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FACTORS INFLUENCING THE REGIONAL CONCENTRATION OF INNOVATIVE PROCESSES IN UKRAINE

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Abstract:
The object of the research is the process of regional concentration of engineering organizations in Ukraine. The article discusses one of the reasons for the regional concentration of factors of production of Ukrainian organizations of the sphere of engineering. Research methodology is based on the definition of the difference by the module of the specific gravity of the distribution by regions of the factor and the result of its influence. If the corresponding difference is not minimal, then there is a weak link between the investigated factors. It is justified the hypothesis that an important reason for the regional concentration of factors of activity of organizations in the sphere of engineering is social, as well as scientific and technological and innovation infrastructure. As a result of the research, it was revealed that the regional location of industrial enterprises in Ukraine is not the main reason for the regional concentration of Ukrainian organizations in the engineering sphere. Customers and performers of project documentation interact without any problems even being in different regions of the country.

Keywords: Organizations of the Sphere of Engineering; Scientific Organizations; Gross Regional Product; Innovation and Investment Project; Scientific and Technical and Innovation Infrastructure; Design and Estimate Documentation.

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1. Introduction

Regional engineering organizations directly participate in the implementation of regional and national innovation and investment projects. They determine the quality of project decisions contained in the project-budget documentation, and therefore they are essential for the scientific, technical and innovation activities. This determines the relevance of research of factors and the laws of their concentration in those or other regions.

The absence of such organizations or lack of their professionalism for implementing important innovation projects may call into question the successful implementation of the project activity, since in today's environment, project-estimate documentation is a prerequisite for the construction, modernization and reconstruction of any facilities.

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For a long time, the Ukrainian organizations of the sphere of engineering and their resources was concentrating in certain regions of the country, so it is important to determine the factors and the main causes of such concentration.

An analysis of recent research and publications of subject [1-9] allows us to determine the existence of significant developments in the topics of innovation and scientific and technical activities, as well as engineering services. Unfortunately, within these topics, the issue of regional concentration of engineering organizations often remains beyond the attention of scientists.

The paper [3] noted that the activation of innovation activity in the regions is necessary through the creation of innovative infrastructure objects, which will create conditions for cooperation between universities, scientific organizations, enterprises of the financial and real sectors of the economy and public organizations.

In [10] the author has already carried out the study of the peculiarities of the regional development of the organizations of the sphere of engineering in Ukraine for the period of 2000-2007. As a result of which the tendency of concentration of the resources of these organizations in Kiev and other industrialized regions has been revealed country.

In our study, we will focus on the following hypothesis: an important reason for the regional concentration of factors of activity of organizations of the sphere of engineering is social, as well as scientific and technological and innovation infrastructure, which in aggregate is more important for the of such concentration in comparison with the orientation towards the customers of their works. At the same time, the absence of significant barriers to interregional cooperation allows organizations of the sphere of engineering and of industrial enterprises to be locating in different regions of the country.

The purpose of the article is to clarify the causes of regional concentration of Ukrainian organizations of the sphere of engineering and the main factors of their activities.

2. Materials and Methods

The basis of the main results of the research was the use of the author's method of analyzing the deviations of the indicators of structure by country's regions [11].

According to this method, the regional structure of the GRP and the main indicators of the organizations of the sphere of engineering according to the regions of Ukraine were compared. In addition, the regional structure of the main indicators of scientific organizations was compared. At the same time, such business entities were seen as an innovation infrastructure.

Mathematically, the comparison was made by calculating the deviations of the specific gravity of the indicator for each region by module. Was determined the total quantitative corresponding deviation, which allowed to do evaluate objectively.

Indicators of organizations of the sphere of engineering in Ukraine by region were obtained from responses to inquiries to the State Statistics Service of Ukraine. Indicators of scientific

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organizations by region of the country and the regional structure of the GRP were obtained from open sources of the State Statistics Service of Ukraine.

3. Experimental Procedures

Table 1: Average structure of basic indicators of engineering organizations and GRP by regions Ukraine for 2014-2017

Regions	**The value of the average structure of indicators by regions,%**			
	GRP	**the number of organizations of the sphere of engineering**	**number of employees of the organizations of the sphere of engineering**	**volumes of performance of organizations of the sphere of engineering**
Ukraine	100,00	100,00	100,00	100,00
Vinnytsia region	2,97	2,61	2,05	1,01
Volyn region	1,54	1,70	1,08	0,24
Dnipropetrovsk region	10,73	7,08	7,73	4,44
Donetsk region	6,37	3,28	4,05	5,48
Zhytomyr region	1,94	2,23	1,50	0,37
Transcarpathian region	1,44	2,05	1,02	0,27
Zaporozhye region	4,34	3,94	3,06	1,28
Ivano-Frankivsk region	2,28	2,98	1,69	2,63
Kiev region	5,21	6,07	2,85	4,27
Kirovograd region	1,89	1,20	0,84	0,27
Lugansk region	1,50	1,16	3,37	2,90
Lviv region	4,72	6,05	6,07	2,74
Mykolaiv region	2,36	2,36	1,82	1,09
Odessa region	4,92	5,57	4,49	4,19
Poltava regions	4,70	3,20	2,57	2,98
Rivne region	1,75	2,42	1,34	0,33
Sumy region	1,98	2,00	1,69	0,76
Ternopil region	1,34	1,52	0,99	0,29
Kharkiv region	6,29	7,05	10,14	6,53
Kherson region	1,57	1,36	1,03	0,29
Khmelnytsky region	2,05	2,37	1,37	0,47
Cherkasy region	2,49	2,39	1,59	0,55
Chernivtsi region	0,92	1,26	0,63	0,13
Chernihiv region	1,82	1,85	1,03	0,36
m. Kyiv	22,89	26,29	36,01	56,12

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Table 2: Deflection by modulus between the values of the average shares of the GRP by region and values of the average shares the of the main indicators of the organizations of the sphere of engineering

Regions	**Deviation of specific gravity by module, %**		
	factor - number of organizations	**factor - number of employees**	**factor - volume of work execution**
Ukraine	*20,66*	*40,38*	*70,45*
Vinnytsia region	0,35	0,92	1,96
Volyn region	0,16	0,46	1,29
Dnipropetrovsk region	3,65	3,00	6,29
Donetsk region	3,09	2,32	0,89
Zhytomyr region	0,29	0,44	1,57
Transcarpathian region	0,61	0,43	1,17
Zaporozhye region	0,40	1,28	3,05
Ivano-Frankivsk region	0,70	0,59	0,35
Kiev region	0,86	2,36	0,95
Kirovograd region	0,69	1,06	1,62
Lugansk region	0,34	1,87	1,40
Lviv region	1,33	1,34	1,98
Mykolaiv region	0,00	0,54	1,27
Odessa region	0,65	0,43	0,73
Poltava regions	1,50	2,13	1,72
Rivne region	0,68	0,41	1,42
Sumy region	0,02	0,29	1,22
Ternopil region	0,19	0,34	1,05
Kharkiv region	0,76	3,86	0,24
Kherson region	0,21	0,54	1,28
Khmelnytsky region	0,32	0,68	1,57
Cherkasy region	0,10	0,90	1,94
Chernivtsi region	0,33	0,29	0,79
Chernihiv region	0,03	0,78	1,46
m. Kyiv	3,40	13,12	33,23

Table 3: The Average Structure of The Main Indicators of Ukrainian Scientific Organizations By Regions During 2014-2017

Regions	**The value of the average structure of indicators by regions,%**		
	number of organizations that carried out research and development	**the number of employees who were involved in research and development**	**the amount of work performed by scientific organizations**
Ukraine	100,00	100,00	100,00

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Vinnytsia region	2,09	0,69	0,33
Volyn region	1,00	0,30	0,12
Dnipropetrovsk region	5,84	9,69	11,91
Donetsk region	1,82	0,24	1,85
Zhytomyr region	0,93	0,41	0,18
Transcarpathian region	0,93	0,64	0,31
Zaporozhye region	2,99	4,38	4,42
Ivano-Frankivsk region	1,78	0,58	0,34
Kiev region	2,88	1,89	1,72
Kirovograd region	1,54	0,51	0,40
Lugansk region	1,58	0,37	0,42
Lviv region	7,42	4,86	2,57
Mykolaiv region	2,61	2,30	3,02
Odessa region	4,94	3,32	1,93
Poltava regions	2,16	1,29	0,50
Rivne region	1,17	0,37	0,10
Sumy region	1,61	2,56	1,14
Ternopil region	1,27	0,39	0,10
Kharkiv region	16,30	16,29	18,28
Kherson region	1,96	0,74	0,36
Khmelnytsky region	0,82	0,37	0,13
Cherkasy region	2,06	0,77	0,69
Chernivtsi region	1,96	0,86	0,47
Chernihiv region	1,51	0,74	0,39
m. Kyiv	30,83	45,45	48,30

Table 4: Deviations By Modulus Between The Values Of The Average Specific Weight Of The Main Indicators Of Scientific Organizations By Region And The Values Of The Average Specific Gravity By Regions Of The Main Indicators Of Scientific Organizations

Regions	**Deviation of specific gravity by module,%**								
	factor - the number of organizations that carried out research and development			**factor - the number of employees who were involved in research and development**			**factor - the amount of work performed by scientific organizations**		
	NOSI	NPOSI	VWOSI	NOSI	NPOSI	VWOSI	NOSI	NPOSI	VWOSI
Ukraine	34,94	45,55	78,45	26,22	40,88	54,35	66,62	51,68	50,85
Vinnytsia region	0,52	1,92	2,29	0,04	1,36	1,72	1,09	0,32	0,68
Volyn region	0,71	1,40	1,58	0,08	0,78	0,95	0,75	0,05	0,12
Dnipropetrovsk region	1,25	2,60	4,83	1,90	1,96	4,18	1,40	5,25	7,47
Donetsk region	1,47	3,05	1,43	2,23	3,81	2,20	3,66	5,24	3,62

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Zhytomyr region	1,30	1,83	2,05	0,57	1,09	1,31	0,55	0,03	0,19
Transcarpathian region	1,12	1,41	1,74	0,09	0,37	0,71	0,66	0,37	0,04
Zaporozhye region	0,95	0,44	0,49	0,07	1,32	1,37	1,70	3,10	3,14
Ivano-Frankivsk region	1,19	2,40	2,63	0,10	1,11	1,34	0,85	2,06	2,29
Kiev region	3,19	4,18	4,36	0,03	0,96	1,13	1,38	2,37	2,55
Kirovograd region	0,34	0,69	0,80	0,71	0,32	0,43	1,27	0,24	0,13
Lugansk region	0,42	0,78	0,74	1,79	2,99	2,95	1,32	2,52	2,48
Lviv region	1,36	1,20	3,48	1,35	1,21	3,50	4,67	2,11	0,17
Mykolaiv region	0,25	0,06	0,66	0,79	0,48	1,20	1,52	1,21	1,92
Odessa region	0,63	2,25	3,64	0,46	1,17	2,56	0,75	0,87	2,26
Poltava regions	1,03	1,90	2,69	0,41	1,28	2,07	0,81	1,68	2,47
Rivne region	1,26	2,06	2,32	0,17	0,97	1,24	0,84	0,04	0,23
Sumy region	0,38	0,56	0,85	0,08	0,87	0,55	0,85	1,80	0,38
Ternopil region	0,25	1,14	1,43	0,28	0,61	0,90	0,98	0,10	0,19
Kharkiv region	9,26	-9,24	11,23	6,16	6,15	8,14	9,77	9,76	11,75
Kherson region	0,60	0,62	1,00	0,93	0,29	0,67	1,67	0,45	0,07
Khmelnytsky region	1,54	2,00	2,24	0,54	1,00	1,24	0,35	0,11	0,34
Cherkasy region	0,33	1,61	1,69	0,47	0,82	0,90	1,51	0,22	0,15
Chernivtsi region	0,70	0,40	0,78	1,32	0,22	0,16	1,82	0,72	0,34
Chernihiv region	0,34	1,11	1,46	0,48	0,29	0,64	1,15	0,38	0,03
m. Kyiv	4,54	19,16	22,01	5,19	9,44	12,29	25,29	10,67	7,82

4. Results

The main customers of the organizations of the sphere of engineering are industrial enterprises, entrepreneurs, state authorities, which manage the processes of construction and reconstruction in the regions. The latter carry out their activities on the basis of tax revenues from entrepreneurs and industrial enterprises; therefore, industrial enterprises and their activity as a result are the main source of financing of the work of the investigated economic entities.

If we consider the volumes of industrial enterprises as the main factor of the regional concentration of organizations of the sphere of engineering, then the structure of distribution of the number of the latter and their resources, as well as the volume of implementation of their works of by country regions, should correspond to the structure of the distribution of the gross regional product (GRP) by such regions.

The average structure of the GRP and the main indicators of the activities of organizations of the sphere of engineering by region is given in Table. 1

Consideration of the table 1 to recognize a certain inconsistency of the structure of the volume of sales of works, the number of employees of organizations of the sphere of engineering by regions and of the regional structure of the GRP. In addition, the structure of the volume of implementation of the work of the investigated organizations to a greater extent is characterized by discrepancy with the structure of the GRP compared with the structure of the number of employees by region.

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The structure of the number of organizations of the sphere of engineering according to the regions is not prioritized in comparison with the structure of their employees, since the latter are the decisive "factor of production" of the project-estimate documentation and design decisions. However, the first indicator can be used for comparison.

For example, if the structure of the number of investigated organizations by region to a greater extent corresponds to the structure of the GRP by region than the structure of their employees and the volume of implementation of works, one can state the lack of addiction regional concentration of the organizations of the sphere of engineering of from the regional location of industrial enterprises.

The levels of structure matching in terms of indicators in this case were determined by visual analysis of data in Table. 1. However, for the confirmation of the hypothesis, objective mathematical methods for comparing the structure of indicators by regions, as outlined in [10], can be used. This method is based on the definition on by the module of the difference of the specific gravity of the distribution by regions of the factor and the result of its influence. If the corresponding difference is not minimal, then there is a weak link between the investigated factors. The results of using the method for the indicators of the investigated organizations are shown in Table. 2.

As we see from the table above, the structure of distribution of the volume of implementation of works of organizations of the sphere of engineering by region almost does not correspond to the structure of the GRP by region. A similar situation is observed on the factor of the number of employees of these organizations. To a greater extent, is observed corresponds by the regional structure GRP and structure of the number of relevant organizations.

Historically, the organization of the sphere of engineering were created "for" regional industrial enterprises near their location, and eventually a certain part of the personnel of the organizations of the sphere of engineering concentrated in such cities as Kiev, Kharkov and in of other industrial centers of country. The high level of wages in these cities and the level of quality of design documentation led to higher rates of cost and monetary volume of sales of such organizations, which located in the capital of the country.

The use of mathematical methods the analysis of the structure of indicators by regions allowed to confirm the fact that the level of dependence of the factors of activity of the organizations of the sphere of engineering on the regional distribution of industrial enterprises are insignificant. If this factor at a lower level affects the regional concentration of the factors of the activities of the investigated organizations, then there should be other causes regional concentration of engineering organization that have had a more significant impact.

The leaders in terms of the number of employees of organizations in the field of engineering are Kyiv (place 1) and Kharkiv region - Kharkiv (place 2). These regions are leaders in the development of social infrastructure: the country's largest wage level, the presence of a higher level (if compared within the country) with regard to all the facilities of the relevant infrastructure (hospitals, educational and cultural institutions, transport, central state institutions, etc.). By the level of development of social infrastructure, these cities are unique centers of attraction of the

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population of the country in general and in particular those who work in organizations of the sphere of engineering.

In addition to social impact on the concentration of factors of the organizations of the sphere of engineering in the regions can be scientific-technical and innovation infrastructure. If this hypothesis is correct, then the structure by regions of the main indicators of the investigated organizations should correspond to the structure by regions of similar indicators of scientific organizations.

The average structure of the main indicators of the activities of scientific organizations by region is given in Table 3.

Table 3. The average structure of the main indicators of Ukrainian scientific organizations by regions during 2014-2017

A visual review of the structure of these indicators does not make it possible to identify compliance with 100%, but the level of this correspondence is higher than of the GRP structure by region. To prevent subjectivity, we use the method of comparing the structure of indicators, the results of which are shown in Table. 4

Using the method of comparing the structure of indicators by region can confirm certain compliance of the regional structure of indicators of organizations of the sphere of engineering with the of such structure of some indicators of scientific organizations.

5. Discussion

According to Table 4. the level of regional communication by the degree of decline is as follows:

1) the number of organizations of the sphere of engineering and the number of employees who were involved in research and development (scientific organizations);
2) the number of organizations of the sphere of engineering and the number of organizations that carried out research and development;
3) the number of personnel of organizations of the sphere of engineering and the number of employees who were involved in research and development (scientific organizations);
4) the number of personnel of organizations of the sphere of engineering and the number of organizations that carried out research and development.

According to other factors, there is almost no regional connection.

In this case, it is not necessary to identify any of them in the role of cause, and any of indicator - in the role of the result. We should not also see a direct functional link between them. However, if the regional structure between the investigated indicators is similar, then the expediency of the hypothesis of influence on two types of organizations of the same reasons can be considered. If in the process of regional placement and concentration of scientific organizations an important role is played by the scientific-technical and innovation infrastructure in the country, part of which, there are the scientific organizations themselves, then the same infrastructure also influences to of the regional concentration of the main factors of the organizations of the sphere of engineering.

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If the concentration of the main factors of the organizations of the sphere of engineering does not correspond 100% to the regional distribution of industrial enterprises, then part of the regional innovation projects is being implemented with the participation of such organizations located in other regions. The presence of such practice in Ukraine shows that there are no significant barriers to interregional interaction between the executors and the customers of the design and estimate documentation.

6. Conclusion

The reasons of regional concentration of main factors activity of organizations in the field of engineering are considered. Using the method of analysis of deviations of the structure of indicators by regions, it is justified the hypothesis that an important reason for the regional concentration of factors of activity of organizations in the sphere of engineering is social, as well as scientific and technological and innovation infrastructure, which in aggregate is more important for the corresponding concentration in comparison with the orientation on customers of their works.

It is specified that the absence of significant barriers in interregional interaction allows organizations of the sphere of engineering and customers of design and estimate documentation to be located in different regions of the country.

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