditure on education; the number of patents; the share of costs for carrying out scientific research and development; expenses for innovative activity; the share of innovative enterprises in the total number of enterprises; the share of income from the sale of innovative products to the total volume of products sold. We emphasize that the selected indicators were collected,

grouped, and processed by the authors on the official websites of the Statistics Service of Ukraine [24] and the Republic of Poland [25].

The author's statistical linear multifactor model of changes in GDP per capita built based on knowledge capitalization indicators has the following form:

$$\Delta Y_p = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 \quad (1)$$

where Y_p – gross domestic product per inhabitant, thousands of USD; X_1 – expenditure on education in % of GDP; X_2 – number of patents per 10,000 population; X_3 – the share of expenses for the implementation of scientific research and development in % of GDP; X_4 – expenditure on innovative activity per 1 economically active person, USD; X_5 – the share of innovative enterprises in the total number of enterprises, %; X_6 – the share of income from the sale of innovative products to the total volume of products sold.

The statistical database for the analysis is shown in Table 1. The authors performed a regression analysis of the proposed statistical model of changes in GDP per capita based on indicators of capitalization of knowledge for each of the studied countries.

Table 1. Summary statistical database for regression analysis. (Source: [24-25])

		GDP / 1 person, thousand USD	Expenditure on education in % of GDP	Number of patents per 10,000 population	The share of expenditures on scientific research and development to GDP	Costs of innovation activity per 1 economically active person, USD	The share of innovative enterprises in the total number of enterprises, %	The share of income from the sale of innovative products to the total volume of products sold, %
		Y	X1	X2	X3	X4	X5	X6
Ukraine	2010	2.96	7.40	2889	0.75	46.19	9.08	3.8
	2011	3.60	5.94	3135	0.65	48.37	10.07	3.8
	2012	3.86	6.44	2927	0.67	53.56	10.27	3.3
	2013	4.00	6.42	3023	0.7	58.35	10.11	3.3
	2014	2.19	5.87	2755	0.6	30.22	9.04	2.5
	2015	2.01	5.74	2601	0.55	26.48	11.90	2.2
	2016	2.05	5.01	2773	0.48	23.62	14.30	1.8
	2017	2.50	5.42	2825	0.45	26.71	9.50	0.7
	2018	3.06	5.32	2616	0.47	34.06	8.70	0.8
	2019	4.05	5.44	2531	0.43	41.01	9.10	0.9
	2020	3.57	5.38	2044	0.41	34.09	8.50	1.1
	2021	4.83	5.55	2023	0.39	32.02	8.5	1
Poland	2010	13.22	5.11	4717	2.38	735.21	14.90	11.3
	2011	13.63	4.86	5388	2.03	640.27	13.80	8.9
	2012	12.25	4.86	5357	2.26	632.85	14.40	9.2
	2013	13.98	5.02	5573	2.01	636.93	14.30	8.6
	2014	14.68	4.97	5600	2.19	729.37	14.50	8.7
	2015	13.13	4.82	5473	2.42	719.61	13.70	9.5
	2016	12.37	4.66	5714	2.09	586.22	16.10	8.12
	2017	12.30	4.57	5884	2.07	574.11	14.50	7.08
	2018	16.05	4.61	5677	1.72	624.06	21.80	9.1
	2019	15.86	4.68	4722	1.55	609.31	15.40	9.4
	2020	16.15	4.97	4507	1.66	608.68	31.20	10
	2021	0.00	5.01	4056	1.68	650.68	20.90	8.9

After performing the general statistical calculation of the model, calculating the linear correlation coefficients between X variables, we will conduct a regression analysis of the proposed model for each of the countries. According to the obtained calculation data, we can conclude that the constructed statistical model is qualitative for both data sets. This confirms the value of the total correlation between variables Y and X, which is 0.95 for Ukraine and 0.87 for Poland.

The next step of the research will be an analysis of the adequacy of the model according to Fisher's test. The performed calculations allow us to state that the model is adequate for both data sets. After analyzing the regression coefficients for each of the variables and the obtained reliability coefficients according to the Student's criterion, it can be stated that

many variables have a low level of statistical significance (values higher than 0.05). Table 2 summarizes the results of the regression analysis (regression coefficients before and after the Student's test) within the studied countries.

Table 2. Summary results of regression analysis (regression coefficients before and after testing for Student's criterion). (Source: calculated by the authors based on [24-25])

Indicators	Ukraine		Poland	
	a	p	a	p
Expenditure on education in % of GDP	0.670	0.302	1.583	0.866
Number of patents per 10,000 population	0.001	0.906	0.009	0.023
The share of expenses for the implementation of scientific research and development in % of GDP	-14.284	0.066	-7.506	0.268
Costs of innovative activity per 1 economically active person	0.085	0.003	-0.016	0.631
The share of innovative enterprises in the total number of enterprises	-0.046	0.666	0.011	0.968
The share of income from the sale of innovative products to the total volume of products sold	0.580	0.175	4.461	0.035

Taking into account the high level of adequacy and quality of the model, it can be argued that variables with an insufficient level of statistical significance do not have a significant effect individually, at the same time, such variables have a synergistic effect on the studied model.

Conducting an econometric analysis of knowledge capitalization and the impact of selected indicators on changes in gross domestic product, according to the authors, can be strengthened by calculations of the economic effect of knowledge capitalization. In theory, the economic effect shows the difference between the costs and revenues of economic activity. Accordingly, the proposed indicator should reflect the ratio of investments in knowledge creation (innovative activity) to the income received from the implementation of an innovative product.

Investments in knowledge-creating activities, according to the authors, reflect the number of expenses for scientific research and development, therefore, the innovative product is a patent, as a formalized unit of knowledge. Thus, the author's proposed coefficient of the economic effect from the capitalization of knowledge will reflect the economic value of a unit of knowledge (n UAH / 1 patent) and will have the following form:

$$Kc_i = \frac{COST_i - INC_i}{PAT_i} \quad (2)$$

where Kc_i – economic effect of knowledge capitalization (knowledge capitalization efficiency); $COST_i$ – expenditure on scientific research and development; INC_i – income from the sale of innovative products to the total volume of products sold; PAT_i – number of patents.

The results of the calculation of the statistical model of the change in GDP per capita, taking into account the indicators of the regression analysis, as well as the calculation of the proposed coefficient of the economic effect from capitalization (formula 2) are given in Table 3.

Table 3. Results of calculating the change in GDP per capita, taking into account the indicators of the regression analysis. (Source: calculated by the authors based on [24-25])

Year	Ukraine			Poland		
	Y	Y _p	KC _j	Y	Y _p	KC _j
2010	2.96	3.08	1.11	13.22	13.90	1.78
2011	3.60	4.05	1.35	13.63	14.01	2.07
2012	3.86	3.96	1.14	12.25	13.27	1.72
2013	4.00	4.83	1.06	13.98	14.68	1.68
2014	2.19	3.09	0.37	14.68	15.54	2.15
2015	2.01	2.50	0.24	13.13	14.78	2.09
2016	2.05	2.57	0.17	12.37	13.59	1.46
2017	2.50	3.05	0.05	12.30	13.87	1.63
2018	3.06	3.94	0.11	16.05	19.68	1.96
2019	4.05	5.24	0.29	15.86	17.04	2.27
2020	3.57	5.09	0.74	16.15	17.42	2.69
2021	4.83	5.25	0.45	15.95	16.21	2.93

According to the obtained results, it can be stated that the value of the forecast GDP per capita, taking into account the selected indicators of knowledge capitalization assessment, is higher than the real statistical value. Thus, it can be concluded that investments in knowledge have an impact on economic development both in Ukraine and in the Republic of Poland, that is, the calculations confirmed the authors' hypothesis about the impact of capitalization of knowledge on the economic development of the state, namely the change (increase) in GDP (gross domestic product) per capita.

Figure 1 and Figure 2 show the dynamics of changes in the real (Y) and projected value (Y_p) of GDP per capita in Ukraine and Poland for 2010-2021.

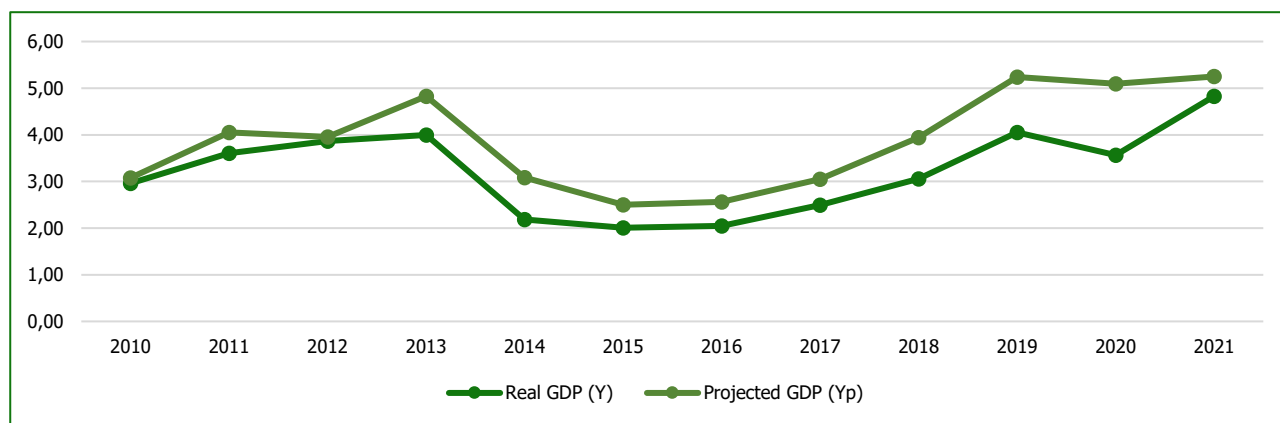


Figure 1. Dynamics of changes in the real and projected value of GDP per capita of Ukraine for 2010-2021.

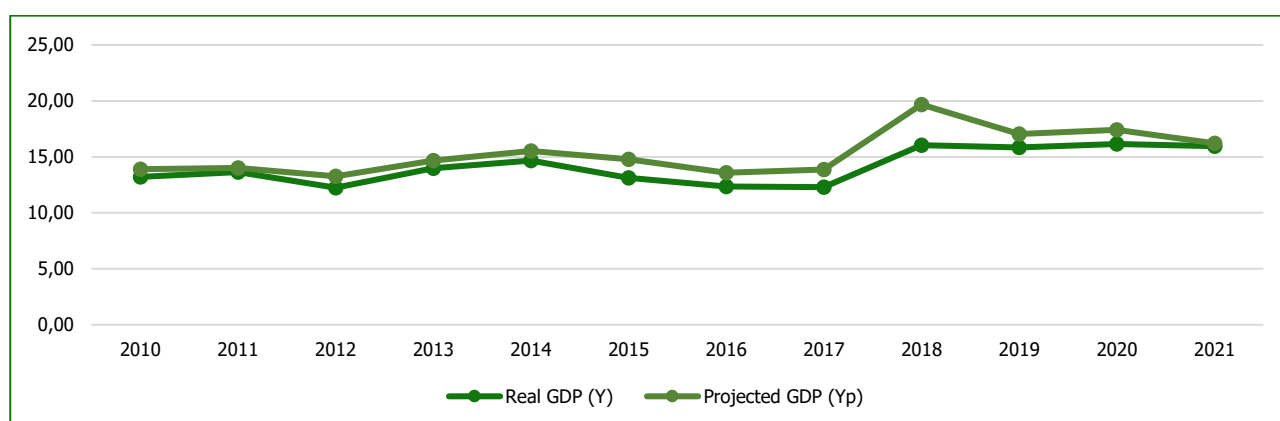


Figure 2. Dynamics of changes in the real and projected value of GDP per capita in the Republic of Poland for 2010-2021.

Analyzing the data shown in Table 3 and the graphic material of Figure 1 and Figure 2, we note that the GDP per capita is significantly higher in the Republic of Poland than in Ukraine, but the potential for the projected growth of the GDP value is higher in Ukraine, since in our country there is an underdevelopment of investments in the innovative development of enterprises and, accordingly, the capitalization of knowledge. Note that the intensity of the impact depends on the growth of the knowledge capitalization indicators given in Formula 1.

Comparing the dynamics of changes in the real and projected GDP of the studied countries, it can be stated that for Ukraine there is a significantly higher difference between the two values of GDP per capita, compared to the Republic of Poland. For the last value of the forecast GDP, they repeat the real values. This confirms the thesis that innovative development in Poland is at a much higher level, education and science receive many times more investments not only from the state but also from external institutions. In addition, in Poland for more than 100 years there has been the institution "Patent Office of the Republic of Poland" (Urząd Patentowy Rzeczypospolitej Polskiej), the purpose of which is to promote the development of science, create opportunities for attracting new investments in education and science, popularize scientific activity, etc. Therefore, the experience of the Republic of Poland in the aspects of promoting the development of science and introducing innovations into practical activities through the tools of creating relevant institutions, programs, and general support of the science sector is extremely important for Ukraine, which will positively affect the knowledge capitalization coefficients proposed by the authors.

The results of calculating the coefficient of economic effect from the capitalization of knowledge reflect the actual value of a unit of knowledge in the economy. We believe that the limit indicator of the coefficient of knowledge capitalization is one. If the value of the coefficient is below one, in this case, the capitalization of knowledge is low, and vice versa, above one, it is high. If the value of the coefficient is below zero, we believe that capitalization of knowledge does not occur, and investments in knowledge are unprofitable. The dynamics of the coefficient of the economic effect of knowledge capitalization in Ukraine and the Republic of Poland for 2010-2021 are presented in Figure 3.

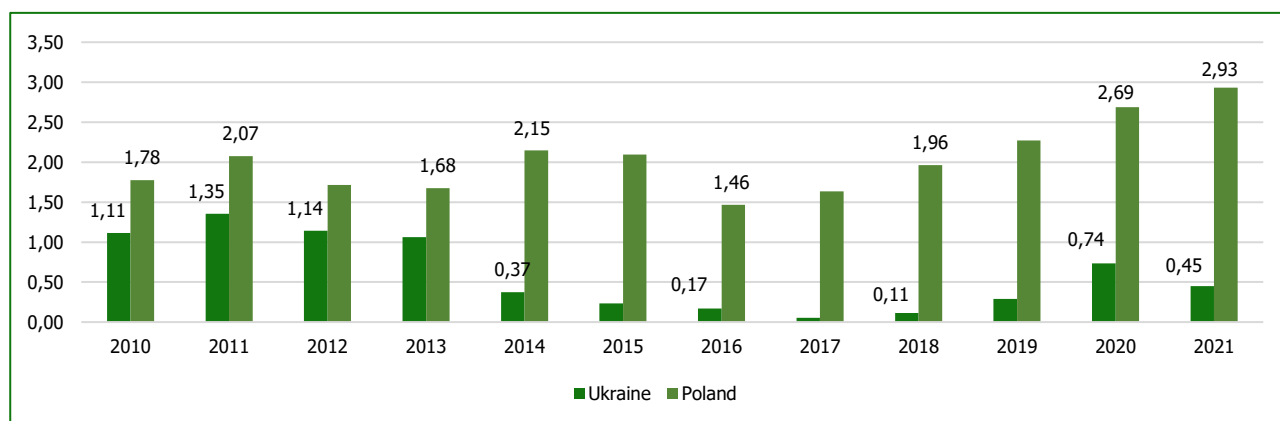


Figure 3. Dynamics of the coefficient of the economic effect of capitalization of knowledge in Ukraine and the Republic of Poland for 2010-2021.

Analyzing the results of the coefficient of the economic effect of knowledge capitalization calculated by the authors, it is possible to draw intermediate conclusions that for the Republic of Poland the capitalization coefficient is much higher than the limit value, in each year of the study the indicated indicator exceeded one, and in 2021 it reached the maximum value of 2.93. The above confirms the thesis of the authors about the high level of investments in innovative activities, their payback, and the corresponding capitalization of knowledge in Poland.

In Ukraine, this indicator exceeds the limit value only in the period from 2010 to 2013 and fluctuated between 1.06 and 1.11, but in the future, the value of the coefficient remains at a level below one and indicates a low capitalization of knowledge in our country, which requires weighted internal policies for stimulating educational, scientific and innovative activities with the involvement of appropriate investments. We emphasize that during the study period in Ukraine, the coefficient of the economic effect of capitalization of knowledge did not have negative values, which would indicate the absence of capitalization of knowledge, and investments in knowledge would be unprofitable.

DISCUSSION

Given the relevance of the research issues, questions related to the possibilities of implementing European, American, or Japanese approaches to knowledge capitalization and possible tools for their achievement remain debatable. Ukraine has unique features of its socio-economic development, a significant number of internal and external challenges and threats, which presents science with new tasks of calculating the economic efficiency of capitalization of knowledge, which is the basis of innovative development of the economy and the impetus for the practical implementation of innovations.

The authors consider a set of indicators that can characterize the capitalization of knowledge to be debatable, since based on the research of Slaughter and Cantwell (2012) [15;16], it can be argued that the list of indicators that characterize the capitalization of knowledge is quite wide and is distinguished by the peculiarities of keeping statistical records in different countries, which complicates the calculation processes and measurement of this indicator, as well as the possibility of comparing it across groups of countries or even continents. Therefore, on a global scale, the task of developing single standardized indicators of capitalization of knowledge with the possibility of their calculation in the section of groups of countries remains relevant, which will facilitate the process of comparison and identification of the necessary tools for increasing the investment attractiveness of scientific activity.

CONCLUSIONS

Thus, after conducting a study of the international experience of capitalization of knowledge in the paradigm of innovative economy, it is possible to draw conclusions contained in the provisions presented below:

- capitalization of knowledge is a tool for increasing and maximizing the value of own and engaged intellectual assets as a result of increasing the influence of science (educational institutions, scientific institutions) on the scientific, technical, and socio-economic development of society;
- the authors proposed a system of statistical indicators of capitalization of knowledge within the economy, namely: expenditures on education; the number of patents; the share of costs for carrying out scientific research and development; expenses for innovative activity; the share of innovative enterprises in the total number of enterprises; the share of income from the sale of innovative products to the total volume of products sold;
- during the research, the author's hypothesis about the impact of knowledge capitalization on the economic development of the state, namely the change in macroeconomic indicators, such as GDP (gross domestic product) per capita, was confirmed;
- after comparing the dynamics of changes in the real and projected value of GDP per capita of Ukraine and the Republic of Poland, the thesis about the significantly higher innovative development of our western neighbour was confirmed, since education and science in Poland receive many times more investments not only from the state but also from external institutions. The mentioned experience is relevant for Ukraine from the point of view of the need to form new transparent institutions such as the "Patent Office of the Republic of Poland", which will positively affect the development of innovative activities and, as a result, the capitalization of knowledge;
- the coefficient of the economic effect of knowledge capitalization proposed by the authors and its calculation for Ukraine and the Republic of Poland clearly showed the experience of knowledge capitalization and the need for a balanced internal policy to stimulate educational, scientific, and innovative activities with the involvement of appropriate investments.

Further research of the authors will be focused on the implementation of practical tools for the implementation of knowledge capitalization experience in domestic realities, taking into account modern challenges and threats.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

Conceptualization: Mykola Rudenko, Vladyslav Krivorychko

Data curation: Mykola Rudenko, Olena Kravchenko, Vladyslav Krivorychko

Formal Analysis: Tamara Bereziianko, Ihor Halytsia, Vladyslav Krivorychko

Methodology: Mykola Rudenko, Tamara Bereziianko

Software: Mykola Dzhiamulych, Olena Kravchenko, Vladyslav Krivorychko

Resources: Mykola Dzhiamulych, Olena Kravchenko, Vladyslav Krivorychko

Supervision: Mykola Rudenko, Mykola Dzhiamulych, Olena Kravchenko

Validation: Mykola Rudenko, Tamara Bereziianko, Ihor Halytsia

Investigation: Mykola Rudenko, Tamara Bereziianko, Ihor Halytsia, Vladyslav Krivorychko

Visualization: Mykola Dzhiamulych, Olena Kravchenko, Vladyslav Krivorychko

Project administration: Mykola Rudenko, Ihor Halytsia

Funding acquisition: Mykola Rudenko, Vladyslav Krivorychko

Writing – review & editing: Mykola Rudenko, Tamara Bereziianko, Ihor Halytsia, Mykola Dzhiamulych, Olena Kravchenko, Vladyslav Krivorychko

Writing – original draft: Mykola Rudenko, Tamara Bereziianko, Ihor Halytsia, Vladyslav Krivorychko

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Руденко М., Березянюк Т., Галиця І., Дзямуліч М., Кравченко О., Криворучко В.

МІЖНАРОДНИЙ ДОСВІД КАПІТАЛІЗАЦІЇ ЗНАНЬ В УМОВАХ ІННОВАЦІЙНОЇ ЕКОНОМІКИ

Досліджено проблеми капіталізації знань у парадигмі інноваційної економіки. Сучасний глобалізований світ характеризується комерціалізацією освітньої та наукової діяльності, формуванням освітніх екосистем, а також капіталізацією знань як ресурсу. У статті описано теоретичний базис капіталізації знань і визначено етапи формування академічного капіталізму. Зазначено, що капіталізація знань є нарощенням, максимізацією вартості власних і залучених інтелектуальних активів за результатами збільшення впливу закладів вищої освіти та наукових установ на науково-технічний та соціально-економічний розвиток суспільства, а комерціалізація є процесом перетворення знань на товар.

Установлено систему статистичних індикаторів капіталізації знань у межах економіки (видатки на освіту; кількість патентів; частка витрат на виконання наукових досліджень та розробок; витрати на інноваційну діяльність; частка інноваційних підприємств серед усіх підприємств; частка доходу від реалізації інноваційної продукції до загального обсягу реалізованої продукції). Розроблено методику проведення розрахунку моделі зміни ВВП на душу населення з урахуванням індикаторів капіталізації знань та описаний алгоритм необхідних дій щодо її застосування. Підтверджено гіпотезу про вплив капіталізації знань на економічний розвиток держави, а саме зміну макроекономічних показників, таких як ВВП (валовий внутрішній продукт) на душу населення.

Запропоновано авторську формулу визначення коефіцієнту економічного ефекту від капіталізації знань, який відображає співвідношення інвестицій у знаннєтворчу (інноваційну) діяльність до отриманого доходу від реалізації інноваційного продукту. Інвестиції в знаннєтворчу діяльність – це обсяги витрат на наукові дослідження та розробки, тому інноваційним продуктом є патент як формалізована одиниця знань. Проведено розрахунок коефіцієнта економічного ефекту капіталізації знань для України та Республіки Польща, який наочно показав доцільність імплементації досвіду капіталізації знань Польщі й необхідність проведення зваженої внутрішньої політики щодо стимулювання освітньої, наукової та інноваційної діяльності із залученням відповідних інвестицій в Україні.

Ключові слова: капіталізація знань, інноваційна економіка, наукова діяльність, досвід, макроекономічні показники, економічний ефект

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