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STUDYING THE SCIENCE CENTRICITY OF THE GOVERNMENT LEGISLATIVE ACTS IN 2014—2022

Introduction. *The effectiveness of government policy formation and its successful implementation is contingent upon the extent of regulatory and legal support. Achieving effectiveness in the implementation of government policy in the R&D sphere relies on the comprehensive integration of scientific legislative norms across multiple branches of legislation.*

Problem Statement. *An important research issue is the study of the hierarchical structure of governmental legislative acts with the aim of identifying the branches of legislation that exhibit the highest level of scientific intensity and assessing their contribution to the overall degree of science centricity in the context of regulatory and legal support of the policy implementation for the governments of Ukraine.*

Purpose. *To determine the structure of science-related government acts by fields of science in 2014—2022.*

Material and Methods. *The main methods of research are: scientometric (slang) method of analysis of the texts of normative legal acts, linguistic and legal methods, as well as statistical methods of grouping, correlation analysis and comparative analysis of legislative acts as statistical units.*

Results. *Novel research methodologies have been developed to define the branches of legislation, which contributes to the establishment of a sectoral structure within statistical collections of science-centric documents. These identified branches of legislation make a significant contribution to the total science-centricity index (SCI) of the governments. Furthermore, statistical analysis has revealed interrelationships among the SCIs for individual branches of legislation, enabling an assessment of the systematic nature of government initiatives pertaining to regulatory and legal support of R&D activities between 2014 and 2022. The findings have indicated that an increase in the number of branches of legislation predominantly has a positive effect on the SCI of the Governments.*

Conclusions. *Including the monitoring of the science-centric orientation of government acts by the field of legislation within the government's agenda for government R&D policy will enhance the predictability of governance in the realm of R&D activities.*

Keywords: document, branch of legislation, focus on science, government, statistical population, science-centricity index (SCI), and R&D policy.

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The effectiveness of government policy formation and its successful implementation are contingent upon the extent of legal and regulatory support. The scientific aspect of governmental legal and regulatory ingenuity serves as an essential element in the triumph of any reforms. The efficacy of implementing government R&D depends on both the prompt enactment of legislative principles within research, engineering, and innovation domains of national development and on the incorporation of legal acts regulating the sphere of science across various branches of legislation.

During the historical period from 2014 to 2022, Ukraine underwent a transitional phase involving the restructuring of its governmental apparatus, entailing the dissolution of outdated governance bodies and the establishment of new ones, in line with the proclaimed European integration objectives by the Ukrainian governments. This era was also characterized by comprehensive economic reforms in Ukraine, during which the scientific aspect of governmental legal and regulatory inventiveness had to assume a pivotal role in all aspects of human endeavors.

The regulatory and legal framework for R&D development in Ukraine is an independent element of the administrative and legal mechanism of the analyzed process and a cohesive legal formation composed of a series of legal acts and bylaws with a clear direction, which are aimed at facilitating the achievement of the long-term goals of the national policy towards the development of Ukraine's R&D potential [1].

One of the important problems of legislative support for science in Ukraine is to improve the efficiency of methods for analyzing the content of legal acts and regulations in order to update existing or to create new problem-oriented legal and regulative frameworks aimed at improving the mechanisms for implementing government policy [2]. This problem is also relevant for scientometric analysis of legislation in the field of science, to be made in order to identify the relationship between the content of legal acts in the field of science and the effectiveness of implementing government R&D policy [3].

Analyzing the representation of science and its fields within the existing legislation based on prioritization and organizational adequacy provides an understanding of how Ukraine views its own science and R&D potential, as well as the prospects for national socio-economic development [4]. At the same time, the issues related to the quality of applicable legal framework that directly regulate scientific, R&D, or innovation areas, as well as the level of science focus of legal acts, remain relevant. The issues related to improving the quality of the applicable regulatory and legal framework are addressed through vertical structuring of types of legal acts [1, 5], as well as in the field of legal linguistic research, including computer linguistics [6, 7].

At the same time, studying the science centricity of legal acts is an important measure for understanding the urgent needs of this field and orienting the entire economy towards a science-driven development [4].

As noted in previous studies by the authors, "the level of science centricity of resolutions of the Cabinet of Ministers of Ukraine, as a rule, is the highest among other types of legislative acts, which is because of its legal essence as a bylaw" [8]. The Cabinet of Ministers of Ukraine as a rule-making body determines the content of its own regulations, as well as their sectoral orientation.

The terminological complexity of legislative acts that contain thematic slang words [8] allows them to be defined as science-oriented acts. The presence of science-oriented legislative acts indicates the scientific complexity of national legislation, the level of which is determined by the science-centricity index (SCI). SCI serves as both an indicator of the development of legal principles for scientific, R&D, and innovation activities in Ukraine and a statistical measure of government R&D policy focus on science.

The spheres of formation and implementation of government R&D policy are determined by the dividing the legal framework into branches of legislation [9]. Each branch of legislation is a set of regulatory and legal acts united by the subject

of legal regulation, which is a sphere of homogeneous social relations, including the sphere of science. The branches of legislation, which contain sets of science-related acts can be considered science-focused, in a first approximation.

Identifying the most science-focused areas of legislation by type of act (law, resolution, etc.) and their makers (government bodies) allows determining the real priorities in the formation and implementation of government R&D policy for any period of state-building.

An actual research problem is the study of the sectoral structure of government legislative acts in order to identify the most science-focused areas of legislation and to assess their contribution to the overall level of science centricity of the regulatory and legal framework in the context of implementing R&D policy of governments.

The purpose of the study is to determine the science centricity of government legislative acts by areas of legislation for the period from 2014 to 2022.

In order to improve the methodology of previous scientometric studies of legislation, the authors have refined the criteria for the scientific content of legal acts and regulations (hereinafter referred to as the documents) of governments based on the primary characteristic, as well as determined the science-centricity index (SCI) [8, 10, 11]. To classify a document as science-related, two conditions shall be met. The first condition is the presence of primary characteristics in the texts of the documents, namely the word forms of keywords "science" and "research" together with first-order derivative lemma-predicates. It should be noted that the presence of the word form "science" in the texts implies belonging to scientific activity, and the word form "research" means belonging to one of the main types of such activity. Moreover, the phrase "scholarly (scientific) research" is an established term in domestic scientific and legislative terminology. The second condition for determining a text as science-related is the presence of scientific context, i.e. regulative direction of the use of keyword forms in the R&D sphere.

Given the increasing number of criteria for determining the scientific content of documents, SCI is considered a measure of the science-related content of legislation in the second approximation. The dimensionless SCI is calculated as the number of science-related documents per 100 issued documents, instead of the specific weight of legislation acts of scientific direction, as proposed earlier [8].

To achieve the purpose of this study, the authors have chosen resolutions of the Cabinet of Ministers of Ukraine.

To determine scientific documents, the texts of Cabinet of Ministers of Ukraine resolutions for the period of 2014—2022 (from 27.02.2014 to

Table 1. **The Number of Documents in 2014—2022, by Prime Ministers**

Government	Prime Minister (term)	Number of documents*	Including science-focused ones
1	2	3	4
Government 1	Arsenii Yatseniuk (27.02.2014—26.11.2014)	613	93
Government 2	Arsenii Yatseniuk (27.11.2014—13.04.2016)	1469	228
Government 3	Volodymyr Groisman (14.04.2016—28.08.2019)	3735	619
Government 4	Oleksii Honcharuk (29.08.2019—03.03.2020)	550	100
Government 5	Denys Shmyhal (04.03.2020—23.02.2022)	2695	405
Total number of documents		**9062**	**1445**

Source: authors' development.

* The number of CMU resolutions in the *Legislation of Ukraine* electronic database as of 24.08.2022.

23.02.2022) have been analyzed from both scientometric (slang) [8, 12] and legal linguistic (contextual) points of view.

As a result of the legal linguistic analysis of government documents, some legal acts that were initially identified as scientific have been excluded. These texts exclusively contained representative characteristics of science centricity, such as the names of state authorities, scientific status (scientific degree, academic title) of experts or representatives of R&D institutions. However, the presence of the name of a scientific institution as the contractor under government projects is considered a scientific direction of the document, as the implementation of such projects requires scientific and R&D activities. International agreements in which texts of appendixes and annexes meet the defined criteria of scientific significance are also included in the scientific documents of the government.

The study of the science centricity of legislative acts of the government in the period of 2014—2022 consists of the three stages: 1) determination of the total number of scientific documents of the governments in the post-Maidan period of Ukraine's historical development and before the beginning of the large-scale armed invasion by the Russian Federation (27.02.2014—23.02.2022); 2) formation of the sectoral structure of statistical populations of scientific documents by government terms; 3) determination of the most science-related areas of legislation using statistical analysis methods.The electronic database *Legislation of Ukraine* portal[1] contains Cabinet of Ministers of Ukraine resolutions for the period from 2014 to 2022, which are formed as statistical sets of documents and distributed by the terms of the Prime Ministers of Ukraine. Based on the results of linguistic-statistical analysis of the primary texts of these documents [13], 148 of them have been identified as science-related in the second approximation (Table 1).

The SCI for each government is calculated based on the data from Table 1. We consider the achieved SCI for each government to be a public perception of their leaders' views on the place and role of science in various spheres of social life at certain historical stages of Ukraine's development, and therefore the level of science-centric orientation of a particular government. The dynamics (variability) of the total SCI of the documents as a summary of the terms of each government have shown the evolution of their science centricity level (Fig. 1).

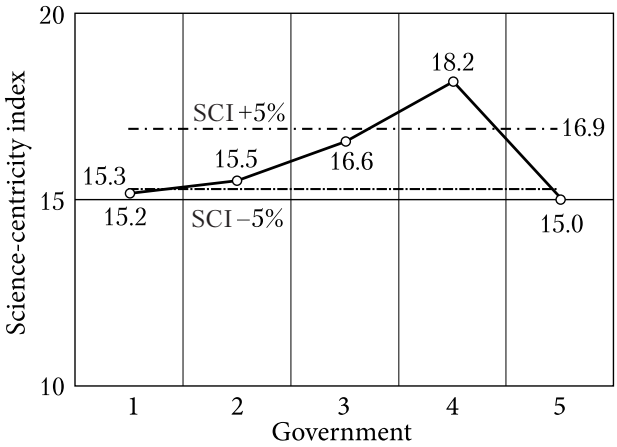

Fig. 1. Variability of total number of science-related documents during 2014—2022, by Governments. The standard deviation of the average value of the total SCI is ±0.8

SC indexes of Governments 1 and 5 (15.3) are below, while that of Government 4 (16.9) is above the SCI standard deviation range. Within the range of standard deviation of the mean value there are the indexes of Governments 2 and 3.

The term of Government 1 coincides with the presidential terms of Oleksandr Turchynov (acting president) and Petro Poroshenko. The main factors of the country's historical development are the external ones: the beginning of the local Russian-Ukrainian war in Donbas (a hybrid war) and the loss of part of the territory (the Autonomous Republic of Crimea, eastern parts of Donetsk and Luhansk Oblasts) and the change of political regime internal as internal one.

The terms of Governments 2 and 3 coincide with the presidential term of Petro Poroshenko. The main external factors are the transition from active

[1] https://zakon.rada.gov.ua/laws/main/a (Last access: 25.08.2022).

hostilities in eastern Ukraine to diplomatic processes of settling the armed conflict (Government 2) and peaceful development in most of the country's territory (Government 3); the main internal factor is intra-party processes within one political system.

The term of Governments 4 and 5 coincide with the presidential term of Volodymyr Zelensky and are characterized by modernization of the country's political and economic system. The main external factors are legal uncertainty of the status of temporarily occupied territories and the COVID-2019 pandemic (Government 5). The main internal factors are intra-party processes both within the pro-presidential mono-majority in parliament and within the opposition political forces from previous regimes of the country.

In addition to the external and internal factors of the country's development on the science centricity of the documents, there is also the human factor, namely the attitude of the Prime Ministers towards the R&D system: from recognition and full support of science as an unconditional foundation for building a competitive environment to absolute misunderstanding and indifference (attitude towards science as a secondary and unimportant sphere and allocation of funds and resources to the science sector according to the residual principle) [4]. The abovementioned external and internal factors definitely influence both the SCI value and the affiliation of scientific documents to a certain branch of legislation.

In order to separate statistical collections of documents according to the branches of legislation, we use the software of *Legislation of Ukraine* electronic database of regulatory and legal information, namely, *Legal Classification* section[2]. The legal classification involves the assignment of codes of one of the 28 branches of legislation in accordance with the classification of the document. Based on Document *Classification* tab from *Card* section for each government document, we form the initial statistical population according to the signs of legal classification (Table 2).

The number of documents by the branches of legislation in Table 2 is not equal to the number of science-related documents specified in Table 1, column 4. This is because of the fact that part of the documents forms complex (intersectoral) legislation, i.e. they contain norms of several branches of legislation.

The interbranch documents do not allow obtaining the branch structure of science-centric legislation, in the usual way, through a simple calculation of shares for each branch of legislation. Analytical reduction of inter-branch documents to single-branch ones is an extraordinary task, as it does not have an unambiguous mathematical solution.

Instead of determining the structure of branches of legislation, a mechanism for determining the structure of statistical populations of the branches of legislation has been proposed. Such a structure is defined through the successive accumulation of uniform statistical collections of documents before the formation of a selective statistical collection, the volume of which is at least 95% of the general collection of science-related documents (Table 1, column 4). Uniform statistical collection of documents means the inclusion of all documents that have legal classification codes (hereinafter — the odes) of certain branches of legislation in *Document Classification* tab. The consistent accumulation of uniform statistical collections of documents means the accumulation of selected documents according to the codes of the branches of legislation, from the most to the least numerous branch (Table 2, columns 3—7), or from the most to the least science-focused one. The inter-branch documents selected for a uniform statistical population are considered pseudo-uniform, that is, belonging to a more scientific field of legislation, and are excluded from the further process of identification by legal classification codes.

Using the abovementioned mechanism for determining the structure of statistical populations,

[2] https://zakon.rada.gov.ua/laws/klas (Last access: 25.08.2022).
https://zakon.rada.gov.ua/laws/card (Last access: 25.08.2022).

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we have identified separate branches of legislation, in the decreasing order in term of focus on science (Table 3).

The achieved values of the shares of the sample statistical populations in the total number of science-related documents (at least 95%) make it possible to determine individual areas of law as statistically significant for each government (Table 3, columns 3, 5, 7, 9, and 11), and 13 out of 28 branches of legislation for all the governments in

Table 2. **The Structure of Science-Related Documents of the Governments by Legal Classification**

Code	Legal classification (branch of legislation)	Gov 1	Gov 2	Gov 3	Gov 4	Gov 5
1	2	3	4	5	6	7
10	Principles of social order	54	86	198	45	107
20	Budget and finance law	20	40	164	21	75
30	Civil law	5	8	22	5	9
40	Natural resources. Protection of nature	3	14	56	14	25
50	Labor law	4	15	64	9	40
60	Social support and social insurance law	8	12	18	2	17
70	Marriage and family law	1	2	6	0	1
80	Housing law. Housing economy	1	1	7	0	3
90	Healthcare law	4	15	65	12	86
100	Education, science, and culture law	25	70	214	35	124
110	Awards and honorary titles	0	2	2	2	4
120	Defense law	3	11	31	4	21
130	National security and law enforcement	7	16	26	1	42
140	International and foreign economic relations	10	30	87	16	38
150	General principles of legal regulation of economic development	17	65	153	19	60
160	Industries law	4	13	52	8	34
170	Urban planning law	2	3	15	2	10
180	Transport law	6	9	22	3	14
190	Communications law	1	2	1	1	1
200	Trade in foodstuff and public catering law. Provision of household services to population	1	2	11	5	0
210	The use of nuclear energy and radiation protection. Liquidation of the consequences of the Chornobyl disaster and other nuclear accidents and trials	6	1	8	0	5
220	Agriculture and agro-industry law	1	10	24	9	12
230	Cooperation law	0	0	4	0	3
240	Administrative offences law	0	0	1	0	0
250	Criminal law	0	2	1	0	0
260	Correctional labor law	1	0	1	0	0
270	Proceedings law	0	1	5	0	3
280	Judicial system. Bodies of justice. Prosecutor's Office Advocacy. Notary	2	7	6	0	3
The number of documents by signs of legal classification		**186**	**437**	**1264**	**213**	**737**

Sources: developed by the authors.

Table 3. **The Structure of Statistical Populations of Branches of Legislation**

Rank	Government 1		Government 2		Government 3		Government 4		Government 5	
	Share*	Code**	Share	Code	Share	Code	Share	Code	Share	Code
1	2	3	4	5	6	7	8	9	10	11
1.	58.1%	(10)	37.7%	(10)	34.6%	(100)	45.0%	(10)	30.6%	(100)
2.	74.2%	(10+100)	61.8%	(10+100)	58.2%	(100+10)	66.0%	(10+100)	50.1%	(100+10)
3.	82.8%	(10+100+140)	79.8%	(10+100+150)	74.0%	(100+10+150)	79.0%	(10+100+150)	67.7%	(100+10+90)
4.	88.2%	(10+...+140+150)	83.8%	(10+...+150+140)	82.6%	(100+...+150+20)	86.0%	(10+...+150+140)	77.5%	(100+...+90+150)
5.	92.5%	(10+...+150+60)	87.3%	(10+...+140+130)	89.2%	(100+...+20+140)	90.0%	(10+...+140+40)	82.5%	(100+...+150+140)
6.	**96.8%**	(10+...+60+20)	90.4%	(10+...+130+20)	91.1%	(100+...+140+90)	93.0%	(10+...+40+90)	87.4%	(100+...+140+20)
7.			93.0%	(10+...+20+60)	92.7%	(100+...+90+160)	**95.0%**	(10+...+90+30)	90.1%	(100+...+20+50)
8.			94.7%	(10+...+60+160)	94.2%	(100+...+160+40)			92.3%	(100+...+50+120)
9.			**96.5%**	(10+...+160+30)	**95.5%**	(100+...+40+50)			94.6%	(100+...+120+40)
10.									**96.0%**	(100+...+40+160)

Source: developed by the authors.
Note. The shares of accumulated branches of legislation are marked with bold; *the share of the sample statistical population of the branch(es) of law in the total number of science-related documents; **the codes of branches of legislation according to the legal classification.

general. The smallest number of branches of legislation is determined by statistical populations of branches of legislation for Government 1 (6 branches) and Government 4 (7), whereas the largest one corresponds to Governments 2, 3 (9) and Government 5 (10).

The terms of Governments 1 and 4 fell on the historical periods of the beginning of the transformation of the political and economic system of Ukraine (first of all, Government 1), so the smaller number of branches of legislation corresponded to the political necessity of solving the short-term goals of government R&D policy. The increase in the number of branches for the 2nd, 3rd, and 5th Governments is likely explained by the introduction of longer-term, programmatic management tasks.

The ranking of the statistical populations of the branches of legislation in the descending order by their focus on science can also be considered as the ranking by the priority of the regulatory and legal support of science in certain branches of legislation (Table 3, column 1). Thus, the greatest contribution to the formation of the structure of statistical populations of all Governments is made by statistical populations of the following key branches of legislation: 100 (education, science, and culture law) and 10 (the social order law), as their share exceeds 50% of general statistical populations. Enhancing the science centricity of the branches of legislation for Governments 1, 2, and 4 (code 10) and Governments 3, 5 (code 100) is caused by prioritizing the regulatory and legal support of R&D sphere by the Governments.

However, it is impossible to separate branches of legislation from Table 3 and to evaluate them in terms of the weight of their contribution to the formation of the structure of statistical collections, since they were formed in a different sequence of accumulation of uniform statistical collections of documents.

In order to standardize the mechanism for determining the structure of statistical populations for all the Governments, we define the education,

science, and culture law (code 100) (that is actually the primary source of science-centric documents) as a system-forming branch. The share of science-related documents of complex law with code 100, which form the primary statistical populations of twelve branches of legislation (Table 2), can be considered the level of regulatory and legal integration of these branches with the system-forming branch (Table 4).

The regulative and legal integration (hereinafter referred to as the integration) of the science-oriented branches of legislation indicates a comprehensive approach to the implementation of government R&D policy. The higher the level of integration of individual branches of legislation, the more effective complex measures for the implementation of individual areas of government policy.

The lack of such integration indicates the regulatory and legal support of an independent, priority direction of government policy, or the manifestation of asynchronous actions of authorities in the regulatory and legal support of R&D [4]. The last assumption requires additional studies of the architecture of external relations of such documents with legislative acts of other higher state authorities of Ukraine and previous Governments, which is beyond the scope of this research.

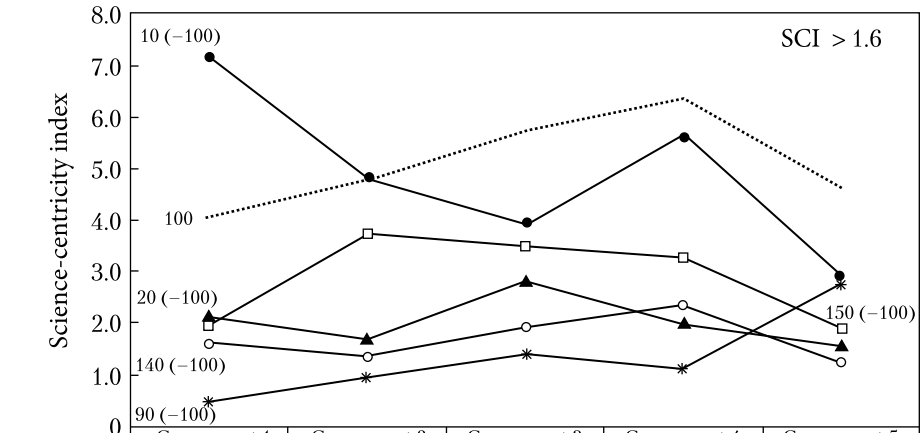
The following branches of legislation (Table 4): the social order law (code 10), the budget and finance law (code 20), the labor law (code 50), the healthcare law (code 90), and the general principles of legal regulation of economic development (code 150) are integrated for all the Governments, which testifies to the synchronicity of the introduction of R&D policy measures and also reflects the conventional attitude of the Prime Ministers to the role of science in the development of certain spheres of social life. The integration of the civil law (code 30), the natural resources and conservation of nature law (code 40), the social security and social insurance law (code 60), the defense law (code 120), the national security and law enforcement (code 130), international and foreign economic relations law (code 140), and the industries law (code 160) can be considered the individual approaches of certain Prime Ministers to the scientific focus of such branches of legislation.

It is possible to determine the contribution of individual branches of legislation to the formation of the structure of statistical populations (Table 3) by calculating SC indexes for the system-forming and other branches of legislation. We have obtained a scientific metric assessment of the system-forming branch of legislation by directly calculating the data from Tables 1, 2. In order to obtain the SC indexes of other branches of legislation, let us form the corresponding sample statistical populations of documents from Table 2, excluding the integrated documents (Table 4). For the sake of clarity, the system-forming and other branches of legislation are divided into two

Table 4. **The Level of Regulatory and Legal Integration of Science-Related Documents of the Science-Centric Branches of Legislation with the System-Forming Branch, by Government**

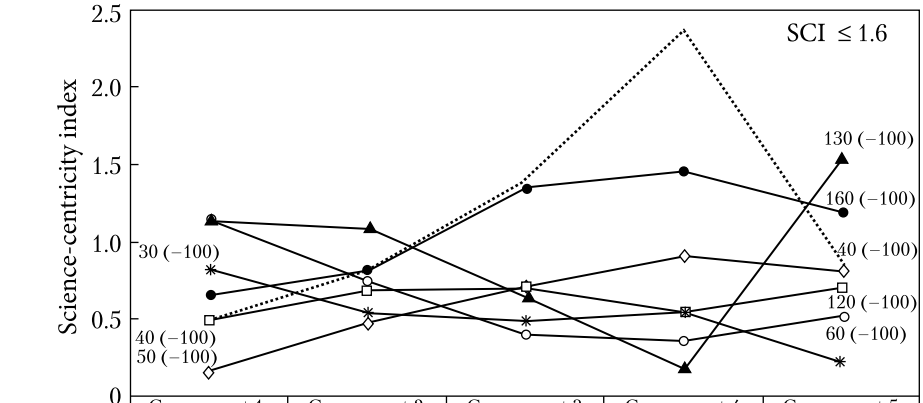
Code	The share of integrated documents, by branches (%)											
	(10)	(20)	(30)	(40)	(50)	(60)	(90)	(120)	(130)	(140)	(150)	(160)
Government 1	18.5	35.0			75.0	12.5	25.0				29.4	7.7
Government 2	17.4	37.5		14.3	53.3	8.3	6.7	9.1		33.3	15.4	3.8
Government 3	26.3	36.0	18.2	7.1	57.8	16.7	20.0	16.1	7.7	17.2	14.4	
Government 4	31.1	47.6	40.0	7.1	44.4		50.0	25.0		18.8	5.3	5.9
Government 5	26.2	42.7	33.3	8.0	45.0	17.6	12.8	9.5	2.4	13.2	15.0	7.7

Source: developed by the authors.



	Government 1	Government 2	Government 3	Government 4	Government 5
100	4.1	4.8	5.7	6.4	4.6
10 (–100)	7.2	4.8	3.9	5.6	2.9
20 (–100)	2.1	1.7	2.8	2.0	1.6
150 (–100)	2.0	3.7	3.5	3.3	1.9
140 (–100)	1.6	1.4	1.9	2.4	1.2
90 (–100)	0.5	1.0	1.4	1.1	2.8

a



	Government 1	Government 2	Government 3	Government 4	Government 5
40 (–100)	0.5	0.8	1.4	2.4	0.9
160 (–100)	0.7	0.8	1.3	1.5	1.2
130 (–100)	1.1	1.1	0.6	0.2	1.5
120 (–100)	0.5	0.7	0.7	0.5	0.7
60 (–100)	1.1	0.7	0.4	0.4	0.5
30 (–100)	0.8	0.5	0.5	0.5	0.2
50 (–100)	0.2	0.5	0.7	0.9	0.8

b

Fig. 2. Variability of SCI of individual branches of legislation*, by Governments.

* xxx(-100) is the designation of a certain branch of legislation according to the legal classification code, excluding the documents integrated into the system-forming branch (code 100)

groups, by the average SC indexes of statistical populations during the terms of all the Governments relative to the double standard deviation of the total SCI average (Fig. 1): the statistically significant SCI > 1.6 (Fig. 2, *a*) and the statistically insignificant ≤ 1.6 (Fig. 2, *b*).

The analysis of the interdependencies of the SCI variability of individual branches of legislation has shown several statistical regularities (Fig. 2). The statistical interdependencies between the SC indexes of the system-forming and individual branches of legislation have been es-

tablished: the direct dependence for code 40 (correlation coefficient 0.967[3]), code 50 (0.764), and code 160 (0.876), and the inverse dependence for code 130 (–0.889). The direct statistical interdependencies of the variability of system-forming and some branches of legislation (natural resources and nature conservation law, industries law) may indicate a latent functional relation between them. The same applies to the inverse statistical interdependence of the variability of the education, science, culture law and the national security and law enforcement law.

There is practically no statistical interdependence between SC indexes of the system-forming and branches of legislation coded 90 (correlation coefficient 0.001) and 120 (0.067). This indicates the absence of a relationship between the science centricity of the regulatory and legal support of government measures in the fields of healthcare and defense and the education, science, and culture law in 2014—2022. The interdependencies of the SCI variability of the remaining branches of legislation do not show any stable statistical trends.

Let us evaluate the contribution of individual branches of legislation to the total SCI of the Governments.

The statistically significant branches (Fig. 2, *a*). Four out of six branches of legislation, code 100 (the education, science, and culture law), code 10 (the social order law), code 150 (the general principles of legal regulation of economic development), code 140 (the international and foreign economic relations law) mainly form the structure of statistical populations during the terms of all the Governments, so they can be considered **conventional** for the regulatory and legal support of the implementation of government R&D policy in 2014—2022. Their contribution to the total SCI of the Governments is decisive, and the share in the general population ranges from 88.2% (Government 1) to 66.2% (Government 5).

For Government 5, the nonconventional branch of legislation (the healthcare law, code 90) is more important than the conventional ones (the general principles of legal regulation of economic development, code 150) and (the international and foreign economic relations law, code 140). The importance of this branch of legislation increased during the reform of the national healthcare system (Governments 3, 4) and the SARS-CoV-2 coronavirus pandemic (Government 5).

The sporadic nature of the contribution of code 20 (the budget and finance law) to the SCI of the Governments varies from the third most important, behind the key branches of legislation (Government 3), to an unclear contribution (Government 4), which indicates the instability of the use of budgetary and financial mechanisms for the implementation of government R&D policy. The highest weight achieved under Government 3 is associated with the implementation of the budget and financial provisions of the Law of Ukraine on scholarly research and R&D, with the highest SCI (Fig. 1) under Government 4 ensured by the regulatory and legal integration of budget and financial mechanisms not only to the system-forming (Table 4), but also to other branches of legislation. It seems that the highest SCI is achieved as a result of systemic coordination of budgetary and financial support with the branches of legislation, which form the structure of the statistical collection of science-related documents of Government 4.

The statistically insignificant branches (Fig. 2, *b*). None of the statistically insignificant branches of legislation form the structure of statistical populations during the term of all Governments. The SCI average for 3 out of 7 branches of legislation, code 40 (the natural resources and nature conservation law), code 160 (the industries law), and code 130 (the national security and law enforcement law) is greater than the standard deviation of the total SCI average (0.8). Among them, the structure of statistical populations for some Governments is formed by the following

[3] For two series, each consisting of five statistical units, the critical Pearson coefficient is 0.805 ($P > 0.95$). https://www.statisticssolutions.com/free-resources/directory-of-statistical-analyses/pearsons-correlation-coefficient/table-of-critical-values-pearson-correlation/ (Last accessed: 04.12.2022).

branches of legislation: the natural resources and nature conservation law (Governments 3—5), the industries law (Governments 2, 3, and 5), and the national security and law enforcement law (Governments 2, 5).

The average values of INS of four out of seven branches of legislation, under codes 120 (Defense Legislation), 60 (Legislation on Social Security and Social Insurance), 30 (Civil Legislation), 50 (Labor Legislation) were within the limits of statistical error, so their contribution in the formation of the structure of statistical collections of documents of some Governments was imperceptible. It also seems that these branches of legislation are not among the priority ones, because some of them are statistically random (Table 5, Fig. 2, *b*): the social security and social insurance law (Government 1), the civil law (Governments 2, 4), and the labor law (Governments 3, 5).

Let us form a list of statistically significant branches of legislation, which constitute the structure of statistical populations, and determine their population share, by Governments (Table 5).

Comparing the data from Tables 3 and 5 has shown that the number of the statistically significant branches of legislation and that of those constituting the structure of statistical populations for Governments 1 and 5 are identical. For Governments 2—4, they differ. The cumulative shares of the branches of legislation (92.1—94.2%) for Governments 2—4 (Table 5, column 4) give a reason to state that such statistically insignificant branches of legislation as the social security and social insurance law (Government 2), the labor law (Government 3), and the civil law (Governments 2, 4) do not influence the formation of the structure of statistical populations and the variability of SCI of the Governments.

Therefore, 11 out of 28 branches of legislation have been identified as separate branches of legislation, which mainly constitute the sectoral structure of statistical populations and have a significant contribution to the total SCI of the Governments in 2014—2022.They are as follows: the education, science, and culture law; the principles of social order; the budget and finance law; the natural resources and nature conservation law; the labor law; the social security and social insurance law; the healthcare law; the national security and law enforcement law; the international and foreign economic relations law; the general principles of legal regulation of economic development; and the industries law.

The analysis of the SCI variability for Governments and the dynamics of the number of statistically significant branches of legislation has shown that the increase in the number of branches of legislation has a positive effect on the SCI growth, in general. The exceptions are the SCI of Government 4 (the effect of full integration of the budget and finance law into other areas of law) and the SCI of Government 5. For the last Government, the causes of a decrease in its SCI are the absence of program objectives for its activities (there is no action program of the Cabinet of Ministers of Ukraine approved by the Verkhovna Rada of Uk-

Table 5. **The list of Statistically Significant Branches of Legislation, by Governments**

Government	Branches of legislation (codes)		Total share of the branches of legislation
Government 1	Conventional	20, 60	96.8%
Government 2		20, 160, 130	92.1%
Government 3		20, 90, 40, 160	94.2%
Government 4		90, 40	93.0%
Government 5		20, 90, 40, 160, 130, 50	96.0%

Source: developed by the authors.

raine[45]) and, consequently, the uncertainty (dispersion) of its priorities in the field of R&D.

The statistical interrelationships of some statistically significant branches of legislation allow us to assess the level of systematicity of government activities in the field of R&D. Thus, an increase in the number of conventional branches of legislation indicates an increase in the level of government systematization, while a decrease in the number means a downgrade in the level. As an example, for Governments 1—3 and 5, the budget and finance law (Fig. 2, *a*), Table 5, is among the conditional branches of legislation. Accordingly, these governments are characterized by a certain systematicity in the implementation of budgetary and financial mechanisms of the R&D policy, in contrast to Government 4.

CONCLUSIONS

Summarizing the results of research on the scientific focus of governmental acts for 2014—2022, we have concluded as follows.

1. On the basis of the developed approaches, the branches of legislation, which mainly form the sectoral structure of statistical collections of science-centric documents and have the largest contribution to the total SCI of the Governments (at least, 95%), have been identified. These 11 branches of legislation are as follows: the education, science, and culture law; the principles of social order; the budget and finance law; the natural resources and nature conservation law; the labor law; the social security and social insurance law; the healthcare law; the national security and law enforcement law; the international and foreign economic relations law; the general principles of legal regulation of economic development; and the industries law. These branches can be considered the priority directions in the implementation of the government R&D policy in 2014—2022.

2. The contribution of individual branches of legislation to the general level of the science centricity of government acts has been assessed through the determination of statistically significant branches of legislation.

3. The level of science centricity of government documents is conditioned mainly by regulatory and legal support of the so-called conventional branches of legislation: the science, education, and culture law; the principles of social order; the international relations and foreign economic relations law; and the general principles of legal regulation of economic development. Certain branches of legislation, such as the budget and finance law and the healthcare law were more important than the conventional ones during the terms of Government 3 and Government 5, respectively. This shows that their role in shaping the science centricity of governmental acts is non-systematic.

4. The level of science centricity of government documents in the relevant, as for the period of the hybrid Russia-Ukraine war, spheres of law such as the defense law, the national security and law enforcement law, did not meet the requirements of the time. The contribution of these branches of legislation to the general level of science centricity of government acts fluctuated within the limits of statistical error (the defense law) or was statistically insignificant (the national security and law enforcement law).

5. Several branches of legislation (the natural resources and nature conservation law, the industries law, the labor law, and the national security and law enforcement law are statistically interdependent with the system-forming science, education, and culture law.

Monitoring the science centricity of governmental acts as part of the agenda of the public R&D policy will contribute to improving the predictability of governance in the field of R&D.

The further research directions are as follows:

1. Verifying the stability of the identified statistical trends over longer historical period of Ukraine's independence, in particular, identifying the peculiarities of the public R&D policy of governments

[4] Resolution of Verkhovna Rada of Ukraine dated 04.06.2020 No. 665-IX on the Action Program of the Cabinet of Ministers of Ukraine. https://zakon.rada.gov.ua/laws/show/665-20#Text (Last accessed: 25.08.2022).

under non-military threats to the state's development, as well as under conditions of full-scale war.

2. Studying the architecture of external relations of science-related government documents with legal acts of the highest legal force (laws of Ukraine), as well as the acts of previous governments, with the aim of establishing the relationship between them in terms of focus on science, as well as identifying the asynchrony of the adoption of management decisions.

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ДОСЛІДЖЕННЯ НАУКОВОЇ СПРЯМОВАНОСТІ УРЯДОВИХ АКТІВ ЗАКОНОДАВСТВА У 2014—2022 РОКАХ

Вступ. Механізми формування публічної політики та можливості її ефективної реалізації залежать від рівня нормативно-правового забезпечення. Результативність впровадження урядової науково-технологічної політики полягає в інтеграції норм наукового законодавства до якомога більшої кількості галузей законодавства.

Проблематика. Актуальною науковою проблемою є дослідження галузевої структури урядових актів законодавства задля виявлення найбільш наукоємних його галузей та оцінювання їх внеску у загальний рівень наукової спрямованості нормативно-правового забезпечення у контексті реалізації публічної політики Урядів.

Мета. Визначити галузеві напрями наукової спрямованості урядових актів законодавства за 2014—2022 роки.

Матеріали і методи. Основними методами дослідження слугували наукометричний (сленговий) метод аналізу текстів нормативно-правових актів, лінгвістично-юридичний, а також статистичні методи групування, кореляційного та порівняльного аналізу актів законодавства як статистичних одиниць.

Результати. Розроблено оригінальні наукові підходи до визначення галузей законодавства, які формували переважно галузеву структуру статистичних сукупностей документів наукової спрямованості та мали найвагоміший внесок у величину загального індексу наукової спрямованості (ІНС) Урядів. Встановлено статистичний взаємозв'язок мінливості показників ІНС окремих галузей законодавства, що дає змогу оцінити системність урядових заходів щодо нормативно-правового забезпечення науково-технологічної діяльності за період 2014—2022 років. З'ясовано, що збільшення кількості галузей законодавства здебільшого позитивно впливає на зростання рівня ІНС Урядів.

Висновки. Винесення у формування порядку денного публічної науково-технологічної політики моніторингу наукової спрямованості урядових актів за галузями законодавства сприятиме поліпшенню передбачуваності урядування у сфері науково-технологічної діяльності.

Ключові слова: документ, галузь законодавства, наукова спрямованість, Уряд, статистична сукупність, індекс наукової спрямованості (ІНС), науково-технологічна політика.