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### INNOVATION DEVELOPMENT AND EFFICIENCY OF PUBLIC ADMINISTRATION: MANAGEMENT AND LEGISLATION FEATURES

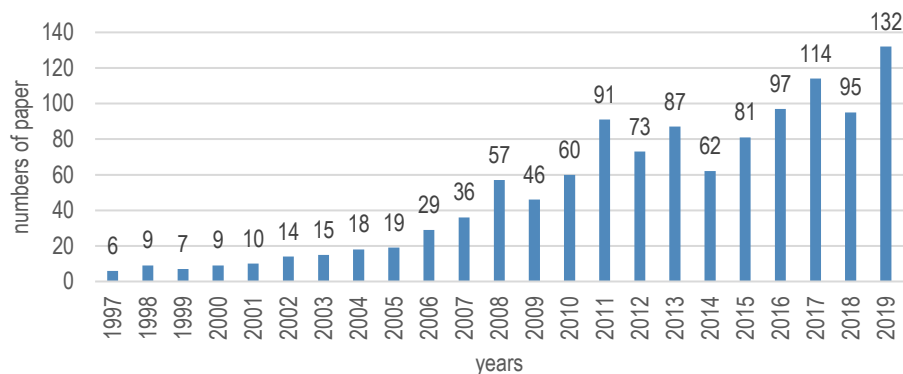
**Abstract.** *The paper deals with the analysis of the impact of public administration on the innovation development. With purposes to identify the main scientific directions of analysis among the scientific community, the authors did the bibliometric study. For the reviews, the authors selected 1167 papers which indexing in Scopus. For the visualising the findings of bibliometric analysis, the VOSviewer was used. The results allow allocating 10 clusters of scientific directions which analysed the issues of innovations and public administrations. The first most significant clusters could «innovation» analysed the efficiency of the public administration through the effectiveness of innovation implementation. The second clusters connected with the government innovation policy and located close to the first clusters. The third cluster «public administration» involved 40 items and 4699 links. The scientists with Italian and American affiliations had the most significant shares of papers. At the same time, the European funding allocated the most significant share of financing such research. The hypothesis of the investigation was checking the linking between levels of innovation development and countries' rating on the efficiency of public administration using the correlation analysis and least square model. For the checking hypothesis, the authors used the software EViews11. The authors analysed the Worldwide Governance Indicators as the base indicators for the assessment of public administration efficiency. For the analysis, the authors used data for EU countries and Ukraine. As Ukraine has started the integration process, the Ukrainian policy should be synchronised with the EU. The findings proved the correlation between variables. Thus, the increasing of government efficiency and the rule of law lead to increasing by 0,094 and 0,043 points the level of innovation development of the country corresponding. At the same time, the increasing regulation policy provoke the increase of innovation development by 0,08 points. The less impact had the variables as follows: sustainability competitiveness of the country and volume of expenditure on research and development. After analysis of the empirical data, the reviews of the management and legal instruments was done. Considering the EU experience, the authors identified the system of tools which lead to increasing of public administration efficiency as follows: legislation on property rights, anti-corruption directives, digitalisation of government authorities at all levels. For the future investigation, the time and range of the countries should be extended.*

**Keywords:** governance, management, law, property right, innovation.

**Introduction.** The strengthening of global competitiveness provokes the government to transform from the traditional to innovation model of the country's economic development. Thus, the range of the common indicators developed by the rating agencies with the purpose to estimate the country's competitiveness. Besides, the ongoing Industry Revolution leads to extending innovations and considering them in management at all levels. In this case, governance should understand the impact of innovations on public administration and developed relevant legislative mechanisms and instruments to attract and support innovations.

**Literature Review.** Considering the findings of the bibliometric analysis, the numbers of papers on «public administration» and «innovations» have been increasing for the last ten years. Thus, in 2019 the numbers of documents increased in twice compare with 2009. At the same time, in 2009, 2012, 2014 and

2018, the numbers of paper decreased compared with the relevant previous years. Publication activity in Scopus on innovations and public administration showed in Figure 1.



**Figure 1. Publication activity in Scopus on innovations and public administration**

Sources: developed by authors using Scopus Tools Analyses

Considering the findings, the scientists with Italian and United Kingdom affiliations had the most significant share of paper on innovations and public administration in Scopus. Thus, among 1167 papers 12,43% and 12,25% of the documents were written by the scientists from Italy of the United Kingdom (Table 1).

**Table 1. Papers in Scopus on innovations and public administration by country**

Country	Numbers of documents, unit	Share, %
Italy	145	12,43%
United States	143	12,25%
Russian Federation	120	10,28%
Spain	116	9,94%
United Kingdom	69	5,91%
Canada	64	5,48%
Netherlands	46	3,94%
Australia	39	3,34%
Brazil	37	3,17%
Germany	35	3,00%
TOTAL	1167	

Sources: developed by authors using Scopus Tools Analyses

Thus, considering the results, the most cited papers (84 citations) among Italian scientists were published in high ranked Journal «Public Administration Review» (SNIP 2,857 in 2018). The positive dynamic of investigation on abovementioned issues could be explained by the massive volume of financing, which invested by the EU government. Considering the data in Table 2, the European Commission financed ten investigations, National Natural Science Foundation of China and Social Sciences and Humanities Research Council of Canada – 7 documents, less European Regional Development Fund and National Science Foundation.

Besides, the most cited paper (more than 220 citations, among all) was published by the authors from Spain and Mexico Criado J. I., Sandoval-Almazan R. and Gil-Garcia J. R. in 2013. In the paper (Criado et



The findings proved that scientific community around the world analysed the public administration and innovations from the different points of views: social and economic development of the national economy (Bilan et al., 2019e; Vasylieva et al., 2017b, 2013; ; Dalevska et al, 2019;); the influence of bank and financial system on innovation development (Bilan et al., 2019a; Buriak et al., 2015; Vasylieva et al., 2017a; Bilan et al., 2019d; Kaźmierczyk and Chinalska, 2018; Tkachenko et al., 2019b; Brychko et al., 2018); country's brand management (Bilan et al., 2019b); macroeconomic stability (Bilan et al., 2019c; Dementyev and Scherbakov, 2017); green innovations and energy policy (Yevdokimov et al., 2018; Pimonenko et al., 2017; Chygryn et al., 2019; Pająk et al., 2017); new management trends (Leonov et al., 2017).

The scientists of the first clusters (Figure 1) Scupola A. and Zanfei A. (2016) using Hartley's model proved the hypothesis between innovation tools and efficiency of governance. The scientists in the paper (Arduini et al., 2010; Hrytsenko et al., 2018) proved the necessity to develop competence to develop the skills to use innovative technologies in governance at all levels. Ahn M. J. and Bretschneider S. (2011) proved that innovation technology declined the corruption and bureaucracy among the government authorities. The scientists in the papers (Smith, 2010; Mergel et al., 2013; Vasilyeva et al., 2017; Vasyli'eva et al., 2017) proved that open innovations increased the openness of the government. Despite the numerous investigations on linking between innovations and efficiency of public administration, most scientists analyse the efficiency information technology as the innovations. At the same time, the aspects of management and legislation features have not developed. Besides, most papers focused on Italian or American conditions. In this case, under this investigation, the authors analysed the linking between innovations and efficiency of public administration on examples of all EU countries and Ukraine.

**Methodology and research methods.** Under the investigation, the few steps were done as follows:

1. The bibliometric analysis presented in the Literature review. For the study, the VOSviewer and Scopus Tools analyses were used.
2. Selecting a variable for analyses. Under the study, the database was used as follows: World Data Bank, Eurostat, Worldwide Governance Indicators
3. Considering the findings, identify the management and legislation instruments, which increased the efficiency of innovations implementation in public authorities.

For checking the general hypothesis about linking between the innovation development and public administration efficiency, the authors used correlation analysis and the least square model. For that purpose, the software EViews 11 was used. The explanations of the variables were presented in Table 3.

**Table 3. The variables for analysis**

Variables	Indicators	Source
Governance Efficiency as a parameter of efficiency of public administration	GE	The Worldwide Governance Indicators (WGI) project reports (Kaufmann et al., 2010-2019)
Rule of Law	RL	
Regulation Policy	RP	
Intramural R&D expenditure (GERD) by sectors of performance as the indicator of innovations	R&D	Intramural R&D expenditure (Eurostat, 2019)
Global Innovation Index indicates the innovation development of the country	GII	The Global Innovation Index, 2019
Global Sustainability Competitiveness Index as a dependent variable	GSCI	The Global Sustainability Competitiveness Index, 2019

Sources: compiled by authors

At the last stage, considering the results from meta-analysis and the correlations analysis, the analysis of legal and management instrument to increase the efficiency of innovations was compiled.

**Results.** At the first stage, the descriptive statistic was done. The findings of the analysis presented in Table 4.

At the next stage, all data were normalised. The checking data of stationarity allow accepting the hypothesis that all data are stationarity.

**Table 4. Descriptive statistic of selected variables**

Variables	GII	GE	RL	RP	R&D	GSCI
Mean	49,47	1,06	1,066	1,11	10269,75	49,78
Mediation	49,3	1,07	1,077	1,08	2258,47	49,9
Maximum	63,8	2,17	2,11	2,04	99553,62	62,8
Minimum	35,7	-0,65	-0,81	-0,63	58,7	0,54
Standard Deviation	7,63	0,66	0,69	0,56	18904,14	6,14

Sources: compiled by authors

The Correlation Matrix allows identifying the multicollinearity of selected variables. As multicollinearity makes the significant parameters insignificance by increasing the standards error. The high rate of correlation between two parameters could indicate about multicollinearity. The Correlation Matrix of variables in Table 3 showed in Table 5.

**Table 5. Correlation Matrix of selected variables**

Variables	GII	GE	GSCI	R&D	RL	RP
GII	1					
GE Probability	0,57 (0,000)	1				
GSCI Probability	0,43 (0,000)	0,46 (0,000)	1			
R&D Probability	0,42 (0,034)	0,36 (0,001)	0,18 (0,02)	1		
RL Probability	0,50 (0,000)	0,44 (0,000)	0,46 (0,000)	0,34 (0,000)	1	
RP Probability	0,49 (0,000)	0,47 (0,000)	0,48 (0,000)	0,33 (0,000)	0,53 (0,000)	1

Sources: compiled by authors.

The findings in Table 4 reject the hypothesis about multicollinearity of variables. At the last stage, the checking of the variables' impact on the country's innovation development was done using the least square model.

**Table 6. Impact of variables on Global Innovation Index**

Variables	Coefficient	Standard Error	t-statistic	Probability
GE	0,094	0,004	2,156	0,000*
GSCI	0,003	0,017	0,035	0,034**
R&D	0,019	0,003	5,282	0,041**
RL	0,043	0,038	1,136	0,001*
RP	0,08	0,033	2,247	0,002*
constant	1,63	0,03	54,33	0,000*

Note: \*, \*\* significance at level 1% and 5% corresponding.

Sources: compiled by authors.

The R-squared coefficient was 0,89, which mean that empirical results were significant. Thus, the obtained data allow identifying that rule of law, government efficiency and regulatory policy were significant at 1%, and expenditure on research on development and sustainability competitiveness of the country were significant at 5% level.

Thus, increasing by one point of government efficiency and the rule of law leads to increasing by 0,094 and 0,043 points the level of innovation development of the country corresponding. At the same time, the increasing regulation policy provoke the increase of innovation development by 0,08 points. The less impact had the variables as follows: sustainability competitiveness of the country and volume of expenditure on research and development.

The empirical results proved that innovation development of the countries' related to government efficiency. Besides, the rule of law and regular policy had a statistically significant impact on government efficiency. In this case, Ukraine, as a country which planned to join the EU should analyse and synchronise the national legislation with the EU normative base.

At the first step, the government should accept the block of anti-corruption regulations which should correspond to the EU legislation. Such changes lead to increasing the openness of the government and decrease the index of corruption in the country. Besides, the regulation of property rights should be implemented at the national level, which boosts the developing of innovations in Ukraine. Noted, that beginning the Ukrainian government had already started to the digitalisation of government at all levels. Unfortunately, that process was not systematically. Only a few services allowed for using among society. In this case, Ukraine should analyse the Estonian experience in this direction.

**Conclusions.** Considering the results of the bibliometric analysis, ten clusters of the scientific directions on investigation the innovation development and government efficiency could allocate. The first most significant groups «innovation» involved scientists who analysed the public administration through the effectiveness of innovations implementation. The second clusters connected with the government innovation policy and located close to the first clusters. The third cluster «public administration» focused on analysis different dimensions on the efficiency of government efficiency. The findings proved the correlation between selected variables. The increasing of government efficiency and the rule of law lead to increasing by 0,094 and 0,043 points the level of innovation development of the country corresponding. Besides, the increasing regulation policy provoke the increase of innovation development by 0,08 points. Considering the EU experience, the system of instruments which lead to increasing of public administration efficiency could be proposed as follows: legislation on property rights, anti-corruption directives, digitalisation of government authorities at all levels. For the future investigation, the time and range of the countries should be extended.

**Author Contributions:** conceptualisation, methodology, investigation, visualisation V. K., L. Z., A.K. and O. O.

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**Інноваційний розвиток і ефективність публічного управління: правові та управлінські аспекти**

У статті проаналізовано вплив ефективності державного управління на інноваційний розвиток країни. Авторами проведено бібліометричний аналіз наукових публікацій, що досліджують питання ефективності державного управління. Для аналізу обрано 1167 наукових статей, які проіндексовано наукометричною базою даних Scopus. Для візуалізації результатів бібліометричного аналізу використано програмне забезпечення VOSviewer. На основі отриманих результатів виокремлено десять наукових кластерів вчених, які досліджували питання взаємозв'язку інноваційного розвитку країни та ефективності державного управління. Перший, найбільший кластер наукових публікацій – «інноваційний розвиток» сфокусований на дослідженні ефективності державного управління та впровадженні інновацій. Другий кластер пов'язаний з аналізом ефективності державної інноваційної політики. Третій кластер – «державне управління» вміщує понад сорок ключових слів та 4699 посилань. Визначено, що найбільша питома вага наукових публікацій опублікована вченими з італійською та американською афіліцією. При цьому Європейські фонди профінансували найбільшу питому вагу наукових досліджень за визначеною тематикою. У рамках статті висунуто гіпотезу про зв'язок між рівнями інноваційного розвитку та ефективності державного управління в країні. Перевірку гіпотези здійснено з використанням кореляційного аналізу, моделі найменших квадратів та програмного забезпечення EViews11. У якості показників оцінювання ефективності державного управління використано світові показники ефективності державного управління (Worldwide Governance Indicators). Об'єктом дослідження обрано країни ЄС та Україна. Отримані емпіричні результати підтвердили наявність кореляції між обраними змінними параметрами. Так, підвищення ефективності державного урядування та посилення верховенства права призводять до підвищення рівня інноваційного розвитку країни на 0,094 та 0,043 пункту відповідно. У той же час посилення регуляторної політики провокує зростання рівня інноваційного розвитку країни на 0,08 пункту. Встановлено, що рівень сталої конкурентоспроможності країни та обсяг витрат на дослідження та розробки мали не значний вплив на індекс інноваційного розвитку країни. На основі результатів аналізу емпіричних даних проведено систематизацію підходів до підвищення ефективності державного управління та відповідного правового забезпечення. Враховуючи досвід ЄС, авторами визначено заходи, впровадження яких сформує передумови для підвищення ефективності державного управління, а саме: удосконалення законодавчої бази щодо регулювання права власності, синхронізація вітчизняних антикорупційних директив з нормами ЄС, проведення цифровізації державних органів влади на всіх рівнях. Для подальших досліджень доцільно збільшити часовий проміжок та вибірку країн, що дозволить отримати більш об'єктивні емпіричні дані.

Ключові слова: управління, менеджмент, нормативна база, право власності, інновації.

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