To assess the relationship between the scale of TNBs' direct loans and external debt of recipient countries, the relative indicators of external debt and loans (the ratio of external debt to GDP, the ratio of TNBs' direct loans to GDP, the ratio of direct loans to external debt) are calculated for some developed and developing countries from different regions of the world. Based on the analysis of these indicators, it is determined that the economies of leading developed countries are of the debt type. The group of developing countries is differentiated and includes both debt and non-debt economies. The average level of indebtedness of developing countries is much lower than the indebtedness level of developed countries. Given that in both groups of countries there is a strong direct linkage between external debt and direct loans, it is found that in the vast majority of developed countries and some developing countries, TNBs' lending still remains an important source of debt economy formation.

Key words: *transnational banks' lending, direct and indirect loans, external borrowings, debt economy, external debt*

УДК 330.341.1-049.5(4-672ЄС)

O. Zakharova
V. Gnidina

FEATURES OF METHODOLOGICAL TOOLS FOR ASSESSING THE INNOVATION SECURITY LEVEL OF COUNTRIES

The article examines the issues of assessing the innovation security level of the world's countries. It is proved that it is an objective quantitative assessment of the innovation component state in the structure of economic security that makes it possible to identify threats and security risks in a timely manner. The authors have proposed and tested two methodological approaches to measuring the innovation security level, namely, the method of data envelopment analysis and the method of multidimensional assessment. The tools of the DEA made it possible to assess the level of efficiency of national innovation systems in the EU countries, classify innovation systems by the level of efficiency, and calculate the overall level of technological efficiency. Using multidimensional assessment tools, an integrated index of innovation security is proposed, the calculation of which allowed ranking the EU countries by the level of innovation development. The calculation of the limit values of innovation indicators included in the index model allowed grouping the EU countries according to the state of innovation security.

Key words: *innovation security, security indicators, innovative indicators, innovative development, EU countries, method DEA, multidimensional assessment, integrated index of innovative security.*

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Introduction. Nowadays, the gross domestic product of most developed countries is formed by the innovative sphere. That is why the activation of innovation activities of economic entities, the intensification of innovation processes and the creation of conditions for this, the development, implementation and continuous development of national innovation systems' model is one of the key aspects of development strategies in many countries. The EU countries are no exception despite the declared common goal of creating an «Innovation Union», significant disparities in innovation development remain, while less developed countries are under «pressure» from the practical experience of more developed countries, and as a result,

only individual EU countries determine the vector of innovation development evolution. This is accompanied by the emergence and spread of threats to innovation security, which, if there are no effective mechanisms to neutralize them, leads to a weakening of the security of the EU countries and the region as a whole. In these conditions, the development and improvement of tools for assessing the security level of countries, in particular the EU countries, in order to constantly monitor the state of innovation security, search for ways to improve its level, develop measures to neutralize risks, which will help to overcome the unevenness of innovative development and increase the innovativeness of economies.

Literature review. The problems of innovative development and formation of national innovation systems (NIS) of the countries have been studied in the works of such foreign and domestic scientists as P. Agion, F. Cook, A. Izaksen, and B. Eshem, M. Gertler, P. Folk, F. Todling, V.M. Heyets, L. I. Fedulova, N. L. Frolova, N. A. Lapko, A. A. Chukhno and many others. Various aspects of the innovative economy formation were studied by researchers of the Dutch innovation school, including K. Nowler, H. Hollander, T. Dannevik, R. Vintez and others. Features of innovative security formation as a significant component of country's economic security, its role in the formation of a high level of general security are the subject of research by such scientists as G. K. Voronovsky, G. V. Duritskaya, E. V. Dron, V. I. Kirilenko, O. I. Kopylyuk, A.V. Matkovsky, E. A. Oleynikov, Yu.I. Sizov, Yu. M. Kharazishvili and others.

In the conditions of rapid development of national economies, innovative security provides a balanced proactive development, which guarantees the most effective use and safe attraction of additional investment resources. It should be noted that the lack of a clear system for assessing the innovation security of countries makes it problematic to diagnose negative trends in innovation in a timely manner. Thus, the features of countries' innovative development and the impact of the economies' innovativeness on various aspects of development, including the environment, can be studied on the basis of analysis and evaluation of the country's positions in world rankings, the main of which include: the Global Innovation Index (GII) [15], the Global Competitiveness Index [14], the European Innovation Scoreboard [13], the Bloomberg index [17], the Global Talent Competitiveness Index [21] and others. These ratings are based on the calculation of integral indices that aggregate a large set of individual indicators of different types and allow to get ratings, conduct a comparative analysis of both the level of innovative development, and the ability to innovate, competitiveness in the innovation sphere, and etc.

From the point of view of evaluating innovative development, in particular the level of its effectiveness, the *method of Data Envelopment Analysis (DEA)* deserves attention, which can be considered a kind of expression of the innovation security level. This method of analysis was developed in the 70-80s of the XX century in the works of A. Charnes and others [10, p. 429-444]. The DEA is used to measure the effectiveness of Decision Making units (dmus). These may be countries or other entities whose relative effectiveness needs to be calculated. According to the DEA, an object can be considered effective in the field of innovation if no other object (s) can produce a more innovative result for a given amount of innovative resources. Within the DEA, performance evaluation can be viewed from the point of view of maximizing results with a fixed amount of resources, or, conversely, from the point of view of minimizing the resources used with a fixed amount of outputs. The first case corresponds to a DEA model specification as output-oriented, the second case focused on resources (input-oriented DEA). The results of applying the DEA method in the aspect of evaluating the effectiveness of NIS' countries are given in [1], which allowed the author to determine the strengths and weaknesses in the innovation sphere of individual countries.

In foreign publications, the concept of innovation security, methods of its measurement and assessment of its state are practically not studied, since innovation is mainly considered as

a factor of economic growth. In particular, in [12] investigated the nature of the impact of some innovative indicators, namely the number of patents, R&D costs, the number of researchers, high-tech exports on the growth rate of GDP per capita, which allowed the authors to identify country differences depending on the level of innovation development. Almost the same innovative indicators are studied in [18] as determinants of long-term sustainable economic growth, competitiveness and progress. Innovation and the knowledge economy are studied as a factor of growth strategy and social security in [19], and the authors prove that the degree of innovation activity in countries where their own models of national innovation systems are created is more closely correlated with the level of innovative development efficiency, which is more evident at the regional level than at the national level as a whole. In some studies, when assessing the innovative level of economic development, the authors apply the concept of innovative potential [20], which they propose to understand as «capability of performing creative acts, inventing new ideas and inventions» and develop a system of innovative indicators to diagnose the level of potential and the nature of its development.

Note that in domestic practice, the most commonly used method of assessing economic security and its individual components is provided in the recommendations for calculating the level of economic security of Ukraine, approved by the order of the Ministry of economic development and trade of Ukraine from 29.10.2013 № 1277 [6]. This method provides for the definition of an integral indicator of the economic security level, but the innovation component is not separately identified, but is taken into account as part of investment-innovation security.

In the papers of many domestic scientists, the innovative component is considered a separate element of economic security. In particular, in [2] this is explained by the fact that innovation is the main driving force of social progress, a measure of economic development. Also, innovative security is considered to be the result of purposeful activities to implement an innovative development model in all aspects of management, and for this it requires a separate analysis and improvement of methods for its assessment [4]. Such domestic scientists as Lysenko N. O. and Belokurskaya N. V. [3], Sobkevich O. V. [7], Sukhorukov A. I. [8] also paid attention to the issue of assessing the innovation security level. The authors propose their own approaches to assessing the innovation security state of certain objects (enterprises, regions, countries), which are characterized by a greater or lesser level of accounting for innovative indicators of national economic development. These approaches have both advantages and disadvantages, which determines the need for further improvement.

In general, in Ukrainian scientific thoughts there is a separate research direction – economic security metrics, in which the methodology of integral assessment of the security level is constantly being improved and it is aimed at solving such problems as: determining the structure of the security object; forming a list of indicators and components of the security object; choosing the form of the integral index; choosing the method of normalization; scientific justification of dynamic weight coefficients and the vector of threshold values [9]. Accordingly, the methodological tools and features of their creation and application primarily depend on the security object as an object of assessment.

Among the most common methods for assessing the economic security level, it is necessary to note the following: observation of the main macroeconomic indicators and comparing them with thresholds that take values not lower than the global average; assessment of the country's economic growth rates based on macroeconomic indicators and their dynamics; expert assessment methods used to describe the quantitative and qualitative characteristics of the processes under study; methods of analysis and scenario processing; optimization methods; methods of multidimensional statistical analysis and others [5].

Taking into account the above, it is necessary to state that the issues of security assessment, in particular the innovative component of economic security, are an urgent and timely direction of research. Given the absence of a generally accepted assessment

methodology, the unstable nature of the global innovation environment, as a result of constant shifts in the trends of economies' innovative development, further research requires the development of methodological tools for analyzing the state of innovation security and quantitative measurement of its level with the ability to identify threats and risks.

The purpose of this article is to improve the methodological tools of assessment of countries' innovative security level whose approbation on the example of the EU countries will determine the security state and the factors determining it to identify opportunities to improve the level of innovative security in the countries of the integration association.

Main results. Before proceeding to the assessment of innovation security, it should be noted that the EU occupies a special place in the world, which was one of the first to build an innovative model of the economy. To assess the development indicators of EU countries' NIS a GII was used, consisting of input criteria indicating available resources and outputs demonstrating innovative results. Thus, the GII-2018 ranking includes 126 countries that produce about 98% of the world's GDP. Sweden was the EU innovative leader in 2016-2017, in 2018 it fell to the 3rd position, although it remains the leading scandinavian economy.

There was a change of innovation leader in 2018; the Netherlands were the leader with a score of 63.32 points out of 100. They are ranked 2nd in terms of innovation potential, and 4th in the innovation results sub-index. Strengthening its position, the Netherlands retains the 2nd place in the field of knowledge and the 3rd place in the field of creative results. The country's weaknesses persist and include higher education (48th place) and indicators of pupil-teacher ratio, gross capital formation, and ease of getting credit.

Also the UK was the third EU leader of innovation development in 2018 (4th in the world, 3rd in the EU). The UK was ranked 3rd in the innovation resources sub-index and 6th in the innovation results sub-index. Despite this, the UK lost three positions in institutions (14th place), human capital & research (8) and infrastructure (7).

It should be noted that in the GII of 2019, Croatia, Greece and Romania are the EU countries with the lowest level of innovation development (26th, 27th, 28th positions in the EU respectively). Although in 2018, Croatia and Romania for the first time entered the top 10 with above-average income in three sub-indices and the innovation efficiency coefficient. All EU countries were in the top 50 countries of the rating GII, Romania (49th in the world) was the last in the EU with a score of 37.59 points.

Turning to the analysis of innovation security, the estimation was carried out for the EU countries using the method of determining secure NIS – Data Envelopment Analysis (DEA). For this purpose, 5 indicators of innovative development were selected, which together characterize the current functioning of national innovation systems. The input indicators, i.e. innovative resources, included 4 indicators: the amount of R&D financing (in thousand dollars) – in the context of financial support for innovation; the number of employees involved in R&D (persons) as an indicator of the institutional environment; the number of patent applications as an indicator of innovation generation; trademark applications (bn PPP$ GDP) as an indicator of creative innovative results.

High-tech exports (mln $ USA) were selected as the output indicator. It should be noted that in the practice of estimation, as a rule, the specification of the source model (output-oriented) is used, focused on maximizing the output indicator. The results of oriented model calculations are shown in fig. 1

The NIS of a country with a score of 1 or 100% is considered as «secure», that is, «reference» for others systems and, in our opinion, it can be attributed to the so-called «effective» or «secure» pole. At the same time, the share of NIS that formed the «effective pole» differs in terms of constant and variable scale effects (CRS and VRS), and amounted to 25.0% (7 countries) and 42.9% (12 countries), respectively. According to the scale efficiency coefficient, 14 countries were recognized as secure objects (exactly 50% of the EU countries).

It is because of the difference in the number of «effective poles» that the countries' position in different models differs significantly.

The constant return to scale (CRS) model is more rigid and imposes severe additional constraints. The average innovation efficiency calculated on this model, which is 0.49, is significantly lower than the calculated by the variable return to scale (VRS), which was 0.63. The scale efficiency, which describes the ratio of efficiency calculated from constant returns to scale to efficiency from variables, is equil averages 0,829 for EU countries.

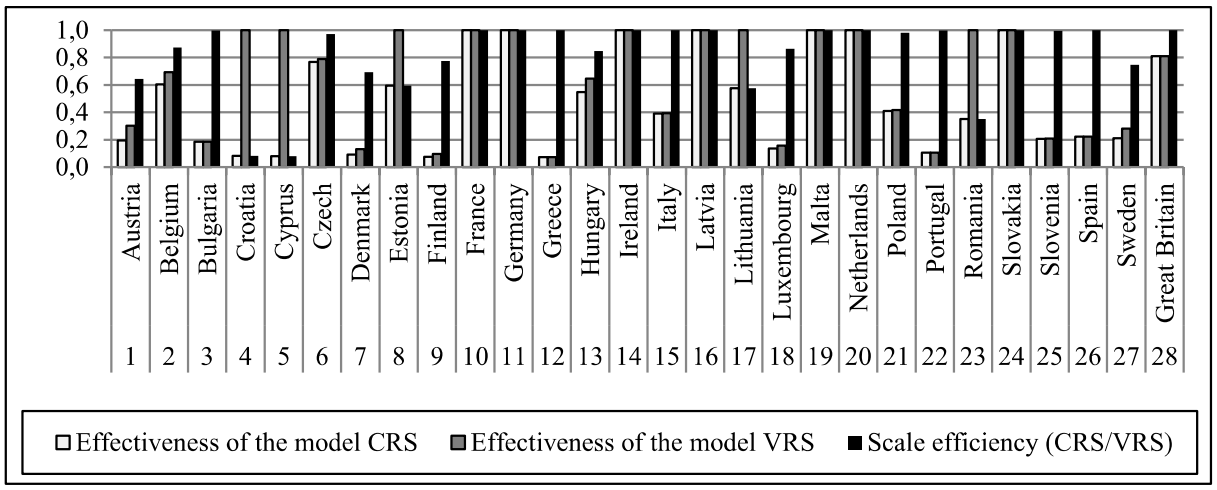

Fig. 1. Results of calculating the effectiveness of innovation systems in the EU using the original DEA oriented model (average value for 2016-2018)

Note:calculated by the authors

For example, 15 countries (starting with Poland with a CRS efficiency of 0.41 or 41% and ending with Greece with 0.07 or 7%) were ineffective in terms of constant return to scale (CRS). The composition of «dangerous» objects with the formation of high-tech exports also includes innovative leaders in GII, such as Sweden (0.21 or 21%), Denmark (0.09 or 9%) and Finland (0.08 or 8%), which could produce significantly more innovative outputs with the available resources (which demonstrates a low safety indicator for the DEA).

Analysis of the VRS model (a model with variable returns to scale) shows that Cyprus, Lithuania, Estonia, Romania and Croatia are also included in the «secure» NIS or «effective pole» countries with a score of 1 or 100%. In this model, the «non-reference» objects included innovative leaders in GII, such as Sweden (a higher figure in this model – 0,28 or 28%), Denmark (0,13 or 13%) and Finland (0,10 or 10%), which could, with their available resources, produce more actual innovative output. According to the VRS rating, Greece also ranks last (0,07 or 7%), which indicates that it has the weakest NIS among EU member states.

There were identify countries that have 1 or 100% of all three indicators, that is, they are «reference» for others and are completely secure, which confirms the independence of their innovative development from the NIS of other countries. They are 7 countries, including the GII innovation leaders – Germany, France, the Netherlands and Ireland; and the EU's leading innovators – Malta, Slovakia and Latvia. In other words, these countries make the most effective use of their input innovation resources and, thanks to them, produce the highest possible high-tech exports.

As a result of calculations, the value of technical efficiency was obtained, which was 0.829 and means that on average the European Union has realized its innovative potential by 83%, that is, not completely, which confirms the possibility of further improvement of the EU countries' NIS.

Taking into account the existing approaches to the assessment of innovation security, it was proposed own method of assessment based on the use of a multidimensional assessment methodology. It is proposed to construct an *integral index of innovation security*, which will consist of four subindexes: innovation generation index (3 indicators), the institutional environment (3 indicators), financial support index (4 indicators) the degree of country involvement in the innovation exchange (4 indicators).

Output indicators for assessing the innovation security level were formed based on the statistical bases of the GII [15] and the European Innovation Scoreboard [13]. The analyzed statistical data shows that there are no absolute leaders in all indicators of individual innovation blocks in 2018. However, it can be seen that, for example, Lithuania, Latvia and Romania have a weak block of innovation generation, namely, they are characterized by the lowest values of the patents per 1 bn $ GDP (PPP); R&D performed by private businesses and trademark applications, respectively. It should be also noted the position of the degree of involvement in the innovation exchange, where Cyprus was characterized by the lowest value of high-tech exports in the amount of 0.4% of total trade, as opposed to the maximum value in Ireland of 22.4%, and the highest value of imports of ICT services (8.2% of total trade), which, of course, negatively affects the level of innovation security.

In terms of financial support for innovation, Denmark leads in public sector spending on R&D (1.07% of GDP). But Sweden has the strongest financial support with the highest private spending on R&D (2.42% of GDP) and education spending (7.7% of GDP). It is also the leader in scientific researchers - 7514.0 people per mln population, which exceeds the same indicator of Romania by about 8.2 times. Luxembourg is also among the leaders, with the highest employment rates in knowledge-intensive activities (53.3% of the total) and venture capital (0.32% of GDP). In terms of the degree of involvement in innovation exchange, Estonia and Ireland are the leaders with the lowest rates of high-tech and ICT imports, which indicate the stability of the NIS almost does not depend on innovation imports and is based on its own developments. Romania is characterized by a weak institutional environment, namely the minimum value of people engaged in high-tech activities (21.3% of the total), the number of scientific researchers – 912.4 people on mln population.

At the next stage of the safety assessment, the optimal (upper and lower) values of innovation indicators were calculated, which characterize the acceptable range of values within which favorable conditions for the functioning of the state are created. Regarding the threshold values of the selected indicators, note that all indicators within the threshold values are optimal (the country must comply with them). Values lower than the lower optimal value indicate a critical level (which is more important for analysis), and values higher than the upper one indicate an excess of the resource whose value is being analyzed.

So regarding the innovation generation block, it should be noted note that for patents and trademark applications, all indicators of the EU countries are within the lower optimal value, but for R&D funded by private business (% of GDP) Cyprus and Latvia showed critical values less than the lowest optimal. In the institutional environment block, 1 country (Luxembourg) and 2 countries (Cyprus and Romania) have critical values for the number of graduates and researchers. The financial support indicates about the same level of critical indicators, primarily government spending on R&D – 14.3% of all business spending on R&D and education spending – 7.1% of countries. As for the degree of involvement in the innovation exchange, note that all countries were within the optimal values for the import and export of ICT services. Also note that the lower optimal values of the last indicator are negative, that is, to a certain extent, the excess of services exports from the country over their imports is acceptable, because the most important indicator is high-tech exports and imports. It is for exports – the number of countries with a critical value almost reaches 10%, including Cyprus, Greece and Luxembourg.

That is, their NIS is the least active by this indicator. After analyzing all the blocks, it can be see that Cyprus and Romania didn't meet more the lower optimal values.

The next stage of security level assessing is the normalization of indicators by standardization (z-scores) [16, p. 84]. The next step was to determine the weight coefficients. The vast majority of researchers use expert assessments. Thus, 10 expert assessments were used for all blocks and indicators. Note that the sum of the weight coefficients inside the blocks and behind 4 blocks in general is equal to 1. The weights coefficients are given in table 1.

Table 1

The weight coefficients of indicators and blocks security of the EU

Weight coefficients							
Innovation generation			**Financial support**				
0,239			**0,278**				
Patents by origin / for 1 billion $GDP by PPP	Trademark applications (for 1 billion $GDP by PPP)	R&D performed by private businesses, % of GDP	Public sector spending on R&D (%of GDP)	Business spending on R&D (%of GDP)	Venture capital (% of GDP);	Spending on education (%of GDP).	
0,322	**0,314**	**0,364**	**0,276**	**0,241**	**0,229**	**0,253**	
Institutional environment			**Degree of involvement in the innovation exchange**				
0,239			**0,244**				
Number of graduates in science and technology, %;	Number of scientific researchers (persons per million people);	Employment in science-intensive activities (% of employment)	High-tech imports, % of total trade	Imports of ICT services, % of total trade	High-tech exports, % of total trade	Export of ICT services, % of trade volume	
0,273	**0,352**	**0,375**	**0,269**	**0,257**	**0,246**	**0,229**	

Note: calculated and compiled by the authors

After weighing the indicators, the integral index of innovation security was calculated. It was defined hierarchically: at the lower level – subindexes of 4 groups; at the upper level-the integral index of innovation security. The results of calculations for 2018 are shown in Fig. 2.

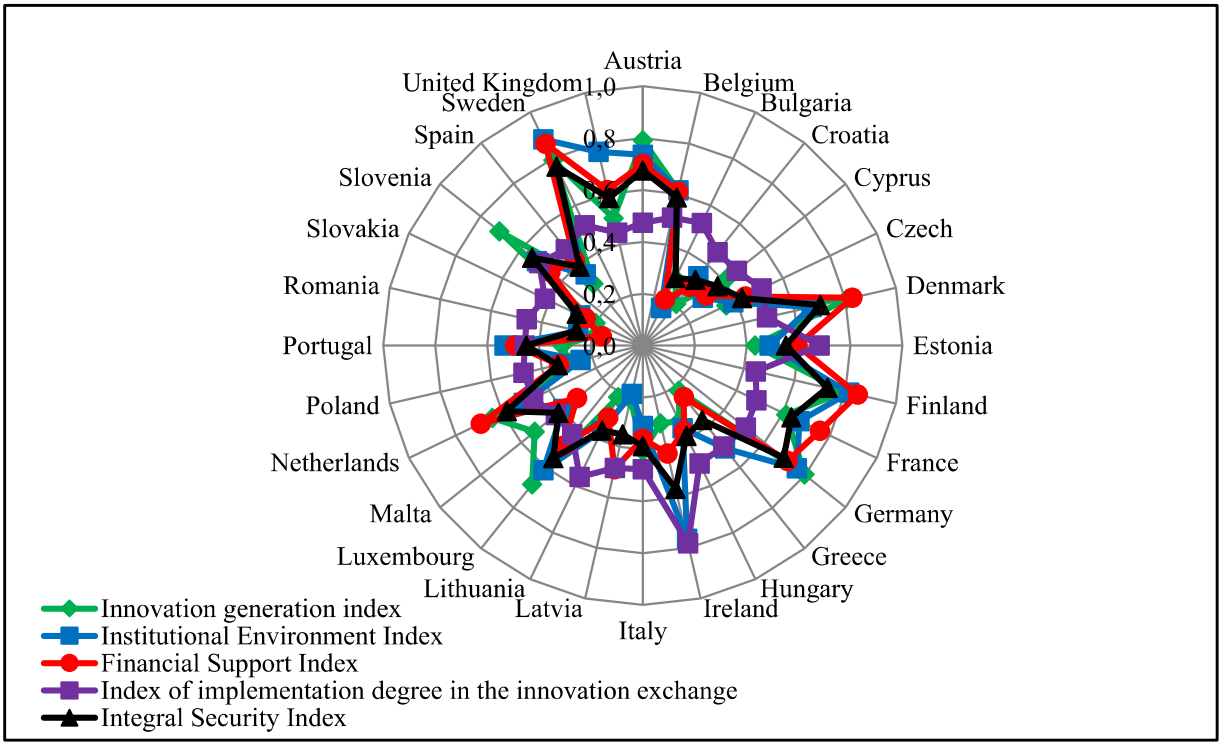

Fig. 2. Innovation security level in the EU countries (2018)

Note: calculated by the authors

Thus, note the leadership of Denmark for the block of the institutional environment (close to 1; 0.806 → 1). Sweden has become the leader in the financial support and innovation generation. Behind the block of the degree of involvement in the innovation exchange, the safest NIS of Ireland was most secure - 0.782, as opposed to the weakest NIS of Slovakia with a sub-index of 0.418. Bulgaria has the most dangerous position of the institutional environment (0.161); Romania – financial support and innovation generation (0.162 and 0.187, respectively). Sweden, Finland and Denmark have the highest level of security during 2016-2018,, which are also among the top 5 countries in the GII. Slovakia and Romania have the lowest level of security, relative to the latter country, this is primarily due to the fact that almost all of its indicators have the lowest values among the EU countries and are critical beyond their threshold.

To determine the levels of EU countries innovation security, their grouping was carried out (table 2.).

Table 2

Grouping of countries by innovation security level

Groups of countries by level of innovation security	Number of countries	Countries	Lower bound of the interval	Upper bound of the interval	Specific weight of the total number of countries, %	Average index value in the group
Very low (critical)	3	Romania, Slovakia, Bulgaria	26,26	31,30	10,71	27,85
Low	9	Croatia, Poland, Latvia, Lithuania, Greece, Cyprus, Hungary, Italy, Spain	31,30	41,38	32,14	36,36
Average	6	Malta, Czech Republic, Portugal, Slovenia, Estonia, Luxembourg	41,38	56,50	21,43	48,99
High	10	Ireland, Netherlands, Great Britain, Belgium, France, Germany, Austria, Denmark, Finland, Sweden	56,50	76,66	35,71	65,21

Source: calculated by the authors

It is interesting to compare the average group security values of countries with the average EU value (48.46%). Thus, the average indicator is lower than the regional for countries in group 1, 2, and some countries in group 3. Countries with a high level of innovation security have a level that exceeds the EU average by 34.56%. So, it can be see that the number of countries with a low (critical) level of innovation security (in general, taking into account a very low level) is equal to 12 countries, which is 42.9% of the total number of countries. The share of countries with an average security level is 21.43%. Countries with a high level of security make up 35.71%, that is, more than a third of the rating, and it should be noted that this group is the largest by the number of countries.

Thus, improving the level of innovation security in the EU countries is a priority for the countries with the lowest level of it, in order to eliminate or at least reduce the strong inequality of innovation development in this region. In our opinion, it is possible to eliminate in the future the asymmetries between the leading EU centers and peripheral territories in the levels of innovation development and security only by creating opportunities for building up the EU regions' own potential for innovation development through the implementation of a coordinated and harmonized policy of regional innovation development aimed at enhancing innovation activity and maximizing the use of innovation potential.

Conclusions. Therefore, the assessment of the innovation security level of the EU countries by two methods has shown different results. The use of the Data Envelopment Analysis (DEA) method has proven that overall leadership in innovation is not a guarantee of high efficiency or security of NIS in the production of high-tech exports. Inefficient systems include innovative GII leaders such as Sweden, Denmark, and Finland, which could produce significantly more high-tech exports with their available resources. But the results of calculating

the integrated index of innovation security of the EU countries confirm the global trends of innovative development. Also difference lies in the general level of innovative security of the European Union, according to the method DEA, the EU has a satisfactory level of security (83%) and by the method of integral estimation – 48.6% which are identified as unsatisfactory.

The differences of the estimates are due to the peculiarities of the assessment tool, in particular the first assessment was given with respect to the efficiency of innovative development (as full ability to use innovative resources to generate innovative products), the second assessment is a more general measure of the level of innovativeness of the economy (considered as the ability to create, diffuse and use innovations, and the availability of institutional and financial conditions for innovative development). The method of DEA is more formalized, it concerns a narrow range of evaluation issues related to determining the effectiveness of resource use, including innovation, and the overall level of technological efficiency. In contrast, the proposed method of integral assessment is less formalized, more flexible and universal, and has a more complex and systematic nature in relation to the accounting of innovative development indicators. The main disadvantage of the latter is the need for a more thorough selection of innovative indicators and the feasibility of including an aggregated index, as well as the choice of the method of rationing, aggregation and weighing is displayed on the evaluation results and, as a result, reduces the level of accuracy and objectivity of conclusions about the state of innovation security. However, despite this, it is the method of integral assessment, based on the construction of integral indices, can be considered as a fairly effective tool for evaluating innovative processes in the system of countries' national economic security around the world.

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О. В.Захарова
В. С.Гнідіна

ОСОБЛИВОСТІ МЕТОДИЧНОГО ІНСТРУМЕНТАРІЮ ОЦІНКИ РІВНЯ ІННОВАЦІЙНОЇ БЕЗПЕКИ КРАЇН

В статті досліджуються питання оцінки рівня інноваційної безпеки країн світу. Доведено, що саме об'єктивна кількісна оцінка стану інноваційної компоненти в структурі економічної безпеки створює можливість своєчасного виявлення загроз та ризиків безпеці. Авторами запропоновано та апробовано на прикладі країн ЄС два методичні підходи до вимірювання рівня інноваційної безпеки, а саме метод оболонкового аналізу даних та методика багатовимірного оцінювання. Інструментарій методу оболонкового аналізу дозволив провести оцінку рівня ефективності національних інноваційних систем країн ЄС, класифікувати інноваційні системи за рівнем ефективності (безпечності), розрахувати загальний рівень технологічної ефективності.

В результатів оцінки виокремлено країни, що за усіма показниками мають 1 або 100%, тобто є «еталонними» для інших та повністю безпечними, що підтверджує незалежність їх інноваційного розвитку щодо національних інноваційних систем інших країн, зокрема серед них світові інноваційні лідери Німеччина, Франція, Нідерланди та Ірландія, п також та наздоганяючі інноватори ЄС – Мальта, Словаччина та Латвія. Тобто ці країни максимально ефективно використовують свої вхідні інноваційні ресурси і завдяки ним продукують максимально можливий високотехнологічний експорт. Розраховане значення технічної ефективності масштабу для ЄС склало 0,829, що характеризує ступінь реалізації інноваційного потенціалу ЄС на рівні 83% та дозволяє констатувати можливості подальшого удосконалення інноваційних систем країн ЄС.

З використанням інструментів багатовимірного оцінювання запропоновано інтегральний індекс інноваційної безпеки країн, розрахунок якого дозволив провести

ранжування країн ЄС за рівнем інноваційного розвитку. Розрахунок граничних значень інноваційних індикаторів, включених до моделі індексу, дозволив провести групування країн ЄС на станом інноваційної безпеки.

Слід відзначити лідерство Данії за субіндексом розвитку інституційного середовища, Швеції - за субіндексами фінансового забезпечення та генерування інновацій стала Швеція, Ірландії – за субіндексом ступеня залучення в обмін інноваціями. В цілому за найвищий рівень інноваційної безпеки за відповідним інтегральним індексом мають Швеція, Фінляндія та Данія, які також входять до топ-5 країн рейтингу глобальних інновацій; найменший рівень безпеки мають Словаччина та Румунія.

Як показали результати групування країн за інтегральним індексом інноваційної безпеки 42,9% (12 країн ЄС) віднесено до групи з низьким рівнем інноваційної безпеки, 21,43% (6 країн) - з середнім рівнем безпеки, 35,71% (10 країн) - з високим рівнем інноваційної безпеки.

Підвищення рівня інноваційної безпеки країн ЄС є нагальним завданням для країн з її найменшим рівнем, щоб ліквідувати або хоча б зменшити сильну нерівномірність інноваційного розвитку у цьому регіоні. Ліквідувати у перспективі асиметрії між провідними центрами ЄС і периферійними територіями у рівнях інноваційного розвитку та безпеки загалом можна лише шляхом створення можливостей для нарощування в регіонах ЄС власного потенціалу інноваційного розвитку через проведення узгодженої та гармонізованої політики регіонального інноваційного розвитку, спрямованої на активізацію інноваційної активності та максимальне використання інноваційного потенціалу.

Ключові слова: *інноваційна безпека, показники безпеки, інноваційні показники, інноваційний розвиток, країни ЄС, метод DEA, методика багатовимірного оцінювання, інтегральний індекс інноваційної безпеки.*

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Л. І. Михайлишин
Ю. І. Коровчук

СУЧАСНІ ДЕТЕРМІНАНТИ РОЗВИТКУ ГЛОБАЛЬНОГО РИНКУ ПРАЦІ

У статті проведено теоретичний аналіз особливостей сучасних трансформацій ринку праці. Розглянуто особливості тлумачення вартості праці з позицій працівників та роботодавців. Досліджено тенденції трансформацій глобального ринку праці під впливом розвитку інформатизованих, атоматизованих і роботизованих систем. Висловлено припущення про те, що неовимоги до працівника третього тисячоліття стане одним із ключових факторів цивілізаційного суспільства.

Ключові слова*: Праця, ринок праці, глобалізація, автоматизація, зайнятість.*

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Постановка проблеми. Ринок праці для сучасної економіки є не тільки однією із найдавніших системою суспільних відносин, а й входить в число найбільш динамічних категорій, що трансформуються під впливом цивілізаційного розвитку. Основним фактором, що зумовлює високу мінливість відносин на ринку праці є полярність інтересів основних його суб'єктів, які на різних стадіях економічного циклу по-різному впливають на економічну активність одне одного. Зважаючи на це, наукове дослідження трансформацій ринку праці у відповідності до цивілізаційних стандартів розвитку суспільства є актуальним та постійно потребуватиме аналізу і моніторингу.