

INDUSTRIAL DEVELOPMENT: METHODOLOGY FOR THE RANKING OF COUNTRIES

Irina Rodionova¹, Tatiana Kokuytseva²

¹ Peoples' Friendship University of Russia (RUDN University)
Faculty of Economics, Department of Regional Economy and Geography
Miklukho-Maklaya Street 6, 117198, Moscow, Russia
E-mail: iarodionova@mail.ru

² Peoples' Friendship University of Russia (RUDN University)
Faculty of Economics, Department of Applied Economy
Miklukho-Maklaya Street 6, 117198, Moscow, Russia
E-mail: tvkokuytseva@gmail.com

Abstract: *The authors of the article are convinced that a strong industrial sector of economy, first, manufacturing industry, is a direct path to economic prosperity in the post-industrial economy. To understand the development of human society and the development of economic activities as a basis for ensuring conditions for a decent and creative life of people, it is necessary to know about the features of the development of the world economy and industry.*

The objective of this article is to compile the world's ranking on a set of criteria that reflect the level of industrial development and the specifics of the world industrialization process.

Data and Methods. *The article presents the authors' ranking of countries based on the level of industrial development in the era of transition to post-industrial economy. The ranking is based on the indicators reflecting the level of manufacturing industry development and the structure of industrial exports. A data matrix was created for nine indicators of the level of industrial development of 117 countries. For each indicator (criterion), the rank of a country was determined (position in the general list from the highest to the lowest). The ranks of the countries for each indicator were summed up, and the integral rank was determined. The leaders of the ranking received the least number of points, and outsiders - the maximum.*

Results. *The leaders in this ranking of modern industrial development are: Republic of Korea, Ireland, Germany, Switzerland, Singapore, Japan, China, Czech Republic, Malaysia, Sweden. The United States is at the 17th position, Russia - at the 33rd position.*

Conclusions. *The data of the ranking should be used as a tool to analyze the problems in the economic and industrial policies of countries and to develop their new strategies aiming at achieving sustainable economic growth and progress.*

Key words: *industrial development, methodology, ranking of countries.*

JEL codes: *O11, O14, O57.*

1. Introduction

The level of industrial development affects the quality of development and performance of other economic sectors. It affects all aspects of the life of population.

There is a creation of new workplaces in the industry (first of all, in the manufacturing industry) not only in developing, but in highly developed countries (Rachwał, 2011; Draper, 2013; Rodionova, 2014; Rodionova, Kokuytseva, Semenov, 2016). The present growth of industrialization creates both a new paradigm of industrial growth in developed countries ("Industry 4.0") and the development of the concept "Internet of Things - IoT". This is a process of improving the productive power, which will finally lead to the technotronic era in the development of the society with the transition to the knowledge-based, high-tech, more efficient industry (Gierańczyk, 2010; Hermann, Pentek and Otto, 2015).

Note that there are many classifications of countries, based on one or several indicators of their socio-economic development. One of the reports (Measuring the Information Society Report, 2015) gives a detailed description of the leaders in the ranking which reflects the level of informatization of society, as well as those countries that have significantly improved their positions in the global industry in recent years. The report has a section devoted to the analysis of opportunities and problems of the development of the Internet of Things.

Several articles are dedicated to the features of industrial sector development that characterize structural shifts in the economy of the selected countries and regions of the world (Kourtit K. et al., 2011; Dominiak, J., Rachwał, T., 2014; Rodionova, 2013). The experts of UNIDO say that a key factor of a labor capacity growth in the industry is structural changes in this sector of economy (Industrial Development Report, 2016; OECD Science, Technology and Industry Scoreboard, 2015). Different authors characterize the development processes of R&D in the countries and the specifics of their implementation in practice, including through the strategies of the largest TNCs (Kourtit et al., 2011; Koopman et al., 2014; Rodionova, 2014). A worldwide globalization and fragmentation of manufacturing have promoted the spreading of new technologies through high-tech goods trading (Draper, 2013).

The Global Manufacturing Competitiveness Index (GMCI) report describes the impact of manufacturing on a global economic development: on the growth of infrastructure, work places creation, contribution to GDP growth. The analytical part of the article studies six countries: the USA, China, Japan, Germany, the Republic of Korea and India. Thanks to their competitive manufacturing, the economies of these countries form about 60% of the global GDP. The leaders in the ranking table by Global Competitiveness Index are: Switzerland, the USA,

Singapore, Netherlands, Germany, Hong Kong, Sweden, United Kingdom, Japan and Finland (Global Manufacturing Competitiveness Index, 2016).

UNIDO also calculates Competitive Industrial Performance Index (CIP Index). The countries are ranked by the index that shows their rating of industrial capacity, technological upgrading and their impact on a global manufacturing and trade. The CIP index combines four main dimensions of industrial competitiveness: industrial capacity, manufactured export capacity, industrialization intensity and export quality. The leader of CIP ranking (of 148 countries ranked) are: Germany, Japan, China, the USA, the Republic of Korea, Switzerland, Belgium, the Netherlands, Singapore, Italy (Competitive Industrial Performance Index, 2016). Russian scientists including the authors of the article also attempt to classify the countries by their level of economic and industrial growth (Rodionova, Tikunov, 2002; Rodionova, 2003).

So, the purpose of this article is to present the ranking tables on a set of criteria that reflect the level of development of the industrial sector of 117 countries. The article describes the countries' positions in the ranking tables for 2015.

2. Methodology and Data

To obtain necessary data for the current research we have investigated the following sources: statistical database of UNIDO, the World Bank, and the National Science Foundation of the USA and some other sources, including Industrial Development Report, UNIDO (2016); International Yearbook of Industrial Statistics, UNIDO (2017); UNESCO Science Report. Towards 2030; World Investment Report (2017); INDSTAT 4 (2017), etc.

The research stages are the following: 1) collection of statistical data; 2) selection indicators; 3) creation of a data matrix of indicators reflecting the level of industrial development; 4) calculation of some indicators; 5) compilation of the ranking of countries; 6) analysis of the positions of countries in a world ranking.

The ranking was carried out according to the indicators reflecting the level of development of the manufacturing industry and the structure of exports of industrial products. A data matrix was created for 9 indicators of the level of development of the industrial sector in 117 countries. For each indicator (criterion), the rank of the country was determined (position in the general list from the highest to the lowest). The ranks of the countries for each indicator were summed up, and the integral rank was determined. The leaders of the rating list received the least number of points, and the outsiders - the maximum ones.

The results of the analysis showed that the positions of countries in the rating tables depend on not only the indicators selected for the classification (ranking), but even on the number of countries. The authors made several attempts to rank 117 countries based on different numbers of indicators (9, 4 and 3). The ranking for 2015 was compiled for only 117 countries, because there was no information for all selected indicators of some least developed countries.

All indicators are arranged in two groups which characterize: 1) the level of manufacturing; 2) the features of innovative development (including data of high-tech manufacturing export). They are not absolute, but relative (in percent or per capita). They are from official sources or calculated by the authors of this article.

The first group of indicators characterizes the features of manufacturing development in the world economy. These are the following indicators: a share of industry in GDP (percent); a share of manufacturing value added (MVA) in GDP (percent); MVA per capita (US \$); a share of a countries MVA in the world MVA (percent); a share of machinery and a share of chemicals in manufacturing production (percent).

The second group of indicators characterizes an innovative development. It includes the following ones: high-tech exports per capita (US \$) and a share of high-tech exports in total manufacturing exports (percent); ICT Development Index.

All indicators have the same "weight". Although, perhaps, it will be advisable to carry out a factor analysis to select the most essential features of the level of industrial development of countries to obtain a more accurate conclusion. This goal was achieved trying to analyze and classify countries not only by 9 (Tab. 1), but also by 4 and 3 most significant (in our opinion) features.

Tab. 3 Indicators of the level of industrial development

| Indicators in the ranking of 2015 | Measure |
|--|---------|
| Share of industry in GDP | percent |
| Share of MVA in GDP | percent |
| Share of a country MVA on world MVA | percent |
| MVA per capita | US \$ |
| Share of machinery in manufacturing industries | percent |
| Share of chemicals in manufacturing industry production | percent |
| High-tech exports per capita | US \$ |
| Share of high-tech exports in total manufacturing exports of country | percent |
| The ICT Development Index | index |

There were selected the following 4 indicators: MVA per capita, a share of MVA in GDP, high-tech exports per capita, a share of high-tech exports in total manufacturing exports of country. And then the following 3 indicators: MVA per capita, high-tech exports per capita, share of MVA in GDP.

The results of three ranking options are presented below (Tab. 2).

Tab. 2 The positions of the leading countries in the rating lists, 2015 (calculation options)

| Position | Country | Position | Country | Position | Country |
|-------------------------|-------------------|-------------------------|-------------------|-------------------------|-------------------|
| Ranking by 9 indicators | | Ranking by 4 indicators | | Ranking by 3 indicators | |
| 1 | Republic of Korea | 1 | Republic of Korea | 1 | Ireland |
| 2 | Ireland | 2 | Singapore | 2 | Republic of Korea |
| 3 | Germany | 3 | Ireland | 3 | Switzerland |
| 4 | Switzerland | 4 | Switzerland | 4 | Germany |
| 5 | Singapore | 5 | Germany | 5 | Singapore |
| 6 | Japan | 6 | Czech Republic | 6 | Czech Republic |
| 7 | China | 7 | Malaysia | 7 | Austria |
| 8 | Czech Republic | 8 | Japan | 8 | Japan |
| 9 | Malaysia | 9 | Austria | 9 | Malaysia |
| 10 | Sweden | 10 | Slovenia | 10 | Slovakia |
| 11 | Slovenia | 11 | China | 11 | Sweden |
| 12 | Austria | 12 | Thailand | 12 | Slovenia |
| 13 | Denmark | 13 | Sweden | 13 | Belgium |
| 14 | Thailand | 14 | Denmark | 14 | China |
| 15 | Israel | 15 | Belgium | 15 | Hungary |

Source: Calculated by the authors.

The ranking shows the same groups of the leading countries measured by 9, 4 and 3 indicators accordingly. The Republic of Korea, Ireland, Singapore, Switzerland, Germany, Japan Austria, Sweden, Belgium are always on the top of the list. In fact, these are highly developed countries including the Republic of Korea (UNIDO experts consider it to be on a stage of industrialization – «industrialized economies»).

The leadings countries have reached their positions not only due to high GDP per capita but also due to qualitative indicators of manufacturing development (MVA per capita, share of MVA in GDP, «relative level of industrialization", high-tech manufacturing exports per capita).

Let us compare the leaders by separate indicators (Tab.3).

Tab. 3 The leaders of the authors ranking by separate indicators

| Ranking by 9 indexes | | «relative level of industrialization» | | MVA per capita | | GDP per capita | |
|----------------------|-------------------|---------------------------------------|----------|----------------|----------|----------------|----------|
| position | country | index | position | US \$ | position | thousand \$ | position |
| 1 | Republic of Korea | 5.27 | 10 | 7400.20 | 8 | 37.9 | 25 |
| 2 | Ireland | 10.28 | 1 | 10739.40 | 2 | 69.4 | 5 |
| 3 | Germany | 5.82 | 8 | 9193.00 | 4 | 48.2 | 15 |
| 4 | Switzerland | 8.22 | 2 | 14466.60 | 1 | 59.4 | 8 |
| 5 | Singapore | 6.98 | 4 | 9292.00 | 3 | 87.1 | 3 |
| 6 | Japan | 6.59 | 5 | 8382.30 | 5 | 38.9 | 24 |
| 7 | China | 0.93 | 48 | 2025.30 | 38 | 15.4 | 61 |
| 8 | Czech Republic | 3.12 | 20 | 5011.90 | 16 | 33.2 | 31 |
| 9 | Malaysia | 1.41 | 38 | 2490.90 | 36 | 27.2 | 39 |
| 10 | Sweden | 5.63 | 9 | 8273.30 | 7 | 49.7 | 13 |
| 11 | Slovenia | 2.90 | 23 | 4328.30 | 21 | 32.0 | 32 |
| 12 | Austria | 6.13 | 7 | 8335.70 | 6 | 47.9 | 16 |
| 13 | Denmark | 8.10 | 3 | 7372.00 | 9 | 46.6 | 17 |
| 14 | Thailand | 0.98 | 47 | 1628.00 | 44 | 16.8 | 58 |
| 15 | Israel | 2.48 | 28 | 4344.60 | 20 | 34.8 | 29 |

| | | | | | | | |
|----|--------|-------|----|---------|----|------|----|
| 33 | Russia | 0.859 | 50 | 1482.90 | 48 | 26.1 | 41 |
|----|--------|-------|----|---------|----|------|----|

Source: Calculated by the authors.

There are also China, Malaysia and Thailand, as well as the former socialist countries of Central and Eastern Europe (Czech Republic, Slovenia, Slovakia, Hungary) in a group of the leaders. Speaking about China, it should be noted that the unprecedented growth in China's production gradually brought this country into the group of the world's largest manufacturers and exporters of industrial products, but the same indicators per capita for this country are still much lower than in many developed countries. The competitive advantages of China are rather high. And we see the proof analyzing its positions in a ranking by Competitive Industrial Performance Index, calculated by UNIDO. China ranked the third behind Germany and Japan and followed by the USA and the Republic of Korea (Industrial Development Report, 2016).

The countries of Central and Eastern Europe and the CIS countries are integrating into the world economy by different ways. They occupy different positions in the ranking of industrial development composed by the authors. Thus, the Czech Republic is on the 8th position, Slovenia is on the 11th position, Hungary is on the 16th, Belarus – 23rd, Russia - 33th, Kyrgyzstan is on the 83rd position.

But one of the most important indicators that affects a level of industrial development of countries is manufacturing value added per capita. The leaders by this indicator are: Switzerland, Ireland, Germany, Singapore, Sweden, Japan, Austria, Republic of Korea. However, this indicator does not reflect the level of competitiveness in the industry.

The structure of exports and the share of high-tech products is the key to characterizing a country's economic growth and the competitiveness of its products on the world market. The share of industry in GDP, the share of high-tech exports in the export and the share of high-tech export per capita directly reflect the intensity of the modern industrialization process. The same indicators characterize the level of technical equipment of the industry. The highest positions in terms of high-tech exports per capita were in 2015 in Singapore, Switzerland, Ireland, Belgium, the Netherlands, the Republic of Korea, Germany, the Czech Republic.

The authors calculated the index of "level of industrialization" (or "the coefficient of industrialization"). It shows a role of each country in a global manufacturing industry. This indicator is higher than 1 for industrialized countries. This is the ratio, where the numerator is a share of a country in the world MVA (percent) and the denominator is a share of a world population (percent). The highest positions in the list reflecting "level of industrialization" are occupied precisely by those countries that are the leaders in the ranking list. These are:

Switzerland, Ireland, Singapore, Japan, Finland, Austria, Germany, Sweden, Republic of Korea, Denmark.

We have characterized the positions of the leading countries by separate indicators. According to the authors' method of compiling the ranking, the ranks of countries for each indicator were summed up and the integral rank was determined. Thus, the leaders of the final ranking had the lowest score. The leaders in this ranking of industrial development are: Republic of Korea, Ireland, Germany, Switzerland, Singapore, Japan, China, Czech Republic, Malaysia, Sweden.

The analysis of the rating tables shows the difference in the growth of developing countries. Globalization and features of modern international manufacturing outsourcing has helped some developing countries (the Republic of Korea, Singapore, Malaysia, Thailand, Mexico, Argentina, Turkey, Brazil) to grow, become equal or even surpasses some developed ones by many indicators. Persian Gulf monarchies have occupied quite high positions in the ranking (Qatar, Bahrain, Kuwait, UAE, and Saudi Arabia).

At the same time some Asian or Latin American countries which have shown a recent rapid growth towards industrialization are not included in the group of developed countries yet. And a major part of developing countries (especially African ones) are still far behind others in their industrial development. This fact is confirmed by our ranking.

3. Results and Discussion

The researchers should find a simple and illustrative method to measure the progress of qualitative changes in the global industry. The structure of the economy (share of industry in GDP) – is not the best indicator of quality. We tried to characterize the level of industrial development of the global economy in terms of development of manufacturing industries and manufacturing exports in our ranking.

Thus, highly industrialized economies form the top of our ranking in 2015. The structures of their manufacturing industry are similar. First of all, the following goods are presented there: chemicals and chemical products; office, accounting and computing machinery; motor vehicles, trailers, semi-trailers; machinery and equipment (totally they form 50% of the manufacturing industry). The structure of industry of Ireland somehow differs from the tops of the ranking (share of chemicals and chemical products is 49%) (UNIDO Industrial Statistics Database, 2017). Let us also note that Ireland (as well as Qatar, Luxembourg, Singapore, Kuwait which

are ahead of Ireland in the list) is a world leader by GDP per capita (Qatar – 129700, Singapore – 87100, Ireland – 69400 US\$, 2015).

But the advantage of Ireland is not a total level of development of the country. It is a possibility of a legal placement of foreign companies on its territory. That is why Ireland has one of the highest MVA per capita (10739.4 US\$, 2015) – the second position after Switzerland (14466.6 US\$, 2015). Ireland is being ahead of Singapore, Germany and Japan. Considering the size of the population, Ireland is among the leaders in a list of a relative coefficient of industrialization (being ahead of Switzerland, Denmark, Singapore and Japan). It is behind Singapore and Switzerland by high-tech manufacturing export per capita (Ireland – 6013.1 US\$, Singapore – 23528.3 US\$ and Switzerland – 6606.4 US\$, 2015). Such a high position of Ireland by some indicators of industrial development has allowed it to take a leading position in our ranking.

Continuing the discussion on the indicators that reflect improvements in global industrialization we concluded that the best of them are high-technology exports per capita and high-technology exports in all manufactured exports.

According to the statistics of UNIDO, in 2016 China's share is about 24% in a global manufacturing production (for comparison - share of the USA is 16%, Japan - less than 9%, Germany - 6,5%). However, MVA per capita (PPP) in the USA is 6074.6 USD (2016, in constant prices for 2010), in Japan – 8514.2 USD, in Germany – 9595.0 USD and in China only 2170.2 USD (though it is higher than an average global indicator of 1660 USD and much lower than in developing countries) (UNIDO Industrial Statistics Database, 2017). We can see the increase of a share of manufacturing in GDP of developing countries - first of all in China, India, Mexico, Brazil and others. Such transfer of manufacturing to China and other developing countries allows multinational companies to make additional profits. The statistics on a share in a high-tech manufacturing export of China can be exaggerated because the share of China in a manufacturing production is only 3-4%, the rest part of a cost is shared by other countries (Draper, 2013). However, according to the current methodology, the full cost of a product is counted as a Chinese high-tech export.

It should be noted that the composition and number of indicators selected for the ranking greatly influences the positions of countries in it. We pay your attention that we do the research using relative (percent, per capita) but not absolute indicators.

We are deeply convinced that calculating the integral index of industrialization the participation of countries in the global value-added chains (GVC) should be considered. This

is not done while calculating the index in this research. Meanwhile, the projects such as, for example, the World Input-Output Database (WIOD) project of the European Commission, is an attempt to assess the contribution of countries to global value chains. At the same time, the situation is viewed in dynamics (World Input-Output Database, 2017). These indicators significantly change the picture of the distribution of value added in the world, which will necessarily affect the order of the countries in the compiled rankings (Mironov, 2013). So, even a reduction in the share of manufacturing in GDP of developed countries does not mean a decrease in the level of industrial development in these countries. On the contrary, the phenomenon of "highly developed post-industrial industry" is fixed. In addition, this fact can be partly explained in highly developed countries by "invisibility" of their real participation in global value chains. This participation is higher in fact. Value added is determined by labor and capital that is directly or indirectly needed for final manufacturing production (Koopman et al., 2014; UNIDO Industrial Statistics Database, 2017). At the same time, the transfer of industrial production to China and other developing countries provides additional benefits mainly to transnational corporations.

4. Conclusions

The shifts in a spatial organization of the world industry have changed the positions of countries in the ranking tables. A great number of conditions and factors, including new ones (the development of information and communication technologies and the network economy, interstate integration, the geographic strategy of TNCs and many others) currently influence the placement of manufacturing industries.

In other words, globalization and the fragmentation of industrial production at the international level contributed to the spread of new technologies. The process of industrialization takes place in states in different conditions, in different ways, at different rates.

The Republic of Korea, Ireland, Singapore, Switzerland, Germany, Japan Austria, Sweden, Belgium, Denmark are always on the top of the list. In fact, these are highly developed countries including the Republic of Korea (UNIDO experts consider them to be on a stage of industrialization – «industrialized economies»).

The process of differentiation of developing countries has intensified. Some developing countries (Republic of Korea, Singapore, China, Qatar, Malaysia, Thailand, Mexico, Argentina, Turkey, Brazil, the United Arab Emirates, Saudi Arabia) have moved forward in their

development. They have become equal or surpassed many developed European countries by industrial development. China has reached very high positions in all industries.

It is also worth emphasizing that the former socialist countries of Central and Eastern Europe and the CIS countries are integrated into the world economy in different ways and occupy different positions in the world economy, including in the authors' ranking of industrial development. But the most significant part of the developing countries (especially African ones) still represents the "deep periphery" of the global industry. This thesis is confirmed by the results of our ranking.

Acknowledgments

The publication has been prepared with the support of the Ministry of Science and Higher Education of the Russian Federation, project "Scientific and methodological, analytical and regulatory support for the implementation of the Set of Measures for 2018-2020 of the International Program for Innovative Cooperation of the CIS countries until 2020".

The publication has been prepared with the support of the «RUDN University Program 5-100».

References

- UNIDO (2018): *Competitive Industrial Performance Index. Industrial Statistics Database. INDSTAT4*, <https://stat.unido.org/>
- Dominiak, J., & Rachwał, T. (2016). Chief development tendencies, structural changes and innovativeness of the industrial and service sectors in Poland. *Quaestiones Geographicae*, 35(4), 49-69.
- Draper P. (2013): *The shift in geography of global value chains: implication for trade policy*, <http://ecpol.ru/2012-04-05-13-42-46/2012-04-05-13-43-05/484-vzglyad-na-mir-cherez-tsepochki-dobavlennoj-stoimosti.html>
- Gierańczyk, W. (2010). Development of high technologies as an indicator of modern industry in the EU. *Bulletin of Geography. Socio-economic Series*, 14(14), 23-35.
- Deloitte (2016): *Global Manufacturing Competitiveness Index. Report highlights*, http://c.ymcdn.com/sites/www.vma.org/resource/resmgr/2016_mow_presentations/MOW_2016_-_Dollar.pdf
- Hermann, M., Pentek, T., & Otto, B. (2015). *Design Principles for Industrie 4.0 Scenarios: A Literature Review*. *Technische Universität Dortmund* (No. 01). Working paper.
- UNIDO (2016): *Industrial Development Report. The Role of Technology and Innovation in Inclusive and Sustainable Industrial Development*.

- Koopman, R., Wang, Z., & Wei, S. J. (2014). Tracing value-added and double counting in gross exports. *American Economic Review*, 104(2), 459-94.
- Kourtit K. et al. (eds.) (2011): *Drivers of Innovation, Entrepreneurship and Regional Dynamics*, "Advances in Spatial Science", Springer-Verlag, Berlin, Heidelberg.
- ITU (2017): *Measuring the Information Society Report. The ICT Development Index (IDI)*.
<http://www.itu.int/net4/ITU-D/idi/2017/index.html>
- Mironov V. (2013): *UNIDO Competitiveness Index and the illnesses of the Russian economy. Manufacturing competitiveness and growth*, <http://ecpol.ru/2012-04-05-13-39-38/2012-04-05-13-39-53/1106-indeks-konkurentosposobnosti-yunido-i-bolezni-rossijskoj-ekonomiki.html>
- OECD (2015): *"Science, Technology and Industry Scoreboard. Innovation for growth and society"*, OECD Publishing, Paris, <http://www.oecd.org/sti/oecd-science-technology-and-industry-scoreboard-20725345.htm>
- Rachwał, T. (2011): *Transformations of the Employment Structure as an Expression of the Transformation of Polish Industry Against the Background of the European Union*, "Bulletin of Geography. Socio-economic Series", No. 15, pp. 5-25, http://www.bulletinofgeography.umk.pl/15_2011/01_Rachwal.pdf
- Rodionova I. (2013): *Competitiveness of countries in the world innovation economy: Central-Eastern Europe and Russia*, "Quaestiones Geographicae", 32(2), Bogucki Wydawnictwo Naukowe, Poznań, pp. 15–24, <https://www.degruyter.com/downloadpdf/j/quageo.2013.32.issue-2/quageo-2013-0010/quageo-2013-0010.pdf>
- Rodionova I. (2014): *World industry in post-industrial society: tendencies and regional shifts*, "Miscellanea Geographica - Regional Studies on Development", Vol. 18, Issue 1, pp. 31-37, <https://www.degruyter.com/downloadpdf/j/mgrsd.2014.18.issue-1/v10288-012-0044-z/v10288-012-0044-z.pdf>
- Rodionova I., Kokuytseva T., Semenov A. (2016). Features of Migration Processes in Different World Industries in the Second Half of the XX Century. *Editorial Board*.
- Rodionova I.A., Tikunova I.N. (2002): *Classification of the countries of the world according to the role of industry in the overall structure of the economy*, "Moscow University Bulletin. Geography series", No 6, pp. 27-36.
- WEF (2018): *The Global Competitiveness Report 2017–2018*, http://reports.weforum.org/pdf/gci-2017-2018-scorecard/WEF_GCI_2017_2018_Scorecard_GCI.pdf