

РОЗДІЛ II. СТАН ФУНКЦІОНУВАННЯ ТА ТЕНДЕНЦІЇ РОЗВИТКУ КОНКУРЕНТОСПРОМОЖНОСТІ КРАЇНИ

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INTERCONNECTION OF THE HUMAN CAPITAL INDEX AND THE DEVELOPMENT OF THE INSTITUTIONAL SYSTEM OF THE COUNTRY

Abstract

Existing studies of human capital and the development of the country's institutional system have been analyzed. For the first time, the connection between the human capital index and the development of the country's institutional system has been shown. A system of indicators related to human capital has been compiled: political-legal, economic, social and institutional. They describe the interconnection between the development of human capital and the state of the institutional system.

A model for evaluating the development of human capital is proposed. Firstly, it examines indicators of the development of the country's institutional system, and secondly, it establishes the relationship between capital development and the institutional system. This makes it possible to predict the dynamism of human capital development depending on various changes, and to predict the direction of the state in relation to the steady improvement of the economy and other areas.

An expert method of analysis was applied. Multiple correlation-regression analysis methods are used for multifactorial models and phenomena. They helped to study and quantify the internal and external consequential relationships between factors and the resulting feature; to investigate the regularities of functioning, trends in the development of the result; establish the density of the relationship between the development of human capital and the institutional system of the country. Thus, the goal of the research was achieved – to establish a connection between the human capital index and the development of the country's institutional system.

Introduction. The effective functioning of human capital becomes the main tool with help of which it is possible to implement the strategic objectives of the state. The purpose of the article is to implement an analytical

characteristic of human`s capital practice in Ukraine and other countries, indicators of human capital development, determining the place of Ukraine on the background of other countries.

There is no single system of indicators for the characterization of human capital. The author`s system in this research is formed and analytical characteristics of practice of human`s capital functioning in Ukraine and other countries of the world are considered. Analysis of the characteristics of human`s capital functioning in Ukraine and other countries of the world showed a relatively low level of the studied indicators.

The last four decades of studying the human capital as a component of national wealth have been in focus of world-class experts – G. Becker [5], J. Mincer [9] and T. Schulz [10] (50-70 years of XX century), I. Fisher [6, p. 225–243]. N. Bryukhovetska, I. Buleev, D. Bohynia, O. Borodina, N. Golikova, V. Geets, O. Grishnova, I. Kalenyuk, E. Libanova, V. Mandibura, L. Chernobay, A. Chukhno, Y. Shiron and others have been studying various aspects of human capital.

Observations at the world level bring analytical considerations about the progress of mankind beyond economic growth, firmly assigning to man and his well-being a central place in development policy and strategy [1, p. 2].

Today, the priority in the effective management of resources is given to human capital, because it is a stock of knowledge, skills, competencies and abilities of people that can create private, social and national well-being [3].

The impact of human capital on economic development is observed not only for individual countries but also for entire regions [11, p. 2700–2702].

Economic opportunities can play a constructive role in human capital to support growth [4, p. 3]. At the same time, it was recognized that human capital stimulates and ensures the formation of man`s economic capacity, enterprise, nation. Thus, the functioning of human capital becomes the main way by which it is possible to implement the strategic objectives of the state.

Requirement in building strong human capital for the rapid development of a country is still an unresolved problem. This study helps to solve this issue.

Formulation of the goals of the article. The purpose of the article is to establish the relationship between the human capital index and the development of the country's institutional system, to provide scientific and practical recommendations for the use of tools to determine the relationship between the human capital index and the development of the country's institutional system, to build correlation-regression models, to calculate the correlation matrix, to draw a conclusion on the dependence of the performance indicator on the factor values.

1. Development of an analytical model for assessing the development of human capital of the national economy

Researches on the measurement of human capital is divided into five stages [2]:

– Stage 1: development of the basic concept and its theoretical substantiation;

- Stage 2: development of basic measurement models for academic research and development;
- Stage 3: research of interest in development of the topic of researchers and business;
- Stage 4: drop of academic and business interests due to lack of understanding of easy and basic level of research and lack of understanding of researcher`s resources;
- Stage 5: from 1981 till today, when international interest has grown in both theory and practical use.

Table 1

Indicators of factors influencing the human`s capital development of the national economy by groups

Groups					
Political and legal factors	Economic factors	Social factors	Organizational-administrative and information-communication factors	Scientific and technological factors	Institutional factors
regulatory policy	level of GNI per capita level of investment	birth rate	competitiveness Index of Countries	number of new technologies	freedom of business
					freedom of the labor
level of corruption	level of investment	mortality rate	competitiveness of Employees	costs of innovation	market monetary
					freedom of trade
level of bureaucracy trade	minimum wage	health care costs	Internet Access	costs of science	freedom of investment
					financial freedom
economic policy	level of consumer prices	culture costs	computer Support Access	costs of research	fiscal health
					government spending
efficiency of law-making	unemployment rate	Environmental efficiency	access to Communication Systems	costs of energy-saving technologies	tax burden
					government decency
law level	labor migration rate	index pension replacement rate	provision of Communication Systems	protection of intellectual property	efficiency of the judiciary
					property rights

Source: author`s development

Theoretical and methodological studies provided the basis for determining indicators that describe the impact of factors on the development of human capital, and their grouping (Table 1).

An acceptable measure of human capital can be based on an equation where the cost of labor, wages, and other benefits will be proportional to the economic benefit, such as turnover or gross profit. But this approach does not take into account the opportunities created by human capital for business development or measuring the benefits of developing practices and processes. The general problem is to measure the value of hidden values: how hidden factors in creating the value of human capital, such as rare skills, unique knowledge, skills, social skills, implicit knowledge, could be better used for national development if they are recognized and identified.

Authors hypothesized an interdependence between the human capital index and the development of the country's institutional system. It is offered to describe this contact by means of the model presented on Figure 1.

HCI	{	RP↑, LC↓, LB↓, TEP↑	∈	PLI
		UR↓, IL↑, MS↑, LCP↓	∈	GEI
		BR↑, MR↓, HCC↑, CC↑, IEI↑, PRR↑, LM↓, GE↑	∈	GSI
		CIC ↑, CE ↑	∈	GOAI
		NNT ↑, CI ↑, CS ↑, CR ↑, CEST ↑, 3I↑	∈	GSTI
		AI ↑, CS ↑, ACS ↑, PCS ↑, ART ↑	∈	GICI
		FB ↑, FLM ↑, MF ↑, FT ↑, FI ↑, FF ↑,		
		FH ↑, GS ↑, TB ↓, GD ↑, GJ ↑, PPR ↑		

where HCI – human capital index, RP – regulatory policy, LC – level of corruption, LB – level of bureaucracy, TEP – trade and economic policy, PLI – group of political and legal indicators, UR – unemployment rate, IL – investment level, MS – minimal salary, LCP – level of consumer prices, GEI – group of economic indicators, BR – birth rate, MR – mortality rate, HCC – health care costs, CC – culture costs, IEI – environmental efficiency index, PRR – pension replacement rate, LM – labor migration rate, GE – gender equality, GSI – group of social indicators, CIC – competitiveness index of countries, CE – competitiveness of employees, GOAI – group of organizational and administrative indicators, NNT – number of new technologies, CI – costs of innovation, CS – costs of science, CR – costs of research, CEST – costs of energy-saving technologies, PIP – protection of intellectual property, GSTI – group of scientific and technological indicators, AI – access to the Internet, CS – computer support, ACS – access to communication systems, PCS – provision of communication systems, ART – availability of radio and telecommunications, GICI – group of information and communication indicators, FB – freedom of business, FLM – freedom of the labor market, MF – monetary freedom, FT – freedom of trade, FI – freedom of investment, FF – financial freedom, FH – fiscal health, GS – government spending, TB – tax burden, GD – government decency, GJ – efficiency of the judiciary, PPR – protection of property rights, GII – a group of institutional indicators.

Figure 1. Factors influencing the development of human capital

Source: author`s development

The group of political and legal indicators includes: regulatory policy, level of corruption, level of bureaucracy, trade and economic policy. Group of economic indicators includes the unemployment rate, level of investment, minimum wage, level of consumer prices. The group of social indicators includes the birth rate, mortality rate, health care costs, culture costs, environmental efficiency index, pension replacement rate, labor migration rate, gender equality.

A selection of indicators describing the dependence of human capital development on the development of country's institutional system, which included political, legal, economic, social, institutional, using the expert method of analysis.

When calculating the reliability of these indicators, the value of the Cronbach's alpha coefficient was 0.78, which confirms the consistency of the characteristics within the group and the possibility of combining them into a single group. The relationship between the indicators showed that the variance between them is at an acceptable level in the range of 0.25-0.55.

The Cronbach's alpha coefficient shows the internal consistency of the characteristics that describe one object, but is not an indicator of the homogeneity of the object. The coefficient is often used in expert assessments when constructing tests and to verify their reliability.

The standardized Cronbach's alpha coefficient is calculated by the formula:

$$a_{st} = N \times \hat{r}, \quad (1)$$

where N – number of test components,

\hat{r} – average correlation coefficient between the components.

Cronbach's alpha can take values: > 0.5 – low consistency, > 0.6 – questionable consistency, > 0.7 – sufficient consistency, > 0.8 – good consistency, > 0.9 – very good consistency.

Based on the hypothesis, an analytical model for assessing the development of human capital of the national economy was developed [8; 13], which is used to calculate the level of human capital development of the national economy:

$$LHCD = \sum_{i=1}^n GPL_i \times \left(\sum_{j=1}^m GE_j / m \right) \times \left(\sum_{k=1}^p GS_k / p \right) / \sum_{l=1}^q GI_l, \quad (2)$$

where LHCD – the level of human capital development;

GPL_i – the i -th mark for the group of political and legal indicators;

GE_j – the j -th mark for the group of economic indicators;

GS_k – the k -th mark of the group of social indicators;

GI_l – the l -th GTmark of the group of institutional indicators.

Model (2) proposed by the author takes into account the development of country's institutional system and allows to establish the interdependence between human capital development and the country's institutional system, which allows to develop forecasts of the dynamics of human capital development from political, legal, economic, social, institutional changes and determine public policy. Its steadily increasing.

For multifactor models or phenomena, it is advisable to use methods of multiple correlation-regression analysis, which allow to study and quantify the internal external consequences between the model-forming factors and to establish patterns of functioning and development trends of the studied performance trait. In a real economy, there are probabilistic (stochastic) relationships between performance indicators and factors. The main task of correlation and regression methods of analysis is to analyze statistical data to identify the mathematical relationship between the studied features and to establish with the help of correlation coefficients a comparative estimate of the density of the relationship, which has a certain numerical expression.

2. Analytical characteristics of the practice of functioning of human capital

A fundamental measurement and study of any country with regard to its human capital status is fundamental to understanding it at various stages of development. The complexity of expressing the value of human capital in countries committed to the disclosure of human capital will lead to the question of the correctness of the financial reporting of public administration bodies, as well as the relevance of existing indicators for management and decision-making from the point of view of significance at the state level.

The implementation of the goal set in this study provides an analytical description of human`s capital in Ukraine and developed countries on certain indicators.

The indicators of human capital index of 157 countries [7] are taken as actual data, which was sorted into 3 groups according to the level of HCI, indicators of the development of the institutional system of the country [7], based on the components of economic freedom. From each group build a matrix of 2 tables. The table shows the indicators of the human capital index for countries with a high level of GNI per capita.

Table 2

Human capital index for countries with high GNI per capita

Country	HCI	Rank of the country in the HCI rating
Australia	0,79	7
England	0,78	15
Poland	0,75	30
Norway	0,77	18
Sweden	0,8	8
USA	0,76	24
Finland	0,81	5
Japan	0,84	3
Estonia	0,75	29
Republic of Lithuania	0,71	37

High index of human capital development is observed in such developed countries as Japan (3rd place), Finland (5th place in the ranking), Australia (7th place in the ranking).

Comparison with data on the human development index according to the UNDP report gives the following result (Figure 2).

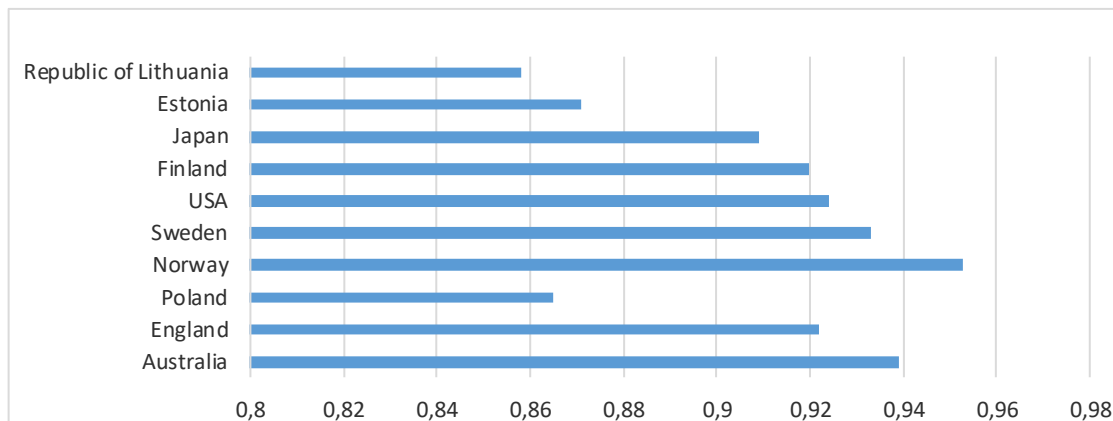


Figure 2. Human Development Index for countries with high GNI per capita, 2017 year, built by the author according to the data

Source: [7; 11]

In the table 3 shows data characterizing the development of the institutional system for building a matrix for countries with a high level of GNI per capita [7; 11].

In the table 4 provides indicators of the human capital index for countries with an average level of GNI per capita [7; 11].

This group includes Ukraine, which took 50th place in this World Bank rating. At the same time, China ranks 46th alongside Ukraine. Turkey is in 53rd place. The countries of the former Soviet space – Moldova, Kyrgyzstan, Armenia, Tajikistan – occupy 75, 76, 78, 89 places, respectively.

Data on human development for countries with an average level of GNI per capita are shown in Figure 3.

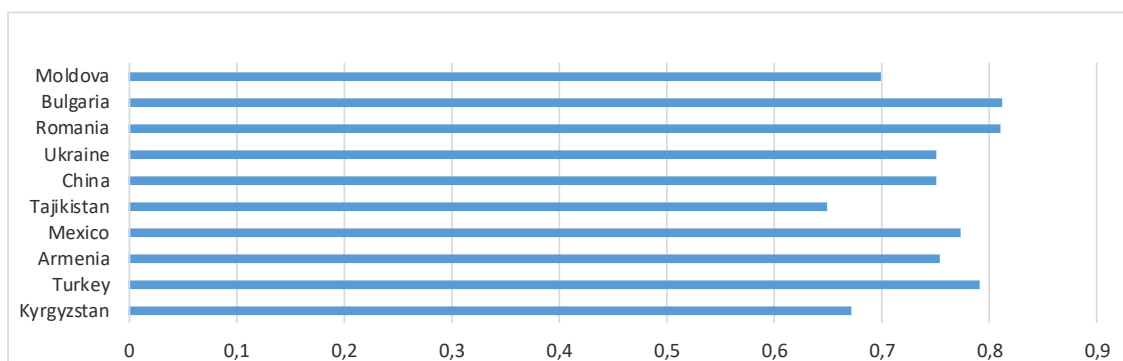


Figure 3. Human Development Index for countries with average GNI per capita, 2017 year

Source: built by the author according to the data [7; 11]

Table 3

Data for calculating indicators of the development of the institutional system of countries with a high level of GNI per capita

Country	freedom of business	freedom of the labor	market monetary	market monetary	freedom of trade	freedom of investment	fiscal health	government spending	tax burden	government decency	efficiency of the judiciary	property rights
Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Australia	89,1	79,7	87,4	86,2	80	90	84,3	61,2	63	77,4	93,4	78,7
England	91,1	74,4	85,2	86,9	90	80	53,5	44,4	65,2	79	93,8	92,2
Poland	67,2	63,9	85	86,9	75	70	81,5	47,8	75,9	50,9	56,6	61,8
Norway	90,4	54,6	73,9	87,9	75	60	97,8	29,2	56,4	93,6	86	86,4
Sweden	89,3	53,7	83,8	86,9	85	80	96,1	23,2	43,9	92,9	88,2	92,6
USA	82,7	91,4	78,6	86,7	85	80	54,8	56,5	65,1	71,9	76,9	79,3
Finland	89,9	50,5	86	86,9	85	80	81,1	2,3	66,5	89,8	82,7	89
Japan	81,7	79,2	85,4	82,3	70	60	49,3	54,1	67,4	79,2	73,2	86
Estonia	75,6	54,8	85,1	86,9	90	80	99,8	52,6	80,7	75,7	83,9	80,4
Republic of Lithuania	73,4	64,5	89,9	86,9	80	70	96,7	63,9	86,4	50,9	66,7	73,8

Source: built by the author according to the data [7; 11]

Table 4

Human capital index for countries with an average level of GNI per capita

Country	HCI	Rank of the country in the HCI rating
Kyrgyzstan	0,58	76
Turkey	0,63	53
Armenia	0,57	78
Mexico	0,61	64
Tajikistan	0,53	89
China	0,67	46
Ukraine	0,65	50
Romania	0,6	67
Bulgaria	0,68	44
Moldova	0,58	75

According to the UNDP, Ukraine ranks 88th on the human development index, which is taken into account as an average indicator of the level of human development.

In the group of countries with an average level of GNI per capita among the former countries of the Soviet Union outlined above, Armenia is the highest city at 83 (5 positions higher than Ukraine).

In the Table 5 shows data characterizing the development of the institutional system for building a matrix for countries with an average level of GNI per capita [7; 11].

Table 5

Data for calculating indicators of the development of the institutional system of countries with an average level of GNI per capita

Country	freedom of business	freedom of the labor	market monetary	market monetary	freedom of trade	freedom of investment	fiscal health	government spending	tax burden	government decency	efficiency of the judiciary	property rights
Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Kyrgyzstan	73,3	77,9	74,9	74,5	60	50	89,2	58,2	93,8	29,4	22,1	50,2
Turkey	63,3	47,6	72,3	78,6	75	60	93,6	68,1	74,7	42	54,5	54,7
Armenia	78,7	69,9	75,8	80	75	70	67,2	80	84,7	40,5	47,4	55,3
Mexico	67,5	59,8	79,2	88	75	60	69,8	78,1	75,7	26,9	39	58,6
Tajikistan	63,4	52,2	69,6	70,6	25	30	90,4	71,4	91,8	38,2	50,3	46,8
China	54,9	61,4	71,4	73,2	25	20	85,9	71,6	70,4	47,3	65,4	46,7
Ukraine	62,7	52,8	60,1	81,1	35	30	75,9	45	80,2	29	29,5	41
Romania	65,2	66,8	82,8	86,9	75	50	91,1	66,9	87,3	40	59,7	61
Bulgaria	64,3	66,1	82,8	86,9	70	60	94,3	60,5	90,9	38,2	42,5	63,6
Moldova	66	39,9	73,2	78,3	55	50	90	56,7	85,3	26,6	26,3	53,5

In the Table 6 provides indicators of the human capital index for countries with a low level of GNI per capita [7; 11].

Table 6

Human capital index for countries with low GNI per capita

Country	HCI	Rank of the country in the HCI rating
New Guinea	0,37	141
Senegal	0,42	121
Madagascar	0,37	140
nepal	0,49	102
Republic of Benin	0,41	127
Gambia	0,4	130
Ethiopia	0,38	135
United Republic of Tanzania	0,4	128
Republic of Chad	0,29	157
Mozambique	0,36	148

This group includes the poorest countries of the modern world – Mozambique, Guinea, Madagascar, Chad, Ethiopia. In the ranking of the human development index, they occupy places from 152 to 189. Data on human development for these countries are provided in Figure 4.

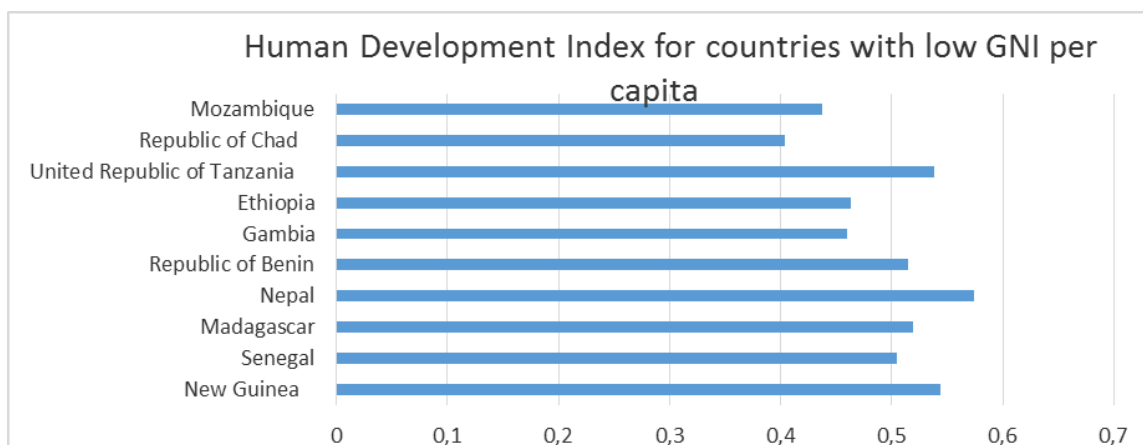


Figure 4. Human Development Index for countries with low GNI per capita, 2017 year

Source: built by the author according to the data [7; 11]

The data characterizing the development of the institutional system were analyzed to build a matrix for countries with a low level of GNI per capita [7; 11].

The ranking of countries by gross national income per capita was also used for the calculation (Table 7).

Table 7

Classification of countries by the level of GNI per capita

Country			
With low GNI per capita (less than USD 1,005)	From below average GNI per capita (from USD 1,006 to 3,955)	From above average GNI per capita (from USD 3,956 to 12,235)	With high GNI per capita (from USD 12,236 and more)
Republic of Benin	Armenia	Albania	Australia
Burundi	People's Republic of Bangladesh	Algeria	Austria
Republic of Chad	Bolivia	Argentina	Bahrain
Ethiopia	Republic of Ghana	Botswana	Barbados
Gambia	Guatemala	Brazil	Belgium
New Guinea	Honduras	Bulgaria	Brunei Darussalam
Republic of Liberia	Arab Republic of Egypt	China	Canada
Madagascar	República de El Salvador	Colombia	Chile
Republic of Malawi	Cambodia	Costa Rica	Cyprus
Mozambique	Republic of Cote d'Ivoire	Dominican Republic	Denmark
Nepal	India	Ecuador	Estonia

Руанда	Republic of Indonesia	Gabon	Finland
Senegal	Modern Standard Arabic	Guyana	France
Съера Лионе	Kenya	Iran, Islamic Republic of	Germany
United Republic of Tanzania	Kyrgyzstan	Jamaica	Greece
Mali	Kingdom of Lesotho	Macedonia	Iceland
Uganda	Mauritania	Malaysia	Republic of Ireland
	Moldova	Mauritius	Israel
	Mongolia	Mexico	Italy
	Morocco	Namibia	Japan
	Myanmar	Panama	Korea, Republic of
	Nicaragua	Paraguay	Kuwait
	Federal Republic of Nigeria	Peru	Latvia
	Islamic Republic of Pakistan	Romania	Republic of Lithuania
	Republic of the Philippines	Russia	Luxembourg
	Sri Lanka	Serbia	Malta
	Kingdom of Eswatini	South Africa	Netherlands
	Tajikistan	Thailand	New Zealand
	Tunisia	Turkey	Norway
	Ukraine	Venezuela	Poland
	Socialist Republic of Vietnam	Republic of Croatia	Spain
	Yemen	Kazakhstan	Sweden
	Zambia		Switzerland
	Cameroon		OAE
	Lao People's Democratic Republic		England
			USA

Source: author`s development

Comparison with the data on the human development index according to the UNDP report gives the following result. Not in all cases does the human capital index correspond to the human development index, which is explained by the different methodology for determining indicators, which was also developed by completely different world institutions – the United Nations within the UNDP and the World Bank in the document “Human Capital Development Project”. In some cases, the data differ significantly.

Thus, if Norway ranks first in the human development index, the human capital index ranks only 18. Former Soviet Union countries Estonia and

Lithuania rank 30th and 35th respectively in terms of HDI and 29th and 37th respectively in terms of HCI.

Indicators characterizing the development of the institutional system for building a matrix for countries with a high level of GNI per capita have been analyzed [7].

The indicators of the human capital index for countries with an average level of GNI per capita have been analyzed [7].

This group includes Ukraine, which took 50th place in this ranking of the World Bank. At the same time, China in the ranking located near Ukraine – 46th place. Turkey ranks 53rd. The countries of the former Soviet space – Moldova, Kyrgyzstan, Armenia, Tajikistan – are holding 75, 76, 78, 89 places, accordingly.

Data on human development for countries with an average level of GNI per capita are shown. Comparison of these data with data on the human development index according to the UNDP report gives the following result. In some cases, the data differ significantly. According to the UNDP, Ukraine ranks 88th according to the UNDP, which is taken into account as an average indicator of the level of human development. In the group of countries with an average level of GNI per capita among the former countries of the Soviet Union outlined above, Armenia holds the highest city 83 (5 positions higher than Ukraine).

Indicators that characterize the development of the institutional system for building a matrix for countries with an average level of GNI per capita are analyzed [12].

The indicators of the human capital index for countries with a low level of GNI per capita are analyzed [7].

This group includes the poorest countries in the modern world – Mozambique, Guinea, Madagascar, Chad, Ethiopia. In the ranking of the human development index, they rank from 152 to 189.

The data characterizing the development of the institutional system for the construction of a matrix for countries with a low level of GNI per capita have been analyzed [12].

3. Construction of correlation-regression models of relationships

Multivariate correlation-regression analysis was used to investigate the qualitative and quantitative assessment of relationships between the level of human capital development of the country and institutional factors of influence:

$$Y = f(\beta \setminus, X) + \varepsilon, \quad (3)$$

where Y – dependent variable (HCI);

X = X (X₁, X₂,..., X_m) – independent variables (PLI, GEI, GSI, GOAI, GSTI, GICI, GII);

$\beta = \beta (\beta_0, \beta_1, \beta_2, \dots, \beta_m)$ – regression coefficients;

ε – accidental error.

As a result of solving the set goal, twelve-factor correlation-regression models were built for a number of countries, which are grouped by the level of gross national income per capita.

The calculation of the correlation matrix made it possible to draw a conclusion about the significant dependence between the effective indicator and the factor values. The coefficient of multiple determination r^2 is 0.53, so the effective indicator depends on 12 factors by 53%. The multiple correlation coefficient of 0.728 indicates a close relationship between the indicators and it is significant and non-random (according to the F-criterion).

Based on the calculated regression coefficients, the author determined the extent to which human capital is sensitive to the variability of the institutional system, which makes it possible to assess to what extent and which factors delay and accelerate the development of human capital, the possibility of developing forecasts of changes in the level of human capital.

Conclusion. The research established the relationship between the human capital index and the development of the country's institutional system, provided scientific and practical recommendations for the use of tools to determine the relationship between the human capital index and the development of the country's institutional system, built correlation-regression models, calculated the correlation matrix, and concluded on the dependence of the performance indicator on the factor values.

Existing studies of human capital and the development of the country's institutional system are analyzed. For the first time, the connection between the human capital index and the development of the country's institutional system is shown. A system of indicators related to human capital has been compiled: political-legal, economic, social and institutional. They describe the relationship between the development of human capital and the state of the institutional system.

A model for evaluating the development of human capital is proposed. Firstly, it examines indicators of the development of the country's institutional system, and secondly, it establishes the relationship between capital development and the institutional system.

This makes it possible to predict the dynamism of human capital development depending on various changes, and to predict the direction of the state in relation to the steady improvement of the economy and other areas.

An expert method of analysis was applied. Multiple correlation-regression analysis methods are used for multifactorial models and phenomena. They helped to study and quantify the internal and external consequential relationships between factors and the resulting feature; to investigate the regularities of functioning, trends in the development of the result; establish the density of the relationship between the development of human capital and the institutional system of the country.

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Based on the calculated regression coefficients, the author determined the extent to which human capital is sensitive to the variability of the institutional system, which makes it possible to assess to what extent and which factors delay and accelerate the development of human capital, the possibility of developing forecasts of changes in the level of human capital.

Thus, the goal of the research was achieved – to establish a connection between the human capital index and the development of the country's institutional system.

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