DEVELOPMENT OF INNOVATIVE POTENTIAL IN THE CONDITIONS OF REGIONALIZATION OF THE WORLD ECONOMY

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Annotation

The article substantiates the innovative potential of the world economy and reveals some changes of innovation activity to regional centers. Recommendations are also given on how to increase innovation activity in the Eurasian region.

Keywords

Innovation potential, innovation, innovation activity, world economy, regionalization, mega-regional trade agreements, EAEU.

Innovation is of paramount importance for solving economic and environmental problems. All UN member states have joined the 2030 Agenda for Sustainable Development, and the Sustainable Development Goals are included in the system of national priorities of developed and developing countries. SDG 9, Industry, innovation and infrastructure, identified the key role of innovation in «finding long-term solutions to both economic and environmental problems, such as improving the efficiency of resource and energy use».

The innovation potential of the world economy includes all the capacities of countries and regions to generate new ideas and innovate. International cooperation creates synergies. They manifest themselves in both breakthrough innovations and in equalizing the innovative level of countries.

At the international level, the innovation 'gap' between the potential of developed and developing countries has been discussed for a long time now. The leading role of developed countries in this area brings benefits to them in the first place, then to the countries of their «immediate economic environment», and only then to everyone else. The process of globalization has not facilitated access to innovation for developing countries. Despite joining the 2030 Agenda, developed countries are increasingly restricting access to the innovations they have, sometimes outright prohibiting their use. This forces developing countries to look for new ways of cooperation to preserve and increase their innovation potential. One of the interaction formats in which trade, investment, and innovation cooperation are closely intertwined is mega-regional trade agreements (MRTS). Within a separate mega-region, it is possible to create conditions for the development of innovations based on the experience of advanced countries and reach a higher level of 'mega-region-to-mega-region' cooperation.

REGIONAL AGREEMENTS: WHO SIDES WITH WHOM?

Globalization has failed to provide the expected level of open trade and equity in the distribution of resources and innovation in the global economy. In recent years, countries have increasingly gravitated towards regional trade agreements — they create favorable conditions for cooperation not only in trade, but also in other areas, including innovation.

As of October 15, 2022, 355 different regional trade agreements have been registered with the WTO. These include Free Trade Agreements (FTA) as well as Economic Integration Agreements (EIA). Signatories to these agreements may include non-WTO member countries as well.

Mega-regional trade agreements have become a certain type of response to the stagnating system of international trade regulation within the WTO. Established MRTSs include the Transatlantic Trade and Investment Partnership (TTIP) that includes all EU countries and the USA.

The Trans-Pacific Partnership (TPP) includes Australia, Brunei, Vietnam, Canada, Malaysia, Mexico, New Zealand, Peru, Singapore, Chile, Japan (all APEC members). The Regional Comprehensive Economic Partnership (RCEP) brings together 10 ASEAN member states and 6 countries that have active free trade agreements with ASEAN. The African Continental Free Trade Area (AfCFTA) includes 54 member countries of the African Union.

Mega-regional agreements focus on trade, but also cooperate on innovation and can contribute to the innovation potential of each other, that of the entire region, and the global economy as a whole.

HOW TO ASSESS INNOVATION POTENTIAL?

From 1996 to 2021, investment in innovation worldwide has doubled. The innovation investment remained quite high even during the pandemic. According to the Global Innovation Index (GII) of the World Intellectual Property Organization (WIPO), high-tech industries continue to allocate funds to research and development (R&D). The leaders in the Global Innovation Index are Switzerland, Sweden, and the USA. China ranks 12th. This country ranks high on the GII in terms of the number of patents, trademarks, and industrial designs. However, China still lags behind other countries in areas such as human capital, higher education enrollment, market sophistication, and business sophistication.

The development of the innovation potential of the world economy is associated with the creation and commercialization of innovations. Its development requires a high level of human potential, a strong innovation system, and appropriate infrastructure. As noted above, globalization has not produced the expected effect in terms of dissemination of innovations, therefore countries are gradually switching to mega-regional formats of cooperation. It is a forced move, and its consequences should be taken into account when developing and adjusting national development strategies.

To assess the innovation potential of member countries of mega-regional trade agreements, the following system of indicators is used:

- research and development spending, % of GDP;
- patent filings, units;
- number of granted patents, units;
- impact of scientific publications (the Hirsch index);
- number of researchers per 1 million people;
- high-tech exports, % of total trade;
- intellectual property payments, % of total trade;
- employment in science-intensive industries, %;
- university–industry R&D collaboration.

An active expansion or, conversely, a reduction of the innovation

sphere is evidenced by such indicators as R&D spending and the share of high-tech exports of a country. The optimal share of R&D spending is at least 2% of GDP.

Thus, in the TTIP countries, this indicator is above the average and has been increasing in recent years. The leaders in this area are Germany, Austria, Belgium, Finland, Sweden, and the United States — their share of R&D spending in 2019–2021 was more than 2.8% of GDP. The countries with the lowest R&D spending are Lithuania, Latvia, Malta, and Cyprus (less than 1% of GDP).

A number of TPP and RCEP countries are also characterized by high levels of R&D spending. Australia has an annual research and development spending of 1.8% of its GDP; Malaysia and New Zealand, 1.4%; Singapore, more than 1.9%; Japan, more than 3.2%; China, 2.2%, the Republic of Korea, 4.5%. Most member countries of mega-regional trade agreements have a low share of R&D spending, less than 1% of GDP. For example, in Mexico, Vietnam, Peru, Chile, Myanmar, this indicator ranges from 0.1 to 0.4% of GDP.

Member countries of the African Continental Free Trade Area have an R&D spending of less than 0.5% of GDP.

Another indicator of innovation activity and technological development of countries is the number of international patent applications filed under the Patent Cooperation Treaty. This is the largest international agreement on mutual recognition of patents, which ensures patent rights protection for inventions in all 156 states. As many as 276,000 international patent applications were filed under the WIPO PCT system in 2020, which is 4% more than in 2019. China was the leading user of the WIPO PCT system (68,720 applications filed). It is followed by the USA (59,230), Japan (50,520), the Republic of Korea (20,060), and Germany (18,643).

According to a WIPO report, despite the pandemic, 2021 did not see a decline in patent activity. In 2020, 3.3 million patent applications were filed worldwide, with Asia accounting for 2/3 of them. China led by a wide margin (45.7%), followed by the US (18.2%) and then Japan (8.8%). For a more objective assessment of countries' patent activity, WIPO uses a relative indicator of the number of patent applications filed by residents per unit of GDP (per 100 billion dollars). Moreover, countries rank in the top ten provided that their GDP exceeds 25 billion in PPP-adjusted dollars, and they have more than 100 patent applications filed by residents.

WIPO trends show that the leaders in the number of patent filings are member countries of the Transatlantic Trade and Investment Partnership (TTIP) and the Regional Comprehensive Economic Partnership (RCEP). Thus, in 2020, China filed 1,441,085 patent applications; Japan, 423,254, the Republic of Korea, 260,610. TTIP countries filed over 800,000 patent applications in 2020. The USA (495,883 applications), Germany (168,005) and France (64,280 applications) are the leaders in the number of patent

applications filed among TTIP countries.

The activity of member countries of the Trans-Pacific Partnership and the African Continental Free Trade Area in the number of patent filings and granted patents is below average. In 2020, the highest number of patent filings was accounted for by Australia (11,906), Canada (23,846), the Republic of Korea (260,610), and Singapore(7,946).

The United States, China, Japan, the Republic of Korea, and Germany are the leaders in the number of granted patents.

The Hirsch index is a comprehensive assessment of the number of scientific publications and their impact. This is a quantitative indicator of the productivity of both scientists and the country as a whole. According to the 2021 edition of the Global Innovation Index, the highest-ranking countries by the Hirsch index are the USA, Switzerland, Japan, Germany, the Netherlands, France, Sweden, China, and Canada.

One of the qualitative indicators of the innovation system development is high-tech exports, which generate the highest income and give fresh impetus to economic development.

TTIP member countries have high and stable growth rates of high-tech exports. It's all about high volumes of high-tech outputs and their competitiveness in the domestic and foreign markets, as well as economic integration under a trade agreement. According to the 2022 edition of the Global Innovation Index, the share of high-tech exports in TTIP countries ranges from 0.7% to 19.7% of total trade. The leaders in this area are Denmark (19.7%), the Netherlands (13.0%), Hungary (14.9%), France (11.2%) and the Czech Republic (23.8%). In the United States, this indicator has been growing in recent years and now is at 9.4% (5.8% in 2019).

The RCEP countries show a positive trend and have a high share of high-tech exports. For China it is 28.0%; the Republic of Korea, 28.4%, Japan, 12.0%, Singapore, 26.4%, the Philippines, 31.4%. In percentage terms, the indicators of these countries are significantly higher than those of the Transatlantic Trade and Investment Partnership member states.

An important indicator reflecting the innovation potential of the economy is the number of researchers per million people. In most countries, it increased in 2016–2022. This indicator was highest in the TTIP countries (on average more than 3 thousand researchers per 1 million people), which is accounted for, in particular, by a significant share of R&D spending and favorable innovation policies. In the RCEP and TPP countries, the number of researchers grew as well. Thus, the Republic of Korea has 7980.4 researchers per 1 million people; Singapore, 6802.5; Japan, 5331.

The growth of this indicator contributes to an increase in other indicators reflecting the innovation potential and commercialization of innovations — the number of patent applications filed, the number of patents granted, the Hirsch index, the share of high-tech exports, etc.

The innovation potential of the economy is also characterized by employment in science-intensive industries as a percentage of total

employment. This indicator varies greatly in different member countries of mega-regional trade agreements. Thus, in the TTIP countries, the employment in science-intensive industries is high — on average more than 40% (USA, 48.0%; Latvia, 40.7%; Lithuania, 42.2%), and in some it exceeds 50% (Luxembourg, 57.7%; Sweden, 52.3%). In the RCEP and TPP countries, this indicator differs by state, so there is no overall positive trend. For example, in Mexico, employment in science-intensive industries is 19.5%; in Myanmar, 5.5%, in the Republic of Korea, 39.5%. We can make a conclusion that the percentage of employment in science-intensive industries is directly related to the number of researchers per 1 million people and R&D spending. The higher the R&D spending, the higher the level of development of innovations, the better the yield of research activities, and the more successful commercialization of innovations.

A comparison of member countries of mega-regional trade agreements shows differences in their innovation activity. Obviously, unless there's a mechanism for innovation exchange, it will be very difficult (or even impossible) to close the gap between countries and move towards innovation-based sustainable development. And this, in turn, can have an impact on the rate of development of the innovation potential of the entire world economy.

Another factor for the development of innovation potential is the activity of multinational corporations (MNCs). A new global trend is joint R&D activity by companies, sometimes even competitors, from different countries. Since innovation activity is associated with high risks, state support or guarantees are needed at all levels. Having large investment funds, MNCs can mitigate such risks on their own. However, they are also interested in state guarantees that can protect them from excessive losses. Despite the increasingly high risks, the innovation activity of leading companies is growing rapidly, as it is required for successful competition on the global market. And, above all, this is manifested in the number of international patents for intellectual property.

The leaders in this area are major companies, such as Huawei (5464 published PCT applications), Samsung Electronics (3093), Mitsubishi (2810), LG Electronics (2759), Qualcomm (2173). Leading high-tech MNCs spread their influence over entire regions, as they have manufacturing facilities in many countries. Apple has manufacturing facilities in the countries of TTIP (Germany, France, Italy, Austria, the Czech Republic, etc.), TPP (Vietnam, Singapore, Japan, Malaysia), and RCEP (China, Japan, Singapore, Thailand). Samsung Electronics also has manufacturing facilities in TTIP (Poland, Hungary, Germany, Slovakia, Italy), TPP, and RCEP (Vietnam, Malaysia, Thailand). Intel moves its manufacturing facilities to Thailand, Mexico, Taiwan, Malaysia, Vietnam, China (RCEP and TPP countries).

Currently, the EAEU is actively making a transition to innovation-based development. This can be facilitated, in particular, by joint R&D projects.

Innovation-driven development in the EAEU countries is implemented in different ways. For example, the R&D spending in Armenia in 2020 was 0.2% of its GDP. As of 2018, exports of high-tech goods accounted for 7% of industrial exports. In 2020, there were 65 organizations involved in R&D activity (72 in 2012). The number of staff employed in research and development has decreased by 31% since 2010. In 2020, the Hirsch index was at 11.2. In terms of the number of patent filings, Armenia is also among the outsiders with only 135 patent applications filed and 106 patents granted.

From 2016 to 2020, Kazakhstan's R&D spending fell to 0.1% of its GDP, and since 2017, its GDP has also been declining. In 2020, Kazakhstan had 667 researchers per 1 million people. In the same year, Kazakhstan filed 1,102 patent applications (334 in 2018 and 945 in 2019), and its Hirsch index was 5.1. Kazakhstan's high-tech exports account for 3.2% of total trade.

In Kyrgyzstan, R&D spending was 0.2% of GDP. In 2020, the number of scientists employed in R&D was 596 per 1 million people, and 127 patent applications were filed. In 2016–2020, the number of patent applications declined along with the share of high-tech exports — in 2020, it amounted to 1% (2.3% in 2019).

Russia's R&D spending is around 1% of its GDP. In 2020, Russia had 2,784 specialists per 1 million people employed in the development and creation of new knowledge, products, processes, methods, or management systems for respective projects. In the same year, Russia filed 30,282 patent applications, the Hirsch index was 38.2, and high-tech exports accounted for 2.4% of total trade.

In the Republic of Belarus, the focus on innovation leads to an increase in the number of patent applications filed. In 2020, the patent activity slightly decreased with a total of 394 patent applications filed (547 in 2018). However, the main priority for Belarus now is to maintain a steady, even though not very high, annual rate of all innovation activity indicators. In general, the EAEU countries have a low share of R&D spending: in most countries it is under 0.5% of their GDP. This leads to a low number of innovations, their high cost, and low demand. As a result, most of the EAEU countries adopt foreign technologies, rather than develop their own.

WHAT IS REQUIRED TO DEVELOP THE INNOVATION POTENTIAL OF THE EURASIAN REGION?

1. Return to scientific cooperation between the EAEU member states. Innovation activity in the region can be incentivized by creating a digital platform for research and development and by simplifying the procedures for registering scientific projects, teams, etc. The first step on this path is the creation of the Eurasian Association for Promotion of Scientific Research (EAPSR) in 2016.

2. When passing a resolution on the accession of a new member

to the EAEU or on trade and economic cooperation with new partners, it is necessary to assess their potential contribution to increasing the innovation potential. A case in point is the 2018 Agreement on Economic and Trade Cooperation Between the Eurasian Economic Union and its Member States and the People's Republic of China. It provides for the development of sectoral cooperation in the field of advanced technologies, innovations, transport, and logistics infrastructure.

3. Creation and development of innovation funds at the level of universities, R&D institutions, companies. Typically, countries with a high number of patent applications have high R&D spending. However, unfortunately, they cannot constantly increase spending on science and education. It is important to balance the expenditure of the national budget and create conditions for attracting investment in R&D from non-government sources. The Republic of Belarus, for example, already has such examples. The China–Belarus Industrial Park «Great Stone» has a successfully operating Innovation Center for R&D Commercialization. The replication of best practices in other legal forms will attract more talented scientists and entrepreneurs and contribute to achieving innovation breakthroughs.

Developed countries restrict access to their innovations. The barriers they impose force developing countries to join their efforts in trade, investment, and innovation on a regional basis. Mega-regional trade agreements allow countries to achieve a spillover effect to develop the innovation potential of mega-regions. The study of the innovation potential of the world economy from the perspective of regional innovative cooperation between countries allows us to significantly expand our understanding of the factors that have an impact on global economic and innovation-related processes. Mega-regional trade agreements of countries should be perceived as informal points of innovation-driven growth in the world economy, and the Eurasian Economic Union strives to become one of them.

REFERENCES

1. These are the global innovation powerhouses of 2021 // World economic forum. URL: https://www. weforum.org/agenda/2021/10/global-innovation-powerhouses-2021/ (Accessed 13 September 2022).

2. WIPO: IP in Facts and Figures (2021) // the World Intellectual Property Organization. URL: https://tind.wipo.int/record/44654 (Accessed 13 September 2022).

3. World Bank Open Data. URL: https://data.worldbank.org/ (Accessed 12 December 2020).

4. The World Intellectual Property Organization. URL: https://www.wipo.int/portal/ru/ (Accessed 10 October 2022).

5. Dutta, S. Global Innovation Index 2021. Who will finance innovation?

2021. URL: https://www.wipo.int/global_innovation_index/en/2021/ (Accessed 19 October 2022).

6. World Data Atlas: Countries // Knoema. URL: https://knoema.ru/atlas (Accessed 16 October 2022).

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Conflict of interest: the authors report no conflict of interest.

Funding: the study was not sponsored.

For citation: Natalya V. Yurova, Anastasia I. Kiselevich (2022). Development of innovative potential in the conditions of regionalization of the world economy, 1(1), pp. 79-87.

Submitted for publication: 13.09.2022 Accepted for publication: 22.09.2022