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THE ASSESSMENT OF UKRAINE'S READINESS FOR INNOVATIONS IN THE CONDITIONS OF THE SPREAD OF TECHNOLOGIES OF THE NEW INDUSTRIAL REVOLUTION

Abstract
The article is devoted to the topic of Ukraine's readiness for innovations in industry 4.0. The article also discusses the concept of the 4th industrial revolution. The proposed methodology for assessing readiness for innovations is based on the annual ranking of The Global Innovation Index of Cornell University, the French Business School and Research Institute (INSEAD), the World Intellectual Property Organization (WIPO) and official EU statistics. An analysis was carried out of Ukraine's readiness for innovation in comparison with EU countries in the area of "The Conditions for Creating Innovative Potential, Level of Innovation Potential, Conditions for Realization of Innovative Potential, Realization of Innovative Potential". A cluster analysis of countries regarding the level of preparedness for innovation based on the indicators was also made. The strengths and weaknesses of Ukraine as an innovative country are highlighted, practical recommendations are also given for improving the level of innovative development in the country.

Keywords
Industry 4.0, Industrial revolution, Innovations, innovative potential, readiness for innovations.

Introduction

Today, in the context of the new industrial revolution, the scientific and innovative development of any country determines its competitiveness in the upcoming decades. According to the founders of the World Economic Forum, the fourth industrial revolution is spreading at an explosive pace. At the same time, humanity has never encountered such large-scale and complicated changes, while the changes themselves will affect all groups and layers of population, all professions, manufacturers and services [1-3].

The Fourth Industrial Revolution (Industry 4.0) is the transition to fully automated digital production, controlled by intelligent systems in real time, in constant interaction with the external environment, going beyond the boundaries of one enterprise, with the prospect of joining the global industrial Network of Things and Services [2-3].

In a more narrow sense, Industry 4.0 is the name of one of the 10 projects of the state Hi-Tech strategy of Germany until 2020, which describes the concept of smart manufacturing based on the global industrial network of the Internet of Things and Services.

In a broader sense, Industry 4.0 characterizes the current trend of the development of automation and data exchange, which includes cyber-physical systems, the Internet of Things and cloud computing. It represents a new level of organization of production and value chain management throughout the entire life cycle of products manufactured [2-5,9].

The renowned Swiss economist, Dr. Klaus Schwab, founder and leader of the World Economic Forum, stated: "This fourth revolution comes on us like a tsunami. The speed is not to be compared with last revolutions and the speed of this revolution is so fast that it makes it difficult or even impossible for the political community to follow up with the necessary regulatory and legislative frameworks.". He also said: "My fear is, if we are not prepared... and we have a concentration of jobs in the high level, more innovative areas and in the low service areas, this could lead to a new problem of social exclusion, which we absolutely have to avoid"[5].

The Fourth Industrial Revolution sets forth new frontiers for economic prosperity, future jobs and policies that will lay the foundation for future competition between companies. In the globally saturated market and spread of the consequences of the fourth industrial revolution, there has been a rethinking of the behavior of leaders and personnel of enterprises from the standpoint of maintaining their competitiveness. This was evidenced by the annual EFQM Forum, held in Milan in August 2016. The main keynote points from the speeches of the leaders of the most successful European organizations were as follows [2,3]:

- the need for operational excellence, quality process execution; stable production of quality products is no longer enough for sustainable success;
- ISO 9001, kaizen, lean manufacturing, etc. have become well-known; their presence is no longer a sufficient condition for success in a globally saturated market;
- it is no longer sufficient to only fulfill the requirements of interested parties.

In reply to the question "What should I do?" The following answers were put forth at the forum:

- strive not only to meet the requirements of consumers, but also to cause them to be delighted;
- to not only attract staff for improvement, but also be a source of happiness and pride for them;
- to not only engage in corporate social responsibility, but also actively build a future in which the organization is able to develop steadily;
- to not only build flexible management systems, but also recognize the inevitability of unforeseen changes and build systems that are resistant to them.

As for Ukraine and its enterprises, in the context of the approaching industry 4.0, the following key points can be distinguished regarding the current state of the Ukrainian economy and how competitive it is in comparison with other more developed countries, in particular with the EU countries. On November 9, 2016, participants of the Scientific and Practical Conference discussed the topic: "Ukraine is paving the way to the EU: how to achieve competitiveness of enterprises and the economy". After hearing and discussing the reports, the attendees noted the following [6-8]:

- the state of the economy of Ukraine is extremely unsatisfactory and continues to deteriorate;
- the situation is aggravated by the fact that with the modern development of world science and technology, the competition for goods (services) in Ukraine is losing momentum, while the competition between models and control systems is becoming increasingly fierce;
- Ukrainian business circles do not adequately meet the requirements of a saturated global market. Their business culture, in particular business excellence, was formed during the years Ukraine has undergone total financial collapse and significantly lags behind the economies inherent in other developed nations;
- the quality of public administration in the country is low and does not contribute to the development of a competitive economy or significant improvement in the lives of the citizens of Ukraine.

Thus, in order to understand how the Ukrainian economy will survive and assume its role in the era of Industry 4.0, an assessment of Ukraine's readiness for innovations in the conditions of the spread of technologies of the new industrial revolution was made. This study should help to identify the strengths and weaknesses of Ukraine as an innovator country in order to eliminate existing shortcomings and develop a strategy for the development and creation of innovations in the country and find the most favorable ways to apply them. The assessment was carried out in comparison with the EU countries.

Methods of research

To assess the level of readiness of EU countries and Ukraine for innovation, the following methodology was proposed: determining which indicators the different countries' readiness for innovation were to be evaluated; distribution of selected indicators into four groups, namely [6]: The Conditions for Creating Innovative Potential (CFCIP), Level of Innovation Potential (LIP), Conditions for Realization of Innovative Potential (CFRIP), Realization of Innovative Potential (RIP); the assessment of countries' readiness for innovation by these indicators; classification of countries according to the level of their readiness for innovation, based on the indicators. A diagram of the methodology can be seen in Fig. 1 below.

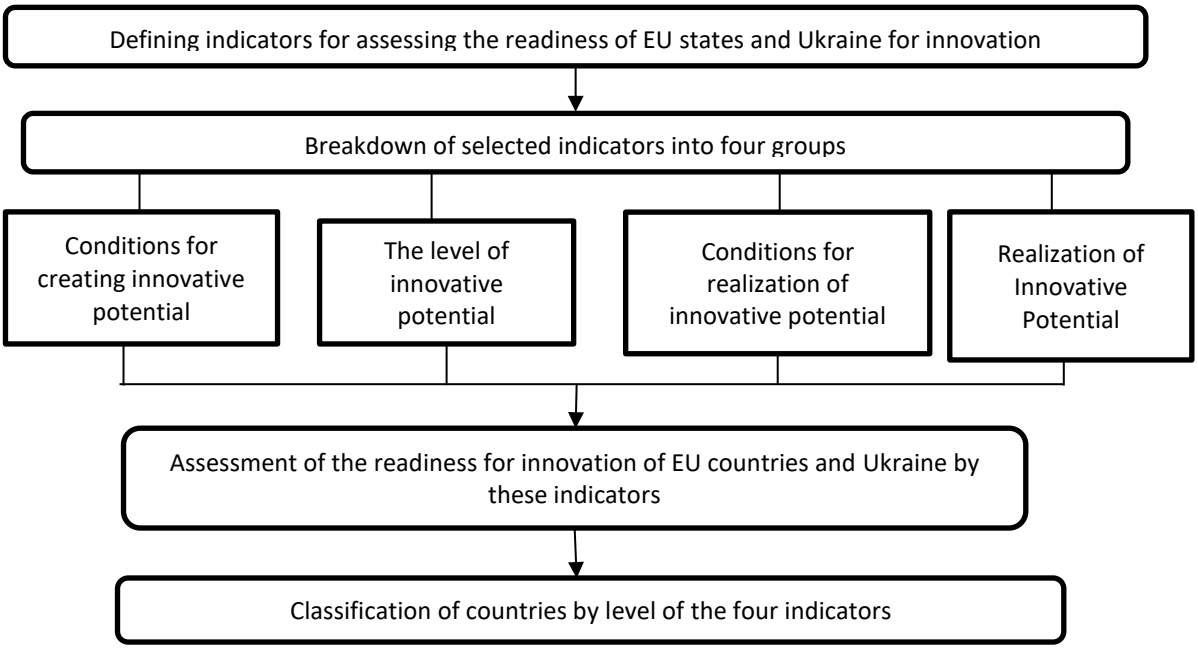

Figure 1. Methodology for assessing countries' readiness for innovation
Source: Author's

The study was based on the annual ranking of The Global Innovation Index of Cornell University, the French Business School and Research Institute (INSEAD), the World Intellectual Property Organization (WIPO) and official EU statistics. In total, 25 indicators were used. The raw data used for the study can be seen in tables 1, 2, 3 and 4.

Indicators for assessing the conditions for creating innovative potential were divided into two sub-groups, namely: conditions for creating educational potential and conditions for creating institutional potential. The following indicators were used to assess the conditions for creating educational potential: expenditure on education, school life expectancy and ICT access. Indicators of ease of obtaining credit, ease of protecting minority investors and state of cluster development were used to assess the conditions for creating institutional potential [6,10-11].

The indicator of the level of innovation potential was accordingly divided into the level of educational potential and the level of institutional potential. Assessment of educational potential was based on the following indicators: population aged 20-24 with upper secondary education, population aged 30–34 with tertiary educational attainment of graduates in science and engineering, new doctoral graduates aged 25-34. The following indicators were used to assess the level of institutional potential: number of researchers, QS university ranking, quality of scientific research institutions and innovation capacity [10-11].

Assessment of Conditions for Realization of Innovative Potential was based on such indicators as: gross expenditure on research and development, ICT use and employment in knowledge-intensive activities.
Finally, the assessment of the realization of the innovative potential also took place in two stages: the first was the assessment of the realization of R&D potential on the basis of indicators of number of trademark applications and the number of international patent applications filed by residents; the second was to assess the commercial realization of the potential on the basis of indicators such as: knowledge-intensive services export, high-tech and medium high-tech output, high-tech exports, ICTS and business model creation, SME with product or process innovations and creative goods exports [10-11].

Table 1. Indicators for assessing the level of Conditions for creating innovative potential

Country	The conditions for creating innovative potential					
	Conditions for creating educational potential			Conditions for creating institutional potential		
	expenditure on education, % of GDP	school life expectancy, years	ICT access	ease of obtaining credit	ease of protecting minority investors	state of cluster development
1	2	3	4	5	6	7
Austria	5.5	16.3	8.5	55	68.3	5
Belgium	6.6	19.7	8.1	65	61.7	4.9
Bulgaria	4.1	14.8	7	65	68.3	3.8
Hungary	4.6	15.1	7.8	75	50	3.8
United Kingdom	5.5	19	9.3	75	75	5.2
Greece	4	17.9	8	50	66.3	2.9
Denmark	7.6	19.1	8.3	70	66.7	4.8
Estonia	5.2	16.1	8.2	70	56.7	3.7
Ireland	3.8	18.8	8.1	70	75	4.6
Spain	4.3	17.9	8	60	70	4.3
Italy	4.1	16.2	7.4	45	58.3	5.5
Cyprus	6.4	14.6	8	60	66.7	3.8
Latvia	5.3	16.2	7.4	85	66.3	3.8
Lithuania	4.2	16.5	7.4	70	66.7	3.5
Luxembourg	3.9	14.2	9.4	15	48.3	5
Malta	5.3	16.9	9.1	35	61.7	4.2
The Netherlands	5.4	18	8.8	45	58.3	5.4
Germany	4.8	17.1	9	70	58.3	5.5
Poland	4.8	16.4	7.4	75	66.7	3.8
Portugal	4.9	16.3	8	45	60	4.3
Romania	3.1	14.3	7.1	80	60	3.1
Slovakia	4.6	14.5	7.4	70	53.3	3.8
Slovenia	4.9	17.4	8.1	45	70	3.8
Finland	7.1	19.3	7.4	65	58.3	4.9
France	5.5	15.5	8.3	50	66.7	4.8
Czech Republic	5.8	16.8	7.2	70	58.3	4
Croatia	4.6	15	7.6	55	66.7	2.8
Sweden	7.6	18.8	8.3	55	68.3	5.1
Ukraine	5	15	6.7	75	58.3	3.3

Source: [10-11]

Table 2. Indicators for assessing the level of of innovation potential

Country	The level of innovation potential							
	The level of educational potential				The level of institutional potential			
	Population aged 20-24 with upper secondary education, %	Population aged 30–34 with tertiary educational attainment, %	Graduates in science and engineering, % of total graduates	New doctoral graduates aged 25-34	Researchers, per million population	QS university ranking average score of top 3 universities	Quality of scientific research institutions	Innovation capacity
1	2	3	4	5	6	7	8	9
Austria	88	40.7	30.3	1.4	5.4	42	5.5	5.5
Belgium	84.8	47.6	17.1	1.5	4.9	54.2	5.7	5.4
Bulgaria	86	33.7	19.7	0.6	2.1	4.7	3.9	4.2
Hungary	85	33.7	22.8	0.6	2.9	20.5	4.7	3.8
United Kingdom	85.9	48.8	26.3	2	4.3	95.2	5.4	5.5
Greece	93.9	44.3	28.2	0.6	3.1	21.9	4	3.9
Denmark	74.5	49.1	21	2.2	7.9	57.1	5.7	5.3
Estonia	82.6	47.2	27.6	0.8	3.5	21.6	5.4	4.9
Ireland	94.4	56.3	25.2	1.4	4.3	47	5.4	5.2
Spain	72.7	42.4	23.9	1.2	2.9	47	4.7	4.3
Italy	81.1	27.8	23.3	1.1	2.3	47.6	4.9	4.9
Cyprus	91.5	57.1	15.9	0.4	1.2	0	4.3	3.7
Latvia	88.3	42.7	20.5	0.2	1.8	13.1	4.3	4.2
Lithuania	92.1	57.6	23.8	0.7	3	19.8	4.4	4.8
Luxembourg	76.8	56.2	17.9	1.3	4.6	0	5.2	5.6
Malta	77.4	34.7	18	0.4	2	0	4.2	4.7
The Netherlands	82.5	49.4	14.1	1.9	5	68.1	6.2	5.8
Germany	77.4	34.9	36	2.1	5	69.1	5.7	5.9
Poland	91.2	45.7	22.9	0.4	3	25.4	4.3	4.1
Portugal	80.8	33.5	29	0.8	4.3	30.3	5.3	4.7
Romania	81.7	24.6	28.8	1.1	0.9	0	4.1	3.8
Slovakia	89.4	37.7	21.1	1.5	2.8	13.8	3.8	4.5
Slovenia	91.5	42.7	25	1.2	4.4	10.5	5	4.9
Finland	87.4	44.2	29.5	1.1	6.7	48	5.8	5.6
France	88.1	46.2	25.6	1.4	4.4	69.3	5.8	5.7
Czech Republic	89.5	33.7	23.5	1.2	3.7	25.4	5.1	5
Croatia	96.2	34.1	25.3	0.6	1.8	4.7	3.8	3.4
Sweden	84.5	52	26.6	1.5	7.2	59.1	5.7	5.9
Ukraine	97	63	24.2	2.1	1.1	22	3.9	4.3

Source: [10-11]

Table 3. Indicators for assessing the level of Conditions for realization of innovative potential

Country	Conditions for realization of innovative potential		
	gross expenditure on research and development, % of GDP	ICT use	employment in knowledge-intensive activities %
1	2	3	4
Austria	3.2	7.5	40.6
Belgium	2.6	7.6	47.6
Bulgaria	0.8	6.6	31.4
Hungary	1.4	6.4	34.3
United Kingdom	1.7	8.3	48.6
Greece	1.1	6.3	29.8
Denmark	3.1	9	46.3
Estonia	1.3	8	45.5
Ireland	1	7.8	42.5
Spain	1.2	7.7	33.2
Italy	1.4	6.5	36.1
Cyprus	0.6	8	35.3
Latvia	0.5	7.5	42.1
Lithuania	0.9	6.8	41.8
Luxembourg	1.3	8.2	55.9
Malta	0.5	7.8	42.5
The Netherlands	2	8.5	44.7
Germany	3	7.7	46.8
Poland	1	7	38.6
Portugal	1.3	6.7	36.1
Romania	0.5	6.2	23.4
Slovakia	0.9	6.9	32
Slovenia	1.9	6.6	43.1
Finland	2.8	8	47.4
France	2.2	8	45.1
Czech Republic	1.8	7	38
Croatia	0.9	6.3	36.3
Sweden	3.4	8.7	52.3
Ukraine	0.4	4	36.9

Source: [10-11]

Table 4. Indicators for assessing the realization of the innovative potential

Country	The realization of the innovative potential							
	The realization of the R&D potential		The commercial realization of the potential					
	Number of trademark applications, per billion PPP$ GDP	Number of international patent applications filed by residents at the Patent Cooperation Treaty, per billion PPP$ GDP	Knowledge -intensive services export	High-tech and medium high-tech output, % of total output	High-tech exports, % of total export	ICTs and business model creation	SME with product or process innovations	Ccreative goods exports, % of total export
1	5	6	7	8	9	10	11	12
Austria	53.3	3.2	43.7	0.4	7.5	5.4	45	0.9
Belgium	45.8	2.4	68.7	0.4	8.1	5.5	47.3	1.6
Bulgaria	98.6	0.4	37.6	0	3.8	4.5	16.3	0.8
Hungary	40.5	0.5	47.7	0.6	12.5	4.9	18	6.1
United Kingdom	56.2	1.9	82.1	0.4	9	5.8	38	2.9
Greece	0	0.4	52.9	0.1	2	4.2	44.4	1.1
Denmark	44.7	4.8	74.9	0.4	5.2	5.5	33.3	1.6
Estonia	81.3	1.1	50	0.2	8.6	5.5	41.4	1.4
Ireland	0	1.6	94	0.7	9.9	5.6	37.8	1.3
Spain	52.8	0.8	33.8	0.4	3.9	5.5	18.6	0.9
Italy	47.3	1.4	51	0.4	5.3	5	40.7	2.2
Cyprus	97	1.2	68.7	0.2	0.4	4.5	28.6	0.5
Latvia	72.3	0.5	51.5	0.1	7.4	5	18.7	3.1
Lithuania	53.7	0.4	23	0.2	5.9	5.2	37.9	2
Luxembourg	102.9	5.9	92.3	0.1	0.6	5.8	40.4	0.1
Malta	119.8	2.2	53.8	0.1	3.8	5.6	22.5	0.2
The Netherlands	53.9	4.3	78	0.3	11.2	6	48.5	4.1
Germany	65.2	4.5	75.5	0.6	11.5	5.7	41	2.2
Poland	38.2	0.3	40.8	0.3	6.5	4.6	14.8	4.4
Portugal	98.4	0.8	38.5	0.3	2.7	5.7	56	1.5
Romania	43.1	0.1	45.5	0.4	4.2	4.6	4.6	0.7
Slovakia	55.7	0.3	38.3	0.6	9.2	5	19.5	8.5
Slovenia	111.2	1.5	36.5	0.3	4.5	5.1	25.9	1
Finland	44.7	7.1	71.7	0.3	4.4	6.1	54.2	0.5
France	97.9	2.7	62	0.5	12.8	5.6	38	1.7
Czech Republic	61.9	0.5	42.7	0.6	17.1	4.9	33	10.1
Croatia	46.8	0.4	19	0.2	3.1	4.5	30.8	0.8
Sweden	55.6	7.7	71.5	0.5	7.3	5.9	38.4	1.8
Ukraine	128.6	0.4	46.9	0.2	2	3.9	7.4	0.2

Source: [10-11]

To calculate the integral indicators of The Conditions For Creating Innovative Potential and Level of Innovation Potential and Conditions for Realization of Innovative Potential and Realization of Innovative Potential, an additive method of convolution of normalized partial indicators based on the simple mean used for characterization of a hierarchical series of components was applied [6].

Standardization of partial indicators was carried out by the formula:. $z_{ij} = \frac{x_{ij}}{x_{\max j}}$,

where z_{ij} – the normalized j-th partial indicator of the i-th country;

x_{ij} – the value of the j-th partial indicator of the i-th country;

$x_{\max j}$ – the maximum value of the j-th partial indicator.

Results of research

The results of calculating the Indicator of The Conditions For Creating Innovative Potential (CFCIP) in 2018 using the above methodology can be seen in Fig. 2 below:

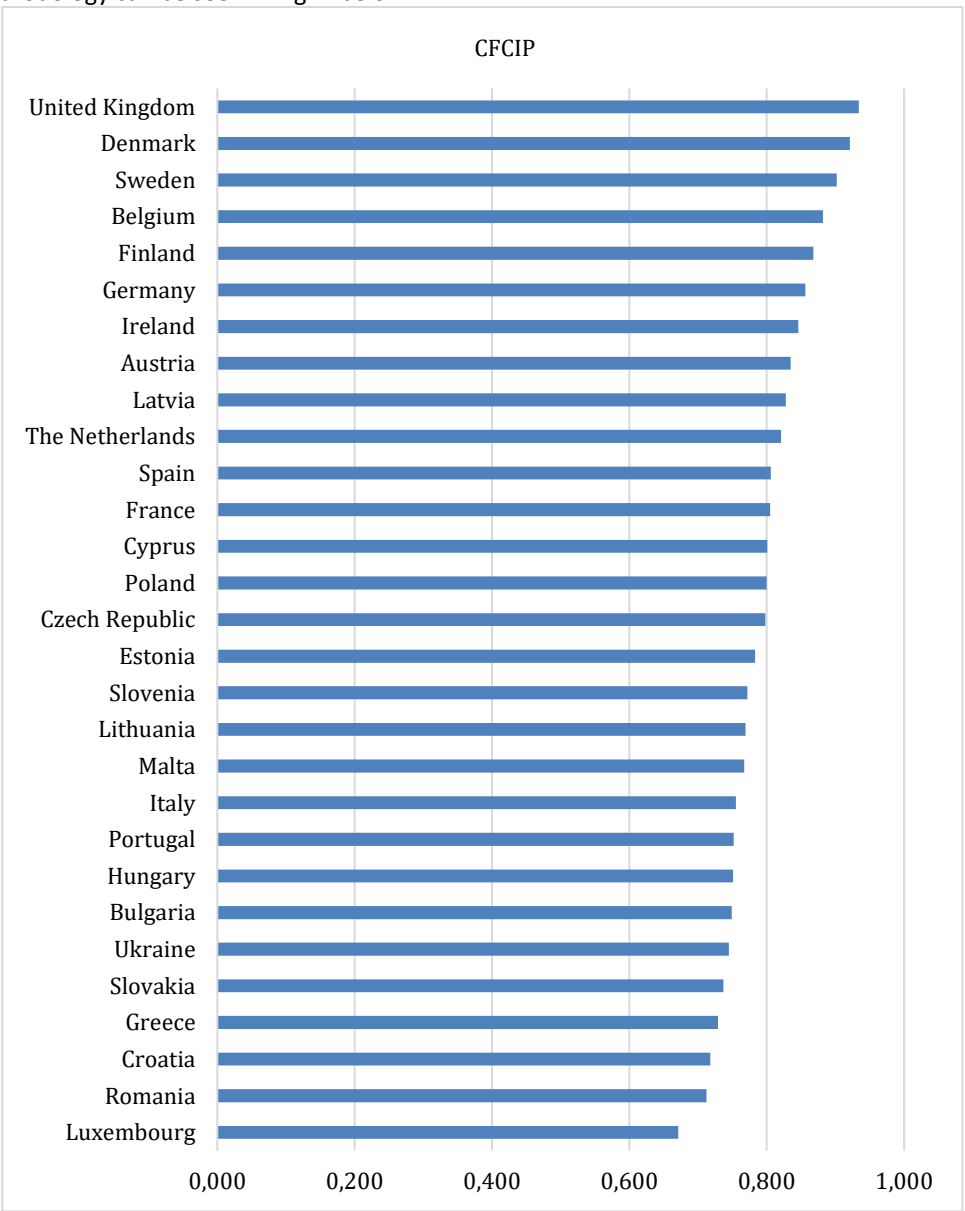

Figure 2. The value of the indicator of conditions for creating innovation potential of EU countries and Ukraine in 2018. Source: Author's

The figure shows that the leaders in the Indicator of The Conditions For Creating Innovative Potential are the UK, Denmark, Sweden, Belgium and Finland. The lower rankings are held by countries such as Slovakia, Greece, Croatia, Romania and Luxembourg.

Ukraine is in 24th place, ahead of the aforementioned countries, but behind all others, including Bulgaria and Hungary. In more detail, it can be said that the result of Ukraine is due to the fact that in the country there is a low level of access to ICT and the development of clusters is also low. There are also problems with ease of protecting minority investors indicator and the school life expectancy is much lower compared to EU countries. The expenditure on education and the ease of getting credits are at average level.

The next step was to consider the results of calculating the Level of Innovation Potential (LIP) in 2018, which can be seen in Fig. 3 below:

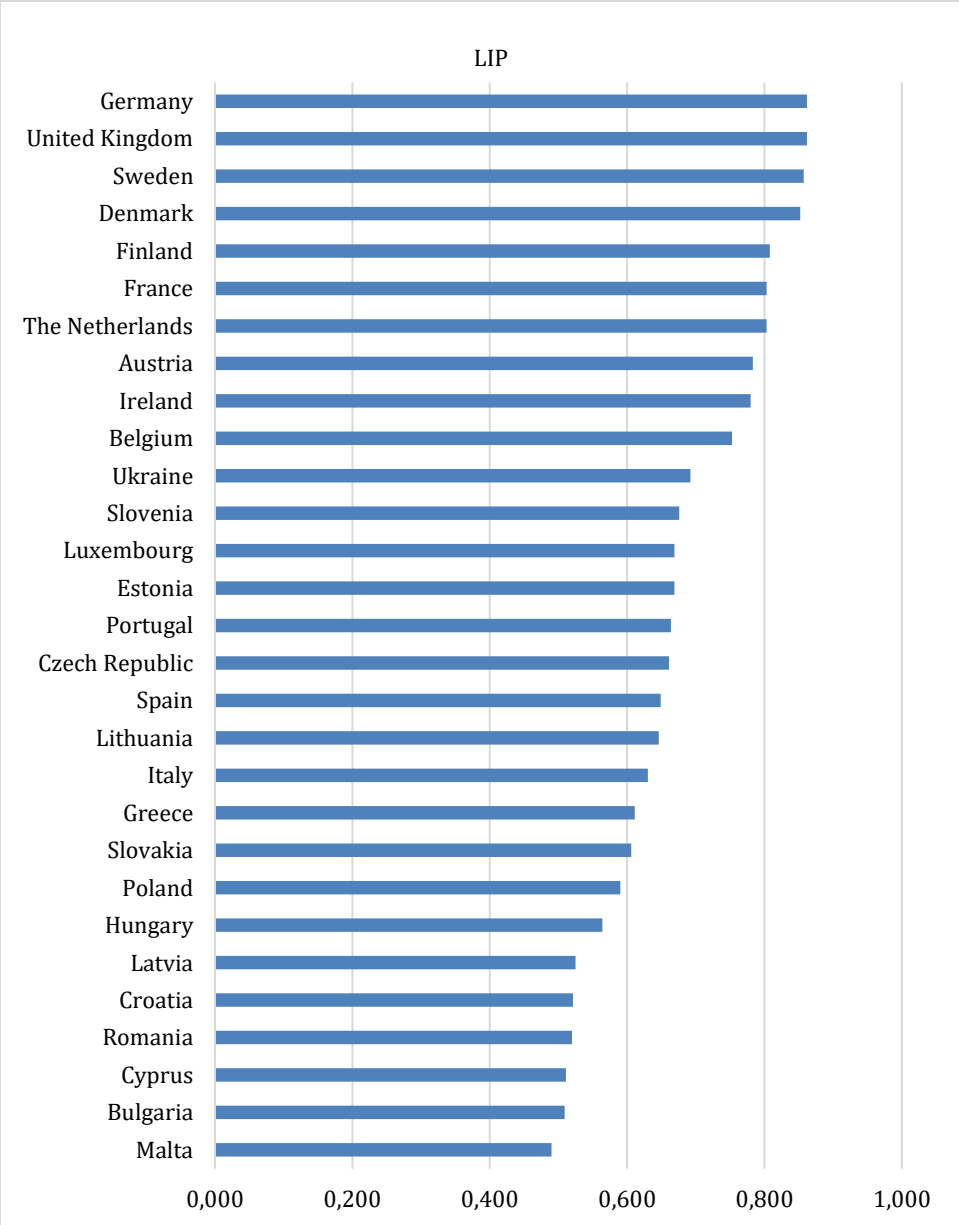

Figure 3. The value of the indicator of level of innovation potential of EU countries and Ukraine in 2018. Source: Author's

As can be seen from the figure, the leaders in the calculation of the indicator of the level of innovation potential are Germany, Great Britain, Sweden, Denmark and Finland. The countries with the lowest rates are Croatia, Romania, Cyprus, Bulgaria and Malta.

Ukraine ranks 11th in this indicator and is ahead of such countries as Slovenia and Luxembourg but has results lower than Belgium and Ireland. This result is due to the fact that Ukraine is the leader on the indicator of population aged 20-24 with upper secondary education and with tertiary educational attainment. This means that there is a rather high level of educational potential in Ukraine. However, the level of institutional potential remains low. The number of researchers in Ukraine is one of the lesser among EU countries, as is the quality of scientific research institutions.

We then we proceeded to the analysis of the results of the calculation of the indicator of the conditions for realization of innovative potential (CFRIP) of the country. The results of the calculation are shown in Fig. 4.

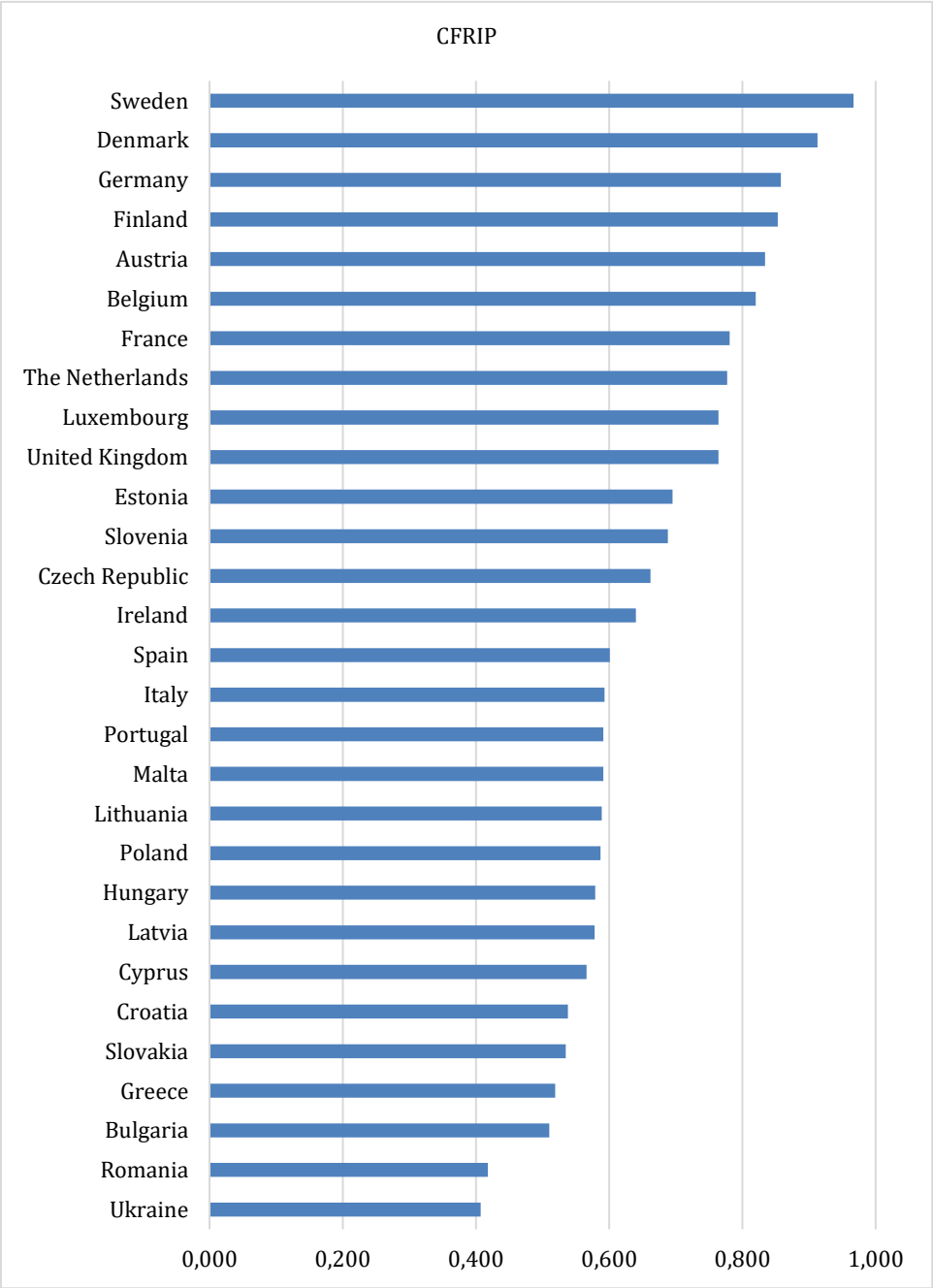

Figure 4. The value of the indicator of the conditions for realization of innovative potential of EU countries and Ukraine in 2018.
Source: Author's

As can be seen from the image, Sweden, Denmark, Germany, Finland and Austria are the leaders on the indicator of the conditions of realization of innovative potential (CRIP). The countries with the lowest URIP are Ukraine,

Romania, Bulgaria, Greece and Slovakia. Ukraine ranks last in CRIP among all countries. This can be explained by the fact that Ukraine has the lowest expenditure on R&D and poorest ICT use.

The next step is to consider the results of calculations of the indicator of realization of innovative potential (RIP). The results can be seen in fig. 5.

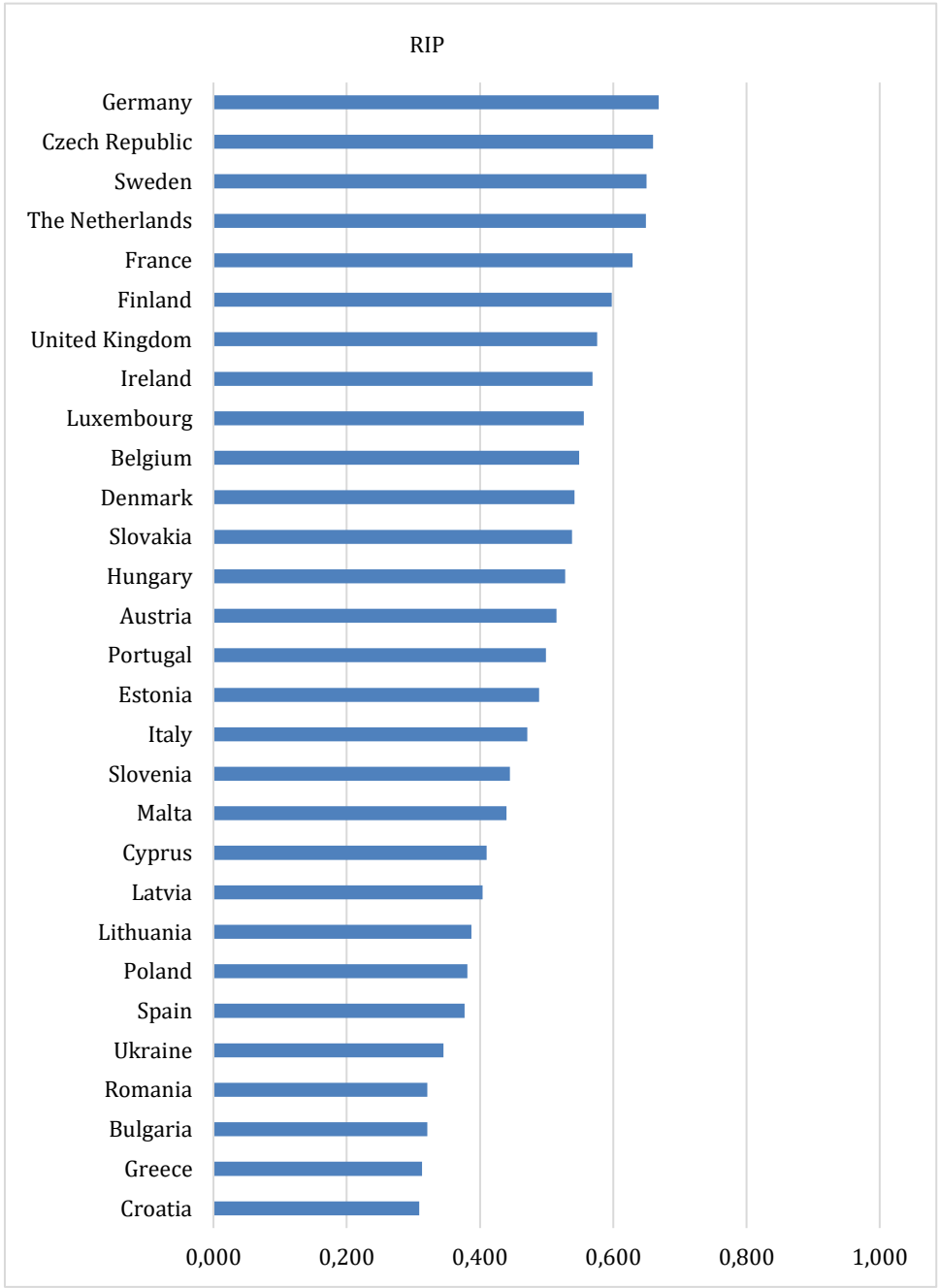

Figure 5. The value of the indicator of the realization of innovative potential of EU countries and Ukraine in 2018. Source: Author's

The figure shows that Germany has been most successful in realization of its innovation potential, followed by such countries as the Czech Republic, Sweden, the Netherlands and France. These countries have one of the highest scores of all indicators used to assess the Realization of Innovation Potential.

The last positions are occupied by the following countries: Croatia, Greece, Bulgaria, Romania. Ukraine is 5th place from the end, behind Spain and Poland. Ukraine has low results on indicators of high-tech exports, ICTS and business model creation, SME with product or process innovations and creative goods exports.

After analyzing the results of calculations of all four indicators of The Conditions for Creating Innovative Potential (CFCIP), Level of Innovation Potential (LIP), Conditions for Realization of Innovative Potential (CFRIP), Realization of Innovative Potential (RIP) it was possible to distinguish obvious leaders on the level of development of innovative potential and willingness to innovate. These countries are Sweden, Denmark, Finland, the United Kingdom and Germany. Countries with clearly low levels of innovation potential and willingness to innovate in comparison with all other EU countries are Romania, Croatia and Bulgaria.

However, in order to determine exactly how the countries were positioned relative to each other and where Ukraine's place among other EU countries is according to the studied indicators, additional analysis was needed. This was done by comparing the analyzed indicators with the help of the cluster analysis method (k-means method).

The graph below shows the final cluster centers to see which calculation results of each indicator are most typical for each cluster.

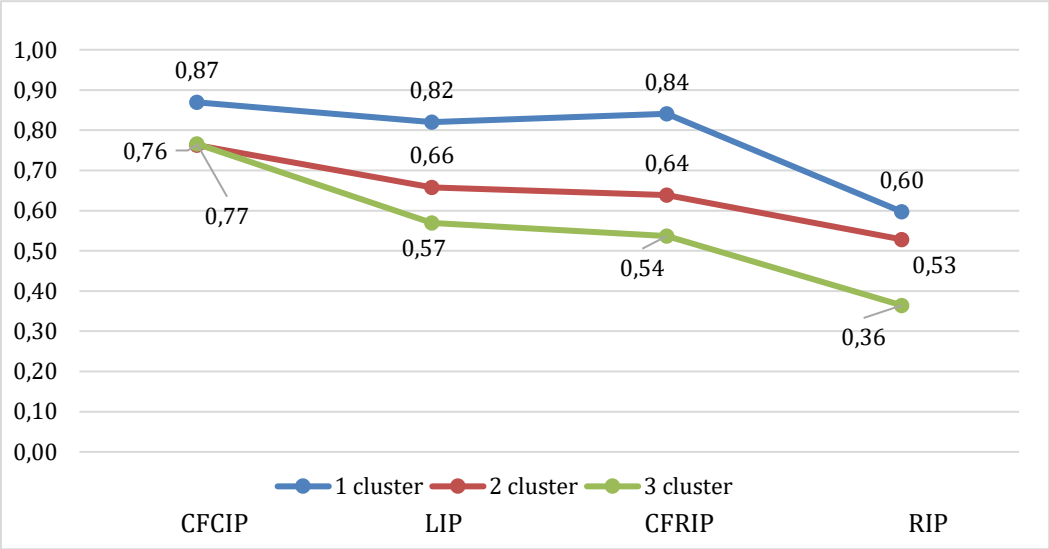

Figure 6. Final Cluster Centers
Source: Author's

From this figure it can be seen that the first cluster includes countries with high indicators of The Conditions for Creating Innovative Potential, Level of Innovation Potential, Conditions for Realization of Innovative Potential and Realization of Innovative Potential; the second cluster includes countries with average indicators of The Conditions for Creating Innovative Potential, Level of Innovation Potential, Conditions for Realization of Innovative Potential, Realization of Innovative Potential; the third cluster includes countries with average indicators of The Conditions for Creating Innovative Potential, moreover, this indicator is even higher than in the countries of the second cluster, but the indicators of the Level of Innovation Potential, Conditions for Realization of Innovative Potential and Realization of Innovative Potential have a low level. These results testify to the relevance of further study of this topic, namely: why countries with the same level of conditions for innovation potential have different results in its implementation.

The breakdown of the countries studied according to the indicators into three clusters can be seen in the table below.

I Cluster	II Cluster	III Cluster
		Bulgaria
Austria	Hungary	Greece
Belgium	Italy	Cyprus
United Kingdom	Portugal	Latvia
Germany	Slovenia	Lithuania
Denmark	Czech Republic	Poland
The Netherlands	Estonia	Romania
Finland	Ireland	Spain
France	Luxembourg	Croatia
Sweden	Slovakia	Ukraine
		Malta

Figure 7. Breakdown of the countries clusters
Source: Author's

As seen from the table, as a result of the cluster analysis, the countries were divided into clusters as follows: the 1st cluster included 9 countries, among them the Scandinavian countries and the countries of Western and North-Western Europe; the second cluster includes mainly the countries of Southern and Central Europe; the 3rd cluster includes the countries of Eastern and Southeastern Europe, to which Ukraine belongs.

Discussion the other scientists and papers

In his work [12], M. Kyzym considered the problems of assessing Ukraine's readiness for innovative transformations, although he assessed the possibility of forming innovative clusters even before the concept ofa new industrial revolution appeared. In her work, V. Khaustova [13] also assessed the possibility of creating innovative clusters in the Ukrainian economy using the example of enterprises in the electrical industry operating in the Kharkiv region. I. Yegorov, I. Odotiuk and O. Salihova [14, 15] considered the possibility of implementing high technologies in the Ukrainian economy and evaluated the development indicators of ICT, biotechnology, nanotechnology, new materials and nuclear technology. Moreover, in the studies of all these authors there was no comprehensive analysis of the technological readiness of the country as a whole. L. Fedulova [16] also used a number of indicators of innovation to justify the national priorities of social and economic development of the country on an innovative basis, although she determined only the technological contours in the Ukrainian industry without taking into account the factors of the new industrial revolution. However, these authors did not have a comprehensive approach to the development of a methodology for studying Ukraine's readiness for innovation in the conditions of Industry 4.0.

Uncertainty and impact of research results

The conducted analysis of indicators has shown the expediency of further research of innovative potential of countries and willingness to innovate in the area of 'The Conditions for Creating Innovative Potential, Level of Innovation Potential, Conditions for Realization of Innovative Potential, Realization of Innovative Potential'. In the future, these indicators will allow to study and analyze in more detail the level of innovation development of the EU and Ukraine, develop a strategy of innovation development and implementation of innovations for the more backward countries and to find ways to increase the competitiveness of the economies of the countries by realizing their innovative potential. Presently, this is very relevant for Ukraine because the EU's high innovation potential is one of the most powerful and motivating factors for Ukraine's European integration choice.

Therefore, it can be stated, that Ukraine is not yet ready for innovations in the conditions of the spread of technologies of the new industrial revolution. This also means that the country has many ways to improve the central element of industry 4.0 and any innovation will be among its people, not technology, and as was mentioned previously, Ukraine has a high level of educational potential, which means, that there can be professionals that will lead the country towards the needed progress.

Summary and conclusions

Based on the results of the study, the following conclusions can be drawn about Ukraine's readiness for innovation in the conditions of Industry 4.0:

- Ukraine is 24th in the Indicator of The Conditions For Creating Innovative Potential because of its low level of access to ICT and the development of clusters;
- Ukraine ranks 11th in the indicator of Level of Innovation Potential due to the fact that Ukraine is the leader of the indicator of Population aged 20-24 with upper secondary education and with tertiary educational

attainment. There is as high level of educational potential in Ukraine. However, the level of institutional potential remains low;
- Ukraine ranks last in CRIP among all countries because Ukraine has the lowest expenditure on R&D and poorest ICT use;
- Ukraine has low results on indicators of high-tech exports, ICTS and business model creation, SME with product or process innovations and creative goods exports.

So, taking into account the fundamental importance, complexity and systematic nature of this problem to ensure the competitiveness of Ukrainian enterprises and the economy in a global saturated market, and taking into account the rapid spread of the consequences of the 4th industrial revolution, there is a need for Ukrainian Government to:
- make raising business excellence a priority in work and personally initiate urgent measures aimed at significantly improving the quality of public administration, in particular, by using the best practices in terms of system management and the corresponding refinement of the Strategy for Public Administration Reform;
- to develop and adopt a concept of state policy in the field of system management, providing for active assistance on the part of the authorities to domestic enterprises in improvement based on modern approaches and best practices;
- to develop and adopt a concept of state policy in the field of quality of products (works, services), including in it such areas of activity as standardization, technical regulation, metrological support and market supervision;
- promote the introduction of digital technology in all areas of production and contribute to computer literacy among the population.

Conflict of interest
There are no conflicts to declare.

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