RUDN Journal of Economics
Вестник РУДН. Серия: Экономика
ISSN 2313-2329 (Print); ISSN 2408-8986 (Online)
2022 Vol. 30 No. 2 231–241
http://journals.rudn.ru/economics

DOI: 10.22363/2313-2329-2022-30-2-231-241
UDC 338.339

Research article / Научная статья

International technology transfer as an effective tool of export-oriented import substitution in Russia

Valentina V. Kalygina

Peoples' Friendship University of Russia (RUDN University),
6 Miklukho-Maklaya St, Moscow, 117198, Russian Federation

kalygina-vv@rudn.ru

Abstract. The aim of this study is to determine the prospects of the international transfer technologies in the Russian market. The sanctions imposed on Russia by the EU countries and the United States have led to a clear understanding of the danger of dependence on imports. In 2014, an import substitution program was launched by the Russian government, and it has already shown the positive results. Some industries showed the increasing the share of domestic products by 15–25% Nevertheless, simple import substitution can also have a negative impact on the enterprise. For example, it can decrease the productivity and the product quality. Not all enterprises can offer competitive products without imported components, technologies, and trained personnel, even for the domestic market. No doubt, the interests of domestic producers must be considered in the first place, but it is necessary to make sure that Russian products are also interesting for the foreign markets. That is why the government set the task of moving from the policy of simple import substitution to the policy of export-oriented import substitution. Russia should improve its performance in the export of non-resource goods. Unfortunately, simple localization can be quite risky for the economy. Russia should be more actively involved in international technology transfer. The article examines the weaknesses and strengths of the Russian innovation system, as well as the opportunities that open for Russian business and Swiss companies, that transforms innovative and patented technologies developed by Swiss universities and international research centers into global successful businesses.

Keywords: transfer technology, export-oriented import substitution, localization, non-resource export, Russian innovation system, sanctions, technological modernization

Article history: received 10 January 2022; revised 25 January 2022; accepted 10 February 2022.

For citation: Kalygina, V. V. (2022). International technology transfer as an effective tool of export-oriented import substitution in Russia. *RUDN Journal of Economics, 30*(2), 231–241. https://doi.org/10.22363/2313-2329-2022-30-2-231-241

Acknowledgements: The research article is prepared in the frame of the project «“The role of international strategic alliances and partnerships for the development of export-oriented import substitution in Russia in the context of pandemic and post-pandemic reality” (project N).

Международный трансфер технологий как эффективный инструмент экспортоориентированного импортозамещения в России

В. В. Калыгина

Российский университет дружбы народов,
Российская Федерация, 117198, Москва, ул. Миклухо-Маклая, д. 6
✉ kalygina-vv@rudn.ru

Аннотация. Целью данного исследования является определение перспектив международного трансфера технологий на российском рынке. Санкции, введенные против России странами ЕС и США, привели к четкому пониманию опасности зависимости страны от импорта. В 2014 г. правительство России запустило программу импортозамещения, и она уже дала положительные результаты. Некоторые отрасли показали увеличение доли отечественной продукции на 15–25 %. Тем не менее простое импортозамещение также может оказать негативное влияние на предприятие. Так, например, это может снизить производительность и качество продукции. Не все предприятия могут предложить конкурентоспособную продукцию без импортных комплектующих, технологий и обученного персонала даже для внутреннего рынка. Безусловно, интересы отечественных производителей должны учитываться в первую очередь, но необходимо сделать так, чтобы российская продукция была интересна и для внешних рынков. Именно поэтому правительство поставило задачу перехода от политики простого импортозамещения к политике экспортоориентированного импортозамещения. Россия должна улучшить свои показатели по экспорту несырьевых товаров. К сожалению, простая локализация может быть достаточно рискованной для экономики. Россия должна активнее участвовать в международном трансфере технологий. В статье рассматриваются слабые и сильные стороны российской инновационной системы, а также возможности, которые открываются для российского бизнеса и швейцарских компаний, трансформирующие инновационные и запатентованные технологии, разработанные швейцарскими университетами и международными исследовательскими центрами, в глобальный успешный бизнес.

Ключевые слова: трансфер технологий, экспортоориентированное импортозамещение, локализация, несырьевой экспорт, российская инновационная система, санкции, технологическая модернизация

История статьи: поступила в редакцию 10 января 2022; проверена 25 января 2022; принята к публикации 10 февраля 2022.

Для цитирования: *Kalygina V. V.* International technology transfer as an effective tool of export-oriented import substitution in Russia // Вестник Российского университета дружбы народов. Серия: Экономика. 2022. Т. 30. № 2. С. 231–241. https://doi.org/10.22363/2313-2329-2022-30-2-231-241

Благодарности: Статья подготовлена в рамках проекта «Роль международных стратегических альянсов и партнерств для развития экспортоориентированного импортозамещения в России в условиях пандемийной и постпандемийной реальности» (номер проекта).

Introduction

The beginning of the active development of the import substitution in Russia is usually attributed to 2014 after the imposition of sanctions by the European Union and the United States. That time it was made clear that the dependance on import was becoming extremely dangerous. However, it is not enough just replacing imported goods with the goods of local producers. The country is faced with the task of increasing the global competitiveness of domestic products and increasing non-resource non-energy exports to $ 250 billion by 2024.

At State Council Presidium meeting Vladimir Putin has outlined the main task. It is not enough just to replace imported goods with Russian-made goods by any means possible. It is necessary to organize mass production of high-quality Russian-made goods that come at an acceptable and economically justified cost and can compete as equals with foreign equivalents on the market here and abroad[1]. So, the main aim of the import substitution is not only producing the goods for the domestic needs by its own, but also export these goods. So the import substitution is becoming export-oriented. But the most import-dependent are exporting enterprises. Based on the research conducted by the Bank of Russia more than 70 % enterprises are dependent on the import equipment to modernize or expand their capacities to supply products to export markets, and 65 % enterprises demonstrated a high import dependence in terms of raw materials, other materials, and components. Moreover, exporting companies use them to some extent in the production process more than non-exporters (Karlova N., Puzanova E., 2021).

A high degree of dependence on imports will not allow Russian enterprises quickly create products that meet international standards. There are three possible strategies which can be seen as the way out of this situation: 1) localization of foreign enterprises, which implies the transfer of high-tech enterprises to the territory of Russia. Although the localization of production creates employment opportunities, it is not always good for the country's economy. Localization should primarily involve the ability to use new technology, and not just create assembly plants in the country. But such strategy can be quite risky because a foreign company can leave the market at any time and take all the technology with it; 2) the development of the Russian technologies using the previous know-how. But, accordance to the Chairman of All-Russia Business Association "Delovaya Rossiya" A. Repik, this strategy will be very expensive and long. And then a lot of previous know-how were patent-free[2],

[1] President of Russia official web site, 2015

[2] Nikolaeva D. (2016). The interview with the Chairman of All-Russia Business Association "Delovaya Rossiya" ("Business Russia"). Komersant, 27.02.2016. Retrieved from https://www.kommersant.ru/doc/2902055

and 3) international technology transfer. In that case Russian companies gain new technologies, knowledges, know-how etc.

This strategy seems to be the most effective for the development of export-oriented import substitution. As example of the positive experience, we can mention Japanese economy. After World War II, it was through technology transfer that Japan very quickly turned not into an importer of these technologies, but into a major exporter. No doubt, there are several problems that can hinder Russia's participation in international technology transfer. This is the general geopolitical situation, and the economic crisis, the lack of a coherent scheme for the transfer of technologies, and the still unstructured interaction between business and science, both domestically and abroad, and often the unwillingness of foreign companies to participate in the transfer of technologies. In this connection, it is necessary to analyze the prospects of the Russian market for the development of international technology transfer to prove its prospects both for Russia and foreign companies.

Methods

Methods that gave been used in the research: induction and deduction, analysis, generalization, synthesis, content analysis of open sources of information: academic publications; interviews with the main experts of the Russian transfer technologies market; survey by HSE on export and import of technologies in Russia (Gokhberg et al., 2021), the analytical note with the results of a survey of the Russian enterprises by the Bank of Russia, Global Innovation Index-2020, Doing Business 2020 by The World Bank.

Literature review

There are a significant number of studies by foreign and Russian scientists deal with the technology transfer. The formation of interaction between technology transfer participants is covered in the works of Larsson M., Dalziel M., Bennet J. (Larsson, Wall, Norstorm, Crncovic, 2006; Dalziel, 1994; Bennett, 1996); the aspects of international technology transfer, as well as the features of the impact of technology imports on the export of enterprises are considered in the works of Bas, Feng L. (Bas, Strauss-Kahn, 2014; Feng, Li, Swenson, 2012;); the technology transfer opportunities for developing countries are covered in the works of Akubue A., Malik K., Ming W. (Akubue, 2002; Malik, Wickramasinghe, 2013; Ming, Xing, 1999). The prospects of using the transfer of foreign technologies as a measure for the formation of the innovative economy of Russia are considered in the scientific work of Vorontsova O. (Vorontsova, Savon, Gritzunova, 2018). The features of the import substitution in Russia, the problems of dependence of the Russian economy on the import of technologies and the possibilities of transfer of technologies in Russia are considered in the works Gnidchenko A. (2016), Terebova S., Simachev Y., Salitskaya E, Solovieva Yu. (Gnidchenko et al., 2016; Terebova, 2017; Simachev, Kuzyk, Zudin, 2016; Salitskaya, 2018, Solovieva, 2019), Chernikov S. (Chernikov, Konovalova, 2016).

Findings

The Russian Federation is the largest country in the world. It is almost 9,000 km (5,600 miles) east-west, and almost 4,000 km (2,500 miles) north-south. Russia covers one seventh of the world's land mass and spans eleven time zones. Russia is a country that is well endowed with a variety of naturally occurring minerals. Russia's economy has a modern infrastructure, high-tech production and a diverse range of industries, supplemented by state-supported business incentives.

The import substitution program has been implemented in Russia since 2014. However, since mid-2016, the course of Russia's trade and economic policy gradually began to turn towards the development of exports, and in 2018 President Vladimir Putin set the task of increasing the export of non-primary energy products. In accordance with the Passport of the National Project «International cooperation and export» non-resource non-energy exports should be increased to $250 bln US doll. by the end of 2024 (with a base value of $ 135.1 bln US doll. at the end of 2017).

However, it is the exporters depend on the import of intermediate equipment, raw materials, materials, and components most often. Companies that export their products have a higher level of import dependence. Among exporters, only 25 % of enterprises do not use imported raw materials, other materials, or components (Karlova, Puzanova, Bogacheva, 2021). This is primarily due to a high degree of competition in international markets, which necessitates the production of higher quality products. Thus, import substitution becomes export-oriented and requires a search for new approaches. This is largely due to the fact the competition in the international markets is very intense that entails the necessity to produce the products of higher quality. So the import substitution is becoming export-oriented and it requires from the enterprises the new strategies.

It is technology transfer that can be an effective tool for the export development and take on the task of the import substitution without loss of quality for the consumers[3].

There are opportunities for cooperation in the field of international technology transfer in various sectors of economy including advanced engineering, biotechnology and pharmaceuticals, consumer goods, education, energy, mining, and telecommunications and etc.

In Russia, the concept «technology transfer» appeared relatively recently. Technology transfer has been actively developing due to:

1) sanctions imposed against Russia by USA and EU in 2014;
2) technological backwardness of domestic production in particular branches of Russian economy;
3) the need to develop the competitiveness of industries in the Russian and world markets.

[3] Nikolaeva D. (2016). The interview with the Chairman of All-Russia Business Association "Delovaya Rossiya" ("Business Russia"). Komersant, 27.02.2016. Retrieved from https://www.kommersant.ru/doc/2902055

For innovative development and the development of technology transfer in Russia, it is necessary to increase the intensity of the exchange of high technology products. According to estimates, innovative activity in the field of technological innovation is one of the key indicators of innovative activity, characterizing the potential for technological modernization and innovative development of the Russian economy. In most areas of the Russian economy, this activity is low, both due to the economic crisis, as well as the action of the sanctions and counter-sanctions regime, and for the following reasons:

- scientists, as a rule, do not know the market and hardly imagine how the scientific results can be transformed into a marketable product;
- managers are practically not familiar with the nature of modern science, the structure and the most important areas of its activities, breakthrough achievements. They are not always able to judge the reliability of the scientific results proposed for implementation and their technological efficiency;
- the state called upon to establish the rules for the transfer of technologies, has little idea of the real atmosphere of the life of scientific laboratories, the conditions for conducting research and development of technologies, the possible consequences of the implementation of adopted legislative provisions to produce scientific knowledge and its commercialization.

So in Russia (except some industries) the practice of technology transfer has not distributed in due course. Fifteen years ago, if there was a necessity for some products they were just imported. That time there were attempts to resolve the issue through the localization of production and by attracting foreign direct investment. But the localization system has not acquired a mass character, and moreover Russian companies have not acquired their competencies. According to the President of Russia, Vladimir Putin, technology transfer is now one of the priority areas: "Recently an idea was raised to establish an effective system for the transfer of foreign technologies. We have experience in the successful transfer of technologies in the pharmaceutical industry, the automotive industry, and the production of consumer goods, but it is important to put such work on a systematic basis, to use the capital of development institutions"[4].

Russia is inferior to many countries in terms of innovative development. In 2013–2016 Russia has managed to significantly improve its position in the ranking, moving from 62nd to 43rd place. This period coincided with the implementation of an active state innovation policy. In recent years, there has been a trend towards the stagnation of innovative activity, which is reflected in the absence of any significant changes in the indicators of the country in the Global Innovative Index 2020[5].

According to the Index, the effectiveness of innovation system in Russia is below the expected level at the current values of GDP per capita and investment in science, technology and innovation. Lagging behind the leading countries is traditionally

[4] President of Russia official web site, 2015

[5] Cornell University, INSEAD, and WIPO (2020). The Global Innovation Index 2020: Who Will Finance Innovation? 13th Edition, Ithaca, Fontainebleau, and Geneva.

determined by the low efficiency of the innovative structure that create conditions for entrepreneurial and creative activity. In the context of the crisis caused by the COVID-19 pandemic and the expected reduction in funding sources, further government support for research and development, innovation (especially in the sector of small enterprises and start-ups) should be a priority for leading countries (Gokhberg, 2020).

The volume of Russian exports and imports of technologies at current prices increased over 2001–2019 respectively, 14.6 and 12.2 times, reaching in 2019 the maximum values for the entire period under consideration — 3.5 (Figure 1) and 4.8 billion dollars (Figure 2). The total foreign trade turnover of technologies in Russia in 2019 amounted to $ 8.4 billion.

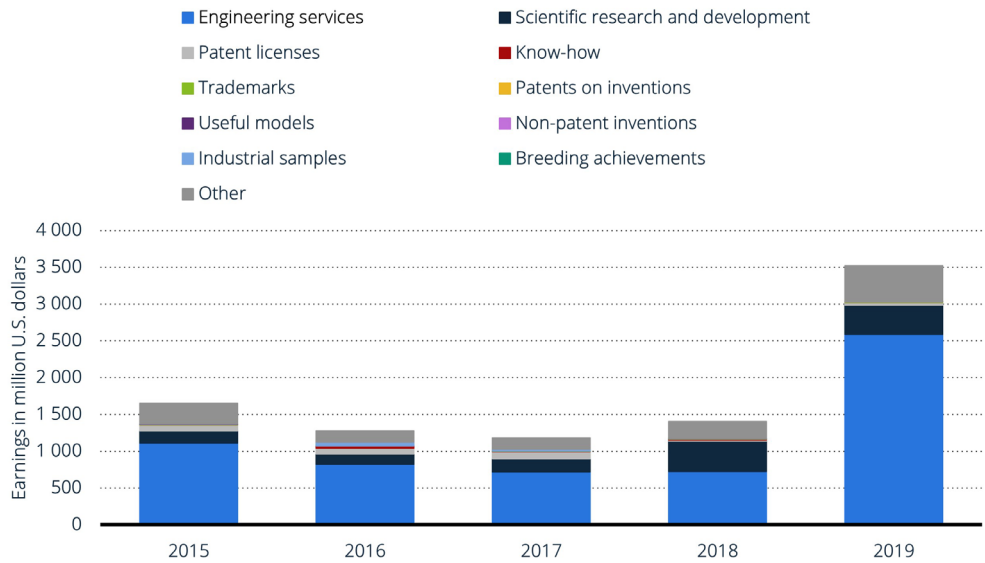

Figure 1. Earnings from technology exports in Russia from 2015 to 2019, by type, million U.S. dollars

Source: Statista, 2021, Survey by Higher School of Economics; Russian Federal State Statistics Service; Ministry of Economic Development of the Russian Federation.

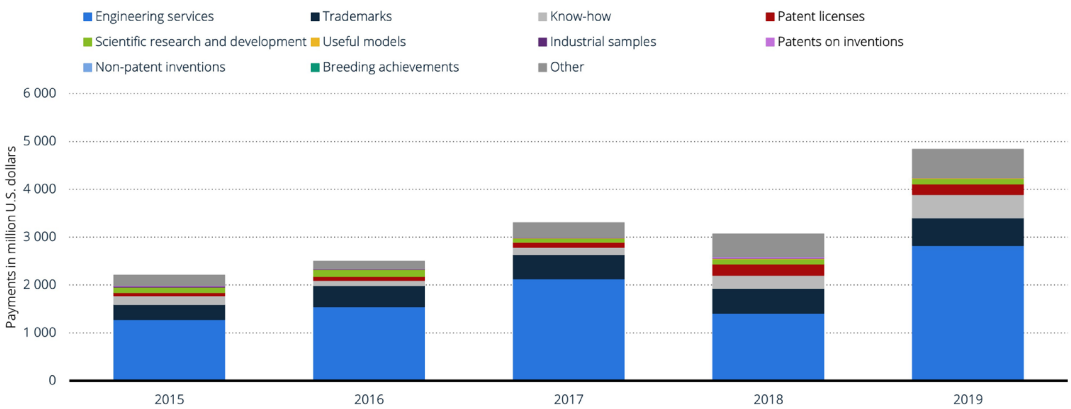

Figure 2. Payments for technology imports in Russia from 2015 to 2019, by type, million U.S. dollars

Source: Statista, 2021, Survey by Higher School of Economics; Russian Federal State Statistics Service; Ministry of Economic Development of the Russian Federation.

Compared to 2018, export increased 2.5 times, with a more moderate increase in payments on imports — by 57.8 %. This narrowed the gap between exports and imports, but not enough to change the passive nature of the balance: the deficit in the balance of payments for technology in 2019 amounted to $ 1.3 billion ($ –1.7 billion in 2018).

A problem in the development of Russian foreign trade in technologies on a mutually beneficial financial basis remains a significant predominance in the export of unprotected results of intellectual activity (RIA) and services of a technological nature, the cost of which is significantly lower than the cost of objects of exclusive rights. Engineering services dominated in the volumes of technological exports and imports of Russia in 2019 (73.5 and 58.4 %, respectively). The share of receipts from exports under agreements, the subjects of which were protected industrial property, amounted to only 1.3 %, while in the structure of payments for the import of similar objects, their share reached 27 %.

Since 2013, Russian technological exports have been predominantly oriented towards the markets of OECD countries, with share varied at the level of 60–70 % over five years. In 2019, the share of OECD countries in Russian export transactions amounted to 66.7 % (Figure 3). The largest volumes of foreign exchange earnings in the country were accounted for by Germany ($ 1.4 billion), the United States ($ 275.6 million), Great Britain (124.7 million) and Switzerland ($ 118.9 million).

The share of the CIS in the country's technological exports in 2019 did not exceed 4 %. Among the partner countries, Belarus and Kazakhstan stand out ($ 44.4 million and $ 41.4 million, respectively), which are more actively purchasing Russian RIA and services. The largest importers of the Asian region are China and India, which accounted for significant amounts of transfers to Russian exporters in 2019 ($ 369.7 and 147.9 million).

OECD countries are the leaders in the structure of Russian technology imports: their share in 2019 reached 81.3 % of the volume of payments. The share of the CIS was only 1.2 %; other countries — 17.6 %. The largest transaction flows from Russia were directed to the Czech Republic ($ 820 million), Germany (665.9), the USA (564.1), China (400), France (346.5), the Netherlands (221.7), Switzerland (195), Turkey (194.7), Great Britain (177.9), Korea (162.2) and Cyprus ($ 133.3 million) (Gokhberg, Ditkovskiy, Evnevich et al., 2021)

Now Russia does not abandon the introduction of foreign technologies into its production but assumes internationalization through building partnerships and joint business and innovation projects. In this connection it is supposed that there is a very promising opportunities for the cooperation with the European technology licensing companies. Specially it concerns to the Swiss companies. Switzerland, whose innovation system has been recognized as the best in Europe for several years in a row, is one of the few countries striving to export not only goods, but also ready-made technological solutions. This is exactly what Russia needs, which in the situation of the sanctions imposed against it is trying to stablish import substitution. There are a lot of companies in Switzerland that transforms innovative and patented technologies developed by Swiss universities and international research centers into global successful businesses. There are some reasons why these companies can be in demand in the Russian market. We can highlight the following ones.

1. Swiss companies are already profiting from participating in the transformation of the Russian economy. The policy of import substitution for them is not an obstacle, but a competitive advantage since Russian countersanctions did not affect the Swiss economy. Moreover, not only big companies develop their business in Russia but medium and small enterprises as well. Switzerland holds a unique position for Russia among the European countries. Although this country, not being a member of the EU, joined the anti-Russian sanctions, countersanctions were not introduced against it.

2. More and more Russian companies are looking for access to foreign markets and are proving their competitiveness at the international level. Many of them see Switzerland as a "window" to Western Europe. Swiss companies could be such a "window" in the transfer technology market.

3. Switzerland is a leader of the Global Innovation Index 2020. Thus, Swiss companies in the high-energy technology market enjoy well-deserved authority and trust. This fact will help the company find reliable partners in the Russian market.

Swiss companies in their turn are looking for promising items under development in Russian universities and the scientific organization and help their authors to commercialize their ideas. They do not just sell or buy some technology. They sell turnkey solutions, strive to conduct joint research, and invest in them.

To achieve its goals, the companies can delivery the patents, IP and related know-how from Switzerland to Russia for further introduction to the European countries; develop educational projects with Russian universities.

Since technology transfer implies mandatory cooperation with research institutions and universities, it is possible to create cooperation between Swiss and Russian universities in the field of exchange of scientific experience, creation of joint scientific projects, development of joint technologies, as well as support and commercialization of scientific developments of universities.

Entering the Russian market Swiss companies get:

- access to the new markets, primarily CIS countries;
- creation of joint ventures (strategic partnership);
- access to new technologies, products, services;
- joint business projects;
- conducting joint research and development (R&D);
- adaptation of products / technologies for requirements of new markets;
- the attraction of foreign experts and highly qualified specialists;
- reduction / sharing of risks (incl. financial).

Conclusion

In July 2019, McKinsey released a report on technologies that could change lives, businesses and the global economy in the coming years, including mobile internet, self-driving cars and cutting-edge genomics. According to analysts' forecasts, by 2025 the potential economic effect from the introduction of such technologies will be in the range of $ 14–33 trillion. This analysis is based on an in-depth analysis of key potential benefits, including better products and lower prices. The results of the report are shown in Figure 3.

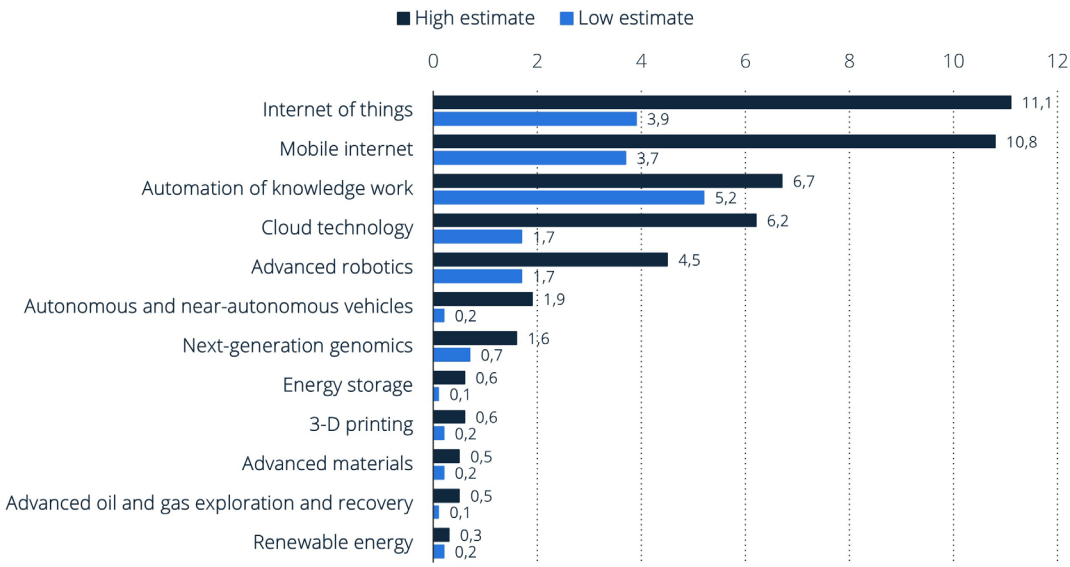

Figure 3. Estimated potential economic impact of technologies across sized applications in 2025, $ trillion

Source: McKinsey. The top trends in tech, 2019. Retrieved from https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20top%20trends%20in%20tech%20final/Tech-Trends-Exec-Summary

In accordance with this research Russia should concentrate its efforts on such areas of technologies as Mobile Internet, Internet of Things, Clouds, Advanced robotics and etc. Traditional sectors of the economy also need innovative technologies. The development of these sectors will also depend on the transfer technologies.

Given the current situation, no doubt, it is hardly worth counting on a quick establishment of relations in this area. But considering the mutual interest in the developing of the transfer technologies both Russia and Switzerland we believe that the cooperation in these fields would be restored.

References

Akubue, A., (2002). Technology Transfer: A Third World Perspective Technology Transfer to the Third World. *The Journal of Technology Studies*, *28*(1), 14–21.

Bas, M., & Strauss-Kahn, V. (2014). Does Importing More Inputs Raise Exports? Firm-Level Evidence from France. Review of World Economics, *150*(2), 241–275.

Bennett, J. L., (1996). Building Relationships for Technology Transfer. *Communications of the ACM*, *39,* 9.

Chernikov, S. Yu., & Konovalova, Yu. A. (2016). Russia-India High Technology Cooperation. *Russian Journal of Industrial Economics*, *2,* 99–107. (In Russ.)

Dalziel, M. (1994). Effective university-industry technology transfer. *Canadian Conference on Electrical and Computer Engineering, 1994, Conference Proceedings*, *2,* 743–746.

Feng, L., Li, Z., & Swenson, D. (2012). The Connection between Imported Intermediate Inputs and Exports: Evidence from Chinese Firms. Working Paper 18260. Cambridge. *MA: National Bureau of Economic Research, 46.* Retrieved from https://www.nber.org/system/files/working_papers/w18260/w18260.pdf

Gnidchenko A. A. (2016). Import substitution in Russian industry: current situation and prospects. *The Journal of the New Economic Association, 4(*32), 154-161 (In Russ.)

Gokhberg, L. Global Innovative Index-2020. (2020). Science and Technology Indicators in the Russian Federation. In *National Research University Higher School of Economics.* Moscow: HSE.

Gokhberg, L., Ditkovskiy, K., & Evnevich, E. (2021). Export and Import of technologies. Science and Technology Indicators in the Russian Federation. In *National Research University Higher School of Economics* (p. 353). Moscow: HSE.

Karlova, N., Puzanova, E., & Bogacheva, I. (2021). What is hindering Russian exports: the results of a survey of enterprises. *Bank of Russia. Analytical Notes. Official website of the Bank of Russia*. Central Bank of the Russian Federation.

Larsson, M., Wall, A., Norstorm, C., & Crncovic, I. (2006). Technology transfer: why some succeed and some don't. *Proceedings of the 2006 international workshop on Software technology transfer in software engineering, 5,* 23–28.

Malik, K., & Wickramasinghe, V. (2013). *I*nternational technology transfer and its impact on innovation enhancement for firms based in Sri Lanka. *International Journal of Technology Transfer and Commercialisation, 12*(1/2/3), 8–21.

Ming, W. X., & Xing, Z. (1999). A new strategy of technology transfer to China. *International Journal of Operations & Production Management, 19*(5/6), 527–537.

Salitskaya, E. (2018). Approaches to creating technology transfer system in Russia. *Science. Innovation. Education, 13*(4), 6–23 (In Russ.).

Simachev, Y., Kuzyk M., & Zudin N. (2016). Import Dependence and Its Substitution in the Russian Manufacturing: Business Viewpoint. *Foresight and STI Governance*, *10*(4), 25–45.

Solovieva, Yu. (2019). Technology transfer in Russia: current state and prospects of development. *Innovation, 5*(247), 46–53. (In Russ.)

Terebova, S. (2017). Cooperation between Russia and the European Union: from importing to exporting technology. *Studies on Russian Economic Development, 28*(3), 327–337.

Vorontsova, O., Savon, I., & Gritzunova, S. (2018). The influence of technology transfer on the formation of the innovative potential of the machine-building industry. *MATEC Web of Conferences.* 6.

Bio note / Сведения об авторе

Valentina V. Kalygina, Head Teacher, Marketing Department, Peoples' Friendship University of Russia (RUDN University). ORCID: 0000-0003-1335-859X. E-mail: kalygina-vv@rudn.ru

Калыгина Валентина Викторовна, старший преподаватель, кафедра маркетинга, Российский университет дружбы народов. ORCID: 0000-0003-1335-859X. E-mail: kalygina-vv@rudn.ru