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THE SOCIOECONOMIC AND POLITICAL LEVEL OF DEVELOPMENT OF COUNTRIES IN VIEW OF DIGITALIZATION OF PUBLIC ADMINISTRATION

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Guryanova L. S., Gavkalova N. L., Lola Y. Y., Prokopovych S. V., Mykhailenko D. H.

The Socioeconomic and Political Level of Development of Countries in View of Digitalization of Public Administration

In the twenty-first century, the information revolution has led to the global digitalization of modern society, encompassing all countries of the world and leading to change in all spheres of human life, including economic, social and political. E-government makes the administrative process convenient, transparent, and fully accountable to the community, improving sociopolitical and democratic processes in the countries, and creating an effective information and technology platform for developing the business environment. In line with the administrative reform e-government is a strategic choice for the country, which aims to increase the competitiveness of the State and improve the well-being of its people. The article examines the influence of the level of digitalization on the level of socioeconomic and political development of countries. To test hypotheses, hierarchical agglomerative and iterative methods of cluster analysis, econometric models were used. The E-Government Development Index, Doing Business, The Global Competitiveness Index, The Social Progress Index for 114 countries for 2014–2019 were considered as the research information base. The results showed a significant positive effect of increasing the level of digitalization on the socioeconomic development and quality of political institutions of countries, which manifests itself with a different time lag. In addition, the results of an econometric analysis show that there is no difference in the intensity of the influence of the factor of digitalization in countries with different income levels. The results can be useful in the formation and adaptation of a strategy of socioeconomic development and competitiveness, in the assessment and systematic analysis of a digitalization strategy.

Keywords: *Doing Business, Global Competitiveness Index, Social Progress Index, Democracy Index, e-government.*

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Guryanova Lidiya S. *– Doctor of Sciences (Economics), Professor, Head of the Department of Economic Cybernetics, Simon Kuznets Kharkiv National University of Economics (9a Nauky Ave., Kharkiv, 61166, Ukraine)*

E-mail: *guryanovalidiya@gmail.com*

ORCID: *http://orcid.org/0000-0002-2009-1451*

Gavkalova Nataliia L. *– Doctor of Sciences (Economics), Professor, Head of the Department of Public Administration, Public Administration and Regional Economics, Simon Kuznets Kharkiv National University of Economics (9a Nauky Ave., Kharkiv, 61166, Ukraine)*

E-mail: *ngavl@ukr.net*

ORCID: *http://orcid.org/0000-0003-1208-9607*

Researcher ID: *https://publons.com/wos-op/researcher/1609135/gavkalova-nataliia/*

Lola Yuliya Yu. *– Candidate of Sciences (Economics), Associate Professor, Department of Public Administration, Public Administration and Regional Economics, Simon Kuznets Kharkiv National University of Economics (9a Nauky Ave., Kharkiv, 61166, Ukraine)*

E-mail: *yuliia.lola@hneu.net*

Prokopovych Svitlana V. *– Candidate of Sciences (Economics), Associate Professor, Associate Professor of the Department of Economic Informatics and Cybernetics, Simon Kuznets Kharkiv National University of Economics (9a Nauky Ave., Kharkiv, 61166, Ukraine)*

E-mail: *prokopovichsv@gmail.com*

Mykhailenko Daria H. *– Candidate of Sciences (Economics), Associate Professor, Senior Research Fellow of the Department of Macroeconomic Policy and Regional Development, Research Centre of Industrial Problems of Development of NAS of Ukraine (2 floor 1a Inzhenernyi Ln., Kharkiv, 61166, Ukraine)*

E-mail: mikhailenko.dg@gmail.com

ORCID: *https://orcid.org/0000-0002-8420-6510*

Researcher ID: *https://publons.com/researcher/1890486/daria-mykhailenko/*

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Гур'янова Л. С., Гавкалова Н. Л., Лола Ю. Ю., Прокопович С. В., Михайленко Д. Г. Соціально-економічний і політичний рівень розвитку країн з огляду на диджиталізацію державного управління

У двадцять першому столітті інформаційна революція привела до глобальної цифровізації сучасного суспільства, охопивши всі країни світу та привівши до змін у всіх сферах життя людини, включно з економічною, соціальною та політичною. Електронне врядування робить адміністративний процес зручним, прозорим і повністю підзвітним громаді, поліпшуючи суспільно-політичні та демократичні процеси в країнах, створю-

ючи ефективну інформаційно-технологічну платформу для розвитку бізнес-середовища. Відповідно до адміністративної реформи електронне урядування є стратегічним вибором для країни, який спрямований на підвищення конкурентоспроможності держави та поліпшення добробуту її народу. У статті досліджено вплив рівня цифровізації на рівень соціально-економічного та політичного розвитку країн. Для перевірки гіпотез використано ієрархічний агломеративний та ітераційний методи кластерного аналізу, економетричні моделі. Інформаційною базою дослідження стали глобальні показники: E-Government Development Index, Doing Business, The Global Competitiveness Index, The Social Progress Index для 114 країн за 2014–2019 роки. Результати показали значний позитивний вплив підвищення рівня цифровізації на соціально-економічний розвиток і якість політичних інститутів країн, який проявляється з різним часовим лагом. Крім того, результати економетричного аналізу показують, що немає різниці в інтенсивності впливу фактора цифровізації в країнах з різним рівнем доходу. Результати можуть бути корисними при формуванні та адаптації стратегії соціально-економічного розвитку та конкурентоспроможності країни, оцінці та системному аналізі стратегії цифровізації.

Ключові слова: *економетричні моделі, Індекс ведення бізнесу, Індекс глобальної конкурентоспроможності, індекс соціального прогресу, індекс демократії, електронний уряд.*

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Гур'янова Лідія Семенівна *– доктор економічних наук, професор, завідувач кафедри економічної кібернетики, Харківський національний економічний університет ім. С. Кузнеця (просп. Науки, 9а, Харків, 61166, Україна)*

E-mail: *guryanovalidiya@gmail.com*

ORCID: *http://orcid.org/0000-0002-2009-1451*

Гавкалова Наталія Леонідівна *– доктор економічних наук, професор, завідувач кафедри державного управління, публічного адміністрування та регіональної економіки, Харківський національний економічний університет ім. С. Кузнеця (просп. Науки, 9а, Харків, 61166, Україна)*

E-mail: *ngavl@ukr.net*

ORCID: *http://orcid.org/0000-0003-1208-9607*

Researcher ID: *https://publons.com/wos-op/researcher/1609135/gavkalova-nataliia/*

Лола Юлія Юріївна *– кандидат економічних наук, доцент кафедри державного управління, публічного адміністрування та регіональної економіки, Харківський національний економічний університет ім. С. Кузнеця (просп. Науки, 9а, Харків, 61166, Україна)*

E-mail: *yuliia.lola@hneu.net*

Прокопович Світлана Валеріївна *– кандидат економічних наук, доцент, доцент кафедри економічної інформатики та кібернетики, Харківський національний економічний університет ім. С. Кузнеця (просп. Науки, 9а, Харків, 61166, Україна)*

E-mail: *prokopovichsv@gmail.com*

Михайленко Дар'я Геннадіївна *– кандидат економічних наук, доцент, старший науковий співробітник відділу макроекономічної політики та регіонального розвитку, Науково-дослідний центр індустріальних проблем розвитку НАН України (пров. Інженерний, 1а, 2 пов., Харків, 61166, Україна)*

E-mail: *mikhailenko.dg@gmail.com*

ORCID: *https://orcid.org/0000-0002-8420-6510*

Researcher ID: *https://publons.com/researcher/1890486/daria-mykhailenko/*

Introduction. In the twenty-first century, the information revolution has led to the global digitalization of modern society, encompassing all countries of the world and leading to change in all spheres of human life, including economic, social and political. E-government makes the administrative process convenient, transparent, and fully accountable to the community, improving sociopolitical and democratic processes in the countries, and creating an effective information and technology platform for developing the business environment. In line with the administrative reform and the goals of the new government of Ukraine, e-government is a strategic choice for the country, which aims to increase the competitiveness of the State and improve the well-being of its people.

Theoretical development and formulation of hypotheses. ICT carries the potential of opening economic opportunities, promoting social and political changes in society, providing access to knowledge, creating stimuli and a field for best practice sharing in all areas of life, the actual processes of informatization across the globe are quite asymmetrical [1]. Without access to the Internet, which facilitates economic development and the enjoyment of a range of human rights, marginalized groups and developing States remain trapped in a disadvantaged situation, thereby perpetuating inequality both within and between States [2]. The Global Brain proposes a positive vision for a more sustainable society. The Global Brain can be defined as the distributed intelligence emerging from all human and technological gents as interacting via the Internet. It plays the role of a nervous system for the social superorganism [3].

The development of the information component immediately leads to the improvement of the sociopolitical sphere in countries with high levels of Human Development Index, Democracy Index, and ICT. The EU countries belong to this cluster [4].

The statistical data of Latvia points on the fact that it is necessary to increase the awareness of population regarding possibilities offered by using of ICT and e-government [5].

There has been a proliferation of e-readiness assessment measures in recent years that each one has a certain objective. Based on definitions, objectives, dimensions, methods and approaches, this paper categorizes the measures and presents a measure for an e-readiness assessment. The convergence measure for the e-readiness assessment include some common indicators: infrastructure and availability, access to and use of

ICT by households and individuals, e-businesses, e-education, e-government, basic enabling indicators [6].

Contemporary enterprises can improve the quality of information security solutions [7], ensuring financial security of corporate structures [8] using structural analysis and design tools as CA AllFusion ERwin Data Modeler.

The findings of the correlation and the cluster analyses confirmed that the global recession and the Eurozone crisis have influenced the progress of the e-government in the years evaluated. This research study provides insights that may be useful in improving the implementation of e-government services [9]. With the increasing importance of trends such as cloud computing, open (big) data, participation tools or social media, new indicators and approaches need to be introduced in the measuring of the e-government development, and the existing indices should to be updated, redefined, and restructured. The findings induce new hypotheses and broadening of the scope of the research based on the previously used research algorithm [10].

The review of research induces us to formulate new hypotheses and enlarge the research sphere.

Hypothesis 1. Increasing the level of digitalization of society and government has a positive impact on the level of socioeconomic and political development of countries.

Hypothesis 2. There are structural changes in the influence of the level of digitization on the level of socioeconomic and political development, i.e. for groups of countries with a high level of development; the influence of the level of digitalization is stronger in comparison with countries with a medium and low level of development.

Hypothesis 3. The influence of the level of digitalization on the development of socioeconomic and political processes (in particular, business processes, increasing competitiveness, ensuring social security and social progress, developing democratic institutions) is heterogeneous and manifests itself with a certain lag. In other words, there is a different lag of delay in the influence of the level of digitalization on the level of socioeconomic and political development of countries.

Methods. The methods of multivariate statistical analysis, such as descriptive statistics, the multiple regression and the cluster analysis were used to study the influence of information and communication technologies on the sociopolitical level of development. These statistical methods were implemented with the StatSoft's software package «Statistica». This package has a wide range of functional data analysis algorithms and has wide graphical capabilities for data visualization.

To carry out the research, the global indices and variables of both socioeconomic and political development were selected:

The E-Government Development Index (EGDI) consists of three indexes (Online Service Index, Telecommunication Index and Human Capital Index) that are equally weighted and cover a broad range of topics that are relevant for e-government [11]. The EGDI is annually presented by the United Nations Department of Economic and Social Affairs.

The Doing Business (DB) is reflected in simplicity of the entrepreneur activity and calculated in two stages: by analyzing normative legal acts and by interviewing entrepreneurs. These regulations are measured using the indicator sets such as: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency and labor market regulation [12]. The rating of countries is calculated by the World Bank.

The Global Competitiveness Index (GCI) shows the ability of countries to provide a high level of welfare to their citizens. It combines 114 indicators that capture concepts that matter for productivity and long-term prosperity. These indicators are grouped into 12 pillars: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, market size, business sophistication, and innovation [13]. The country's rating is calculated by the World Economic Forum.

The Social Progress Index (SP) is an aggregate index of social and environmental indicators that capture three dimensions of social progress: Basic Human Needs, Foundations of Wellbeing, and Opportunity. The index is published by the nonprofit Social Progress Imperative [14].

The Democracy Index (DI) provides a snapshot of the state of democracy worldwide. The Democracy Index is based on five categories: electoral process and pluralism, civil liberties, the functioning of government, political participation and political culture [15]. Such data is collected by the Economist Intelligence Unit (EIU), the world leader in global business analysis.

114 countries of the world are the objects of research. The variables are the data for 2014–2019. The countries without sufficient data were excluded from the database.

To analyze the influence of the level of society and the government's digitalization on the level of socioeconomic and political development of countries, the following research algorithm was used:

Stage 1. Grouping of countries by the level of digitalization, socioeconomic and political development using cluster analysis methods, assessment of cluster characteristics.

Stage 2. Analysis of the presence of a structural shift in the data of the digitalization index along with the socioeconomic development indices of countries (macro-regions), the quality of political institutions based on *dummy*-variables.

Stage 3. Assessment of the lag value in the influence of the digitalization index on the level of socioeconomic and political development using econometric models taking into account lag variables.

Results. For the implementation of *the first stage*, hierarchical agglomerative and iterative methods of cluster analysis were used. Hierarchical agglomerative methods give only a conditionally optimal solution in a subset of local partitions (clusters). However, the advantage of these methods is the simplicity of calculations and interpretation of the results. The essence of hierarchical agglomerative methods is that in the first step, each sample object is considered as a separate cluster. The process of cluster joining takes place sequentially: based on the distance matrix or similarity matrix, the closest objects are combined. The results of clustering, presented in the form of a dendrogram, allow you to choose the number of clusters at which the total intergroup dispersion will take the maximum

value. This number of clusters is used to select the initial conditions of the iterative algorithm of the "k-means" method. After completing the classification procedures, it is necessary to assess the results. For this purpose, a measure of classification quality, the so-called quality functional, is used. The best one according to the chosen functional should be considered such a partition at which the extreme value of the objective function is achieved the quality functional [8].

As the initial data for the grouping, we used the data of the EGDI, DB, GCI, SP, DI indices for 2014–2018 years in 114 countries. The choice of period and objects for analysis is determined by the information security of the given indices in open databases. The dendrogram of classification is obtained using one of the hierarchical agglomerative methods of cluster analysis the Ward method according to the data of the year of 2014.

Analysis of the data allows us to conclude that the initial set of countries should be divided into two or three clusters. This number of clusters was considered as an exogenous parameter in the classification of countries using one of the iterative methods of cluster analysis – the "k-means" method. The choice of the method is chosen due to its following advantages: simplicity, flexibility and rapid convergence. The results of dividing countries into two and three clusters are shown in Fig. 1.

Cluster1	Mean	Standard	Variance
GCI14	4.740196	0.523895	0.274466
DB14	7.402961	0.663287	0.439949
SP14	8.091530	0.703528	0.494952
DI14	7.852157	1.037525	1.076457
EGDI14	7.152510	1.225743	1.502445

Cluster2	Mean	Standard	Variance
GCI14	3.882635	0.533824	0.284968
DB14	5.816397	0.833963	0.695495
SP14	5.611301	1.138868	1.297020
DI14	4.720953	1.627446	2.648580
EGDI14	3.927651	1.557251	2.425031

a) Descriptive statistics of variables in the clusters with a 2-cluster partition

Cluster1	Mean	Standard	Variance
GCI14	4.23889	0.40657	0.16530
DB14	6.59010	0.66421	0.44118
SP14	6.79261	0.59858	0.35830
DI14	5.88877	1.58554	2.51395
EGDI14	5.40551	0.97398	0.94863

Cluster2	Mean	Standard	Variance
GCI14	4.986	0.460	0.212
DB14	7.637	0.584	0.341
SP14	8.533	0.326	0.107
DI14	8.355	0.859	0.737
EGDI14	7.867	0.859	0.738

Cluster3	Mean	Standard	Variance
GCI14	3.566250	0.385326	0.148476
DB14	5.282250	0.660149	0.435796
SP14	4.742656	0.882242	0.778351
DI14	4.175625	1.410685	1.990032
EGDI14	2.741688	0.852511	0.726775

b) Descriptive statistics of variables in the clusters with a 3-cluster partition

Fig. 1. Grouping results based on the iterative k-means method

Source: calculated by the authors

The value of the classification quality functional – the total intraclass variance found on the basis of the data in Fig. 2 makes up 11.13936 for a 2-cluster partition and 10.6412 for a 3-cluster partition, which allows us to make a choice in favor of a 3-cluster partition. Similar results were obtained for the year of 2018. The results of analysis of variance for a 3-cluster partition according to the data of 2018 are shown in the Table 1.

As it can be seen from Table 1, the value of F-statistics shows a significant difference between the selected clusters in the variables GCI, DB, SP, DI, EGDI. The hypothesis of a significant contribution of variables to the formation of clusters is confirmed with a 99% confidence level. It should be noted that the most significant difference is observed for the SP and EGDI variables. The least significant for classification is the DI variable.

To assess the stability of cluster characteristics and the composition of cluster formations, we compared the results of spatial cluster analysis in dynamics (Fig. 2).

Analysis of the data shown in Fig. 2 allows us to conclude that the characteristics of clusters are stable. The divide in the levels of GCI, DB, SP, DI indicators for clusters with a high,

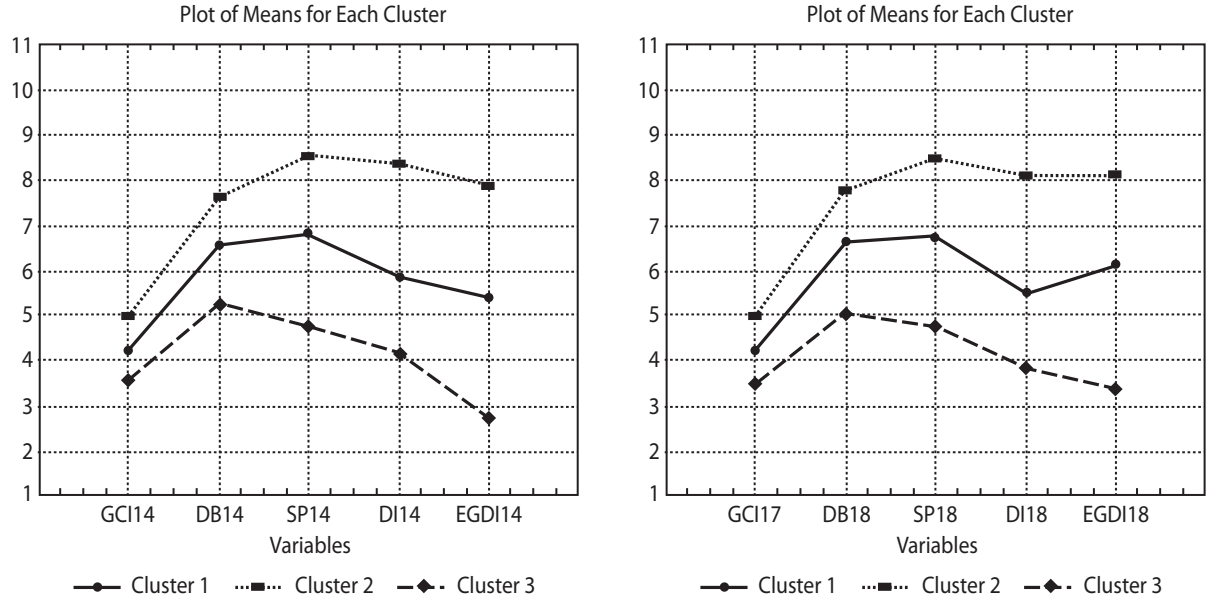

Fig. 2. Graph of average values of variables in clusters

Source: calculated by the authors

Table 1

The results of the analysis of variance for a 3-cluster partition

Variables	Between	df	Within	df	F	signif.
GCI17	35.9096	2	20.1512	111	98.9016	0.0000
DB18	114.3861	2	51.5765	111	123.0875	0.0000
SP18	226.9927	2	39.3847	111	319.8728	0.0000
DI18	308.5605	2	188.2287	111	90.9803	0.0000
EGDI18	357.3825	2	85.4141	111	232.2185	0.0000

Source: calculated by the authors

medium and low level of development according to the results of the 2018 grouping does not change compared to the results of the 2014 grouping.

However, it should be noted that over time, there is a divergence of countries with high and medium levels of development according to the EGDI index. Accordingly, the divide between countries with a low level of development by the EGDI index and countries with a high and medium level of development is substantially widening, which will lead to further divergence of the level of socioeconomic development of the countries of these groups. The percentage distribution of countries by cluster is given in the Table 2.

Table 2

Percentage distribution of countries by cluster

Year of study	Country Cluster		
	High level of development (Cluster 1)	Medium level of development (Cluster 2)	Low level of development (Cluster 3)
2014	33 (29 %)	49 (43 %)	32 (28 %)
2018	39 (34 %)	48 (42 %)	27 (24 %)

Source: calculated by the authors

As it can be seen from the Table 2, the composition of the clusters during the study period is quite stable. From 114 macro-regions, only 11 (9.6%) are tend to migration from cluster to cluster. So, 5 macro-regions moved from a cluster with a low level of development to a cluster with an average level of development.

These are such macro-regions as Bhutan, Guatemala, Iran, Kenya, Nepal. 6 macro-regions that previously belonged

to a cluster of regions with an average level of development, went into a cluster of regions with a high level of development. These are macro-regions such as Bulgaria, Cyprus, Hungary, Malaysia, Mauritius, Slovakia. The composition of clusters with a high, medium and low level of development is given in the Table 3.

Thus, the results of clustering allow us to conclude that countries with a high level of the EGDI index are characterized by higher values of the Easiness of Doing Business Index, Global Competitiveness, the Index of Social Progress and the Democracy Index, which allows us to confirm the first hypothesis put forward in this study: digitalization has a positive influence on the level of socioeconomic development and the quality of political institutions.

At ***the second stage,*** the study tested the hypothesis of the presence of a structural shift in the data of the digitalization

Table 3

Cluster composition

Cluster	Countries that are members of the cluster
Cluster 1 (high level of development)	Australia, Austria, Belgium, Bulgaria, Canada, Chile, Costa Rica, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Malaysia, Mauritius, Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern, Ireland, United States of America
Cluster 2 (medium level of development)	Albania, Argentina, Armenia, Bhutan, Bolivia, Botswana, Brazil, China, Colombia, Croatia, Dominican Republic, Ecuador, El Salvador, Georgia, Ghana, Guatemala, Honduras, India, Indonesia, Iran, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Lebanon, Mexico, Mongolia, Republic of Moldova, Montenegro, Morocco, Nepal, Oman, Panama, Paraguay, Peru, Philippines, Qatar, Romania, Russian Federation, Saudi Arabia, Serbia, South Africa, Sri Lanka, Thailand, Turkey, Uganda, Ukraine, United Arab Emirates
Cluster 3 (low level of development)	Algeria, Angola, Bangladesh, Benin, Burundi, Cambodia, Cameroon, Chad, Egypt, Ethiopia, Guinea, Lao People's Democratic Republic, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mozambique, Nicaragua, Nigeria, Pakistan, Rwanda, Senegal, Tajikistan, Tanzania, Yemen, Zimbabwe

Source: compiled by the authors

index and the indices of the socioeconomic development of countries (macro-regions), the quality of political institutions based on *dummy*-variables, i.e. the hypothesis that for groups of countries with a high level of development the influence of the level of digitalization is stronger in comparison with countries with a medium and low level of development. The implementation of the test for the presence of a structural shift in the data involves: assessing models with dummy shift and slope variables; assessment of the statistical significance of model parameters; definition of structural change's class.

The study assessed the following models with *dummy*-variables:

$$GCI_i = a_0 + a_1 \cdot EGDI_i + a_2 \cdot d_{1i} + a_3 \cdot d_{2i} + a_4 \cdot d_{3i} + a_5 \cdot EGDI_i \cdot d_{1i} + a_6 \cdot EGDI_i \cdot d_{2i} + a_7 \cdot EGDI_i \cdot d_{3i} + \varepsilon_i, \quad (1)$$

$$DB_i = a_0 + a_1 \cdot EGDI_i + a_2 \cdot d_{1i} + a_3 \cdot d_{2i} + a_4 \cdot d_{3i} + a_5 \cdot EGDI_i \cdot d_{1i} + a_6 \cdot EGDI_i \cdot d_{2i} + a_7 \cdot EGDI_i \cdot d_{3i} + \varepsilon_i, \quad (2)$$

$$SP_i = a_0 + a_1 \cdot EGDI_i + a_2 \cdot d_{1i} + a_3 \cdot d_{2i} + a_4 \cdot d_{3i} + a_5 \cdot EGDI_i \cdot d_{1i} + a_6 \cdot EGDI_i \cdot d_{2i} + a_7 \cdot EGDI_i \cdot d_{3i} + \varepsilon_i, \quad (3)$$

$$DI_i = a_0 + a_1 \cdot EGDI_i + a_2 \cdot d_{1i} + a_3 \cdot d_{2i} + a_4 \cdot d_{3i} + a_5 \cdot EGDI_i \cdot d_{1i} + a_6 \cdot EGDI_i \cdot d_{2i} + a_7 \cdot EGDI_i \cdot d_{3i} + \varepsilon_i, \quad (4)$$

where $d_{1i} = \begin{cases} 1, \ if \ \ i < I_1 \\ 0, if \ \ i > I_1 \end{cases}$, I_1 – Lower middle income group of countries;

$d_{2i} = \begin{cases} 1, \ if \ \ i < I_2 \\ 0, if \ \ i > I_2 \end{cases}$, I_2 – Upper middle income group of countries;

$d_{3i} = \begin{cases} 1, \ if \ \ i < I_3 \\ 0, if \ \ i > I_3 \end{cases}$, I_3 – High-income group of countries.

Thus, to study the structural changes in model (1)–(4), 3 dummy variables were introduced, which reflect the macro-region's membership in the group of macro-regions with income levels below average, above average and high income. A group of low-income regions was chosen as the base. It should be noted that the used group coincides with the results of the above cluster analysis. The results of the model's assessment (1) are given in the Table 4.

Table 4

The results of the model's assessment (1)

Variables	Estimate	Standard error	t- value	p-value
Y-intersection	2.92520	0.29317	9.97768	0.00000
EGDI_14	0.25007	0.12066	2.07255	0.04064
D3 (High income)	-0.77790	0.54824	-1.41889	0.15886
D2 (Upper middle income)	0.74285	0.48506	1.53147	0.12863
D1 (Lower middle income)	0.19432	0.36347	0.53462	0.59403
D3*EGDI	0.12744	0.13475	0.94575	0.34643
D2*EGDI	-0.13280	0.13966	-0.95089	0.34382
D1*EGDI	-0.05559	0.13137	-0.42317	0.67303

Source: calculated by the authors

The values of the coefficient of determination, correlation and Fisher criterion for model (1) are respectively R^2= 0.77, R = 0.87, F = 51.93, which allows us to conclude about the statistical significance of the model as a whole. The value of the Student criterion, equal to *ta*0 = 9.97768, *ta*1 = 2.07255, indicates a significant effect of the digitalization index and other factors on the level of global competitiveness of the country.

The values of the Student criterion, equal to *ta*4 = =–1,41889, *ta*3 = 1.53147, *ta*2 = 0,53462, *ta*7 = 0.94575, *ta*6 = –0.95089, *ta*5 = –0.42317, indicate that the parameters are statistically insignificant for dummy shift and slope variables, i. e. the hypothesis of a structural shift in the data is rejected; the sample is homogeneous.

The results of the evaluation of model (2) are given in the Table 5.

Table 5

The results of the evaluation of model

Variables	Estimate	Standard error	t-value	p-value
Y- intersection	3.999360832	0.460052084	8.693278378	4.83745E-14
EGDI_14	0.535214803	0.189339167	2.826751644	0.005621966
D3 (High income)	0.331786817	0.860305906	0.385661443	0.700520315
D2 (Upper middle income)	1.193096636	0.761157944	1.567475772	0.119984034
D1 (Lower middle income)	-0.135703652	0.570364954	-0.237924247	0.812399147
D3*EGDI	-0.11447472	0.211456909	-0.54136193	0.589394149
D2*EGDI	-0.268151229	0.219150251	-1.223595356	0.22381791
D1*EGDI	-0.0530149	0.206142725	-0.257175702	0.797541694

Source: calculated by the authors

The values of the coefficient of determination, correlation and Fisher criterion for model (2) are respectively R^2 = = 0.7709, R= 0.878, F = 50.969, which allows us to confirm the hypothesis of the statistical significance of the model as a whole with a 99% confidence level. The value of the Student criterion, equal to *ta*0 = 8.6933, *ta*1 = 2.8268, indicates a significant effect of the digitalization index and other factors on the Easiness of Doing Business Index. The values of the Student criterion, equal to *ta*4 =0.3857, *ta*3 =1.5675, *ta*2 = –0.2379, *ta*7 = –0.5414, *ta*6 = –1.2236, *ta*5 = –0.2572, indicate the statistical insignificance of the parameters with dummy variables of shift and slope, i.e. the hypothesis of a structural shift in the data is rejected; the sample is homogeneous.

Similar results were obtained for the models (3) – (4).

Thus, our studies allow us to conclude that there is no structural shift in the data, i.e. the hypothesis that for groups of countries with a high level of development the influence of the level of digitalization is stronger in comparison with countries with a medium and low level of development is rejected, the sample is homogeneous.

The content of *the third stage* of the study is to determine the size of the lag in the influence of the growth in the level of digitalization on the level of socioeconomic and political development. To test the third hypothesis, econometric models have been developed taking into account the exogenous lag. The lag value was selected based on a comparative analysis of the quality of models with a different set of lag variables. The results of assessing econometric models of GCI, DB, SP, DI indices taking into account exogenous lag variables of the EGDI index are given in the Table 6.

With the help of the analysis of the data given in the Table 5 can be concluded that the digitalization index has a sig-

Table 6

Assessment results of econometric index models taking into account the exogenous lag variables

Index	Type of Model	The Student criterion (t-value)	Values of model quality criteria
GCI	$\boldsymbol{GCI_t = 2.782 + 0.276 \cdot EGDI_t + \varepsilon_t}$	*ta*0 =**32.836**, *ta*1 =**18.858**	R = **0.872**, R^2 = **0.76**, F = **355.61**
	$GCI_t = 2.777 + 0.279 \cdot EGDI_{t-1} + \varepsilon_t$	*ta*0 =32,061, *ta*1 =18,577	R= 0.869, R^2 = 0.755, F = 345,12
	$GCI_t = 2.773 + 0.284 \cdot EGDI_{t-2} + \varepsilon_t$	*ta*0 =30,585, *ta*1 =18,074	R= 0,863, R^2 = 0.745, F =326,66
	$GCI_t = 2.81 + 0.284 \cdot EGDI_{t-3} + \varepsilon_t$	*ta*0 =31,055, *ta*1 =18,137	R = 0.864, R^2 = 0.746, F=328.97
DB	$DB_t = 4.13 + 0.45 \cdot EGDI_t + \varepsilon_t$	*ta*0 =30.04, *ta*1 =18,74	R = 0,87, R^2 = 0.756, F =351.23
	$\boldsymbol{DB_t = 3.89 + 0.49 \cdot EGDI_{t-1} + \varepsilon_t}$	*ta*0 =**26.82**, *ta*1 =**19.43**	R = **0.88**, R^2 = **0.77**, F = **377.68**
	$DB_t = 3.95 + 0.49 \cdot EGDI_{t-2} + \varepsilon_t$	*ta*0=26.09, *ta*1 =18.52	R = 0.87, R^2 = 0.75, F =343.05
	$DB_t = 4.11 + 0.47 \cdot EGDI_{t-3} + \varepsilon_t$	*ta*0 =26, *ta*1 =17	R = 0.85,R^2 = 0.72, F=289.14
	$DB_t = 4.13 + 0.48 \cdot EGDI_{t-4} + \varepsilon_t$	*ta*0 =24.81, *ta*1 =16.52	R = 0.84, R^2 = 0.71, F=272.77
	$DB_t = 4.31 + 0.46 \cdot EGDI_{t-5} + \varepsilon_t$	*ta*0 =25.58, *ta*1 =15.75	R = 0,83, R^2 = 0.69, F =247,98
SP	$\boldsymbol{SP_t = 3.12 + 0.67 \cdot EGDI_t + \varepsilon_t}$	*ta*0 =**19.35**, *ta*1 =**24,05**	R = **0.92**, R^2 = **0.84**, F=**578.59**
	$SP_t = 3.19 + 0.66 \cdot EGDI_{t-1} + \varepsilon_t$	*ta*0 =19.71, *ta*1 =23.76	R = 0.91, R^2 = 0.83, F = 564.3
	$SP_t = 3.21 + 0.67 \cdot EGDI_{t-2} + \varepsilon_t$	*ta*0 =19.68, *ta*1 =23.54	R = 0.91, R^2 = 0.83, F =554.18
	$SP_t = 3.34 + 0.66 \cdot EGDI_{t-3} + \varepsilon_t$	*ta*0 =20.57, *ta*1 =23.35	R = 0.91, R^2 = 0.83, F =545.05
	$SP_t = 3.37 + 0.65 \cdot EGDI_{t-4} + \varepsilon_t$	*ta*0 =20.99, *ta*1 =23.51	R = 0.91, R^2 = 0.83, F =552.57
DI	$DI_t = 2.83 + 0.61 \cdot EGDI_t + \varepsilon_t$	*ta*0 =6.82, *ta*1 =8.52	R = 0.62, R^2 = 0.39, F =72.65
	$DI_t = 2.832 + 0.61 \cdot EGDI_{t-1} + \varepsilon_t$	*ta*0 =6.87, *ta*1 =8.55	R= 0.63, R^2 = 0.4, F = 73.16
	$DI_t = 2.76 + 0.62 \cdot EGDI_{t-2} + \varepsilon_t$	*ta*0 =6.99, *ta*1 =8.66	R = 0.63, R^2 = 0.4, F=74.95
	$DI_t = 2.68 + 0.62 \cdot EGDI_{t-3} + \varepsilon_t$	*ta*0 =6.61, *ta*1 =8.88	R = 0.64, R^2 = 0.41, F =78.93
	$DI_t = 2.82 + 0.63 \cdot EGDI_{t-4} + \varepsilon_t$	*ta*0 =6.43, *ta*1 =8.97	R = 0.65, R^2 = 0.42, F=80.43
	$\boldsymbol{DI_t = 2.51 + 0.65 \cdot EGDI_{t-5} + \varepsilon_t}$	*ta*0 =**6.08**, *ta*1 =**9.09**	R = **0.65**, R^2= **0.42**, F =**82.56**

Source: compiled by the authors

nificant positive effect on the level of socioeconomic and political development of countries. Moreover, the criteria for the quality and statistical significance of models with a different set of lag variables show that this effect is manifested not only in the short but also in the medium term. The level of digitalization has the most significant influence on the level of social progress, the level of easiness of doing business and global competitiveness.

Comparison of the quality criteria of econometric models of the dependence of the GCI and SP indices on the EGDI index shows that the strongest effect is observed in the short term, i.e. these factors are simultaneously acting. The lag value of one year is characteristic of the influence of the EGDI index on the Easiness of Doing Business Index (DB). The most significant lag value, equal to five years, is observed in the influence of the EGDI index on the quality of political institutions (DI). However, the positive influence of the digitalization index on the quality of political institutions and the level of political culture is increasing over time.

Conclusion

Thus, our studies allowed us to draw the following conclusions:

There is a significant positive relationship between the level of digitalization and the level of socioeconomic and political development of countries. The results of the group based on hierarchical agglomerative and iterative methods of cluster analysis showed that clusters of countries with a high level of the EGDI index are characterized by high indices of the level of global competitiveness, easiness of doing business, the Social Progress Index, and the quality of political institutions. Assessment of changes in the composition of groups and their qualitative characteristics in dynamics allowed us to conclude that the selected cluster formations are stable.

An analysis of structural changes in the data reflecting the impact of the EGDI index on the indicators of socioeconomic and political development of countries that are included in groups of countries with different income levels (low income, lower middle income, higher middle income, high income)

showed that the sample is homogeneous. In other words, there are no significant differences in the intensity of the influence of the factor of digitalization on the socioeconomic and political development in countries with different income levels.

A study of the lag in the impact of the EGDI index on the indicators of socioeconomic development and the quality of political institutions made it possible to conclude that the growth of digitalization has a positive effect on the indicators of socioeconomic development, both in the short and medium term.

The strongest short-term effect is observed in areas such as increased levels of social progress and global competitiveness. The lag in the impact of the digitalization index on the growth of the Easiness of Doing Business Index is one year. The longest lag in the influence of growth in the level of digitalization is the characteristic of the level of political development of a country and is equal to five years. However, over time, the positive influence of the digitalization factor is increasing.

The above conclusions allow us to conclude that the positive impact of digitalization on the level of socioeconomic and political development of countries is consistent with the priorities identified by the Ukrainian government for implementing the digitalization strategy of public sector.

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