

**International Economics**

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**MODERN TENDENCIES  
IN THE DEVELOPMENT  
OF GLOBAL INNOVATION ECONOMY**

**Abstract**

The article studies innovation activity in the world economy, determines factors affecting innovations, as well as interrelationships between innovations and globalization. The author highlights modern tendencies in the development of global innovation economy based on the analysis of changes in the geographical centers and dominant players on the global innovations market. The author considers main principles of building effective innovation strategies for developing countries.

**Key words:**

Globalization, globalization processes, innovation, innovation activity, innovation processes.

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The influence of globalization and opportunities for communications spurred the development of research and innovations. Nowadays, knowledge and innovation processes have become more proliferated and accessible. Changes in the geography of global knowledge and innovations have become obvious over the recent decades: Their generation and development in the regions beyond the borders of Europe, North America and Japan have been growing. Until recently, the developing countries have been viewed as underdeveloped, but their significance in the development of global knowledge and innovations has been steeply growing.

Access to global knowledge and connection with important innovation centers in the new markets encourages internationalization of both public and private sectors.

Universities and other research institutions act to attract and retain best talents and ensure stable research financing. Businesses search for most favorable innovative environment offering qualified personnel and conditions supportive of and favorable for business development, as well as access to strategic consumers and markets. Various levels of governance, acting in collaboration and building strong and stable foundations, manage economic growth and guarantee the agility of global business networks, triggering in their turn continuous reproduction.

Policy-makers of different levels (regional, national, supranational) respond to shifts in knowledge and innovations geography by applying different instruments of influence. What regards innovation policy, it is a challenge to enable national players to access leading global knowledge and innovations for profit generation and strengthen the regional and national innovation systems. Policy-makers often focus their attention on facilitating internationalization, which provides businesses and researchers with access to world-class knowledge and strategic markets, simultaneously ensuring the effectiveness of value generation and allowing to benefit from international science and technology cooperation.

The goal of this article is to study the modern global innovation activity in order to identify main tendencies in the formation and diffusion of innovations and in the development of global innovation economy.

In order to reach the set goal, the following tasks were solved: We analyzed changes in the geography of innovations; identified main players in the world market for innovations; marked out factors of innovations development; and established the impact of innovations on economic growth.

According to the innovation systems theory, the development of innovations and technologies is driven by complex relationships among agents of the system including companies, universities and research institutions (Freeman, 1988; Freeman, 1995; Lundvall, 1985; Lundvall, 1988). In a broad sense, B. Lundvall defines national innovation systems as «elements and relationships interacting in the process of production, diffusion and implementation of new, economical and practical knowledge ... and which are located inside the state» (Schwaag Serger & Wise, 2012, p. 5).

The innovation theory and theory of economic growth have two factors in common: Knowledge and human capital. Knowledge is considered as a key management input, which is different from other growth factors in that it does not generate decreasing returns. On the other hand, changes in knowledge (for example, training) generate positive externalities (Marshall, 1890), thus contributing to evolutionary economic development (Schumpeter, 1934; Nelson & Winter, 1984). National innovation policies promote the transformation of knowledge into products and services (Schwaag Serger & Wise, 2012, p. 5).

Traditionally, policy instruments are focused on the influence produced upon agents and processes of innovation within a country. In any case, a number of factors induces policymakers to include international relations into the focus of their policy.

Methods of knowledge and innovation transfer continue to change. There are two types of knowledge: codified (for example, information, which can be easily transferred) and non-codified («tacit») (for example, skills or experience, which can be transferred only by way of human interaction (people-to-people)). The growing proliferation of information and communication technologies (ICT) intensified the flows of codified knowledge, increasing the mobility and activity of international networks, which in its turn contributed to growth of non-codified knowledge interchange. Both of these changes had an effect on the innovation processes (Schwaag Serger & Wise, 2012, pp. 5–6).

Thus, technological change and globalization are mutually enhancing, whereby technological change acts as «oil» for globalization, whereas globalization speeds up the pace of technological change by promoting circulation of people, products, capital, and primarily ideas and knowledge.

The low cost and global proliferation of ICT enables not only broad dissemination of knowledge, but also makes innovation processes more open and distributed (including open source software, popular software applications, collaboration platforms, etc). Thanks to the Internet, knowledge democratization makes customers better apprehend «what's out there», and more importantly, understand the connection between their needs and their participation in the development processes. More experienced and demanding consumers having access to mass information and willingness to buy goods all over the world, no longer consider the price/quality trade-off as the only selection criterion. Instead,

consumers grow to understand how companies and their products can match their personal values, patterns of behavior and needs. This induces companies to include users in the innovation process – by obtaining information what to produce and developing innovations in collaboration with users. This type of user and society involvement was extensively described by many managers and researchers (Schwaag Serger & Wise, 2012, p. 6).

In addition, dramatic shifts in the ICT have contributed to growth of international mobility and network activity through corporate development. A. Saxenian (2006) conducted a study on how experienced «technological entrepreneurs» accumulated experience and developed relationships while simultaneously operating in several countries by means of identifying market possibilities, partners and international business management (Boermans & Roelfsema, 2012). This type of international activity, which is based on the development and promotion of specific regional advantages, decreases the importance of national borders and increases the significance of «region-states» in a globally intertwined economy. Globalization does not decrease, but rather continues to increase the importance of regional agglomeration trends for economic development. Innovation processes are becoming ever more interconnected with regional environment at the international level. The activity of these local centers contributes to identification of their competitive niches and positions on the global play-field, attraction and retention of talents, and interaction with respective stakeholders at the local and international levels so that to obtain new knowledge and become integrated in global innovation networks.

Today, the increasing internationalization of knowledge, technologies and innovations has become an obvious fact expressing itself in the growing number of joint international publications, trans-border collaborative patenting, mobility of human resources for knowledge and technology development, as well as corporate outsourcing of R&D. There is a growing trend among companies to create R&D centers outside their home country. In this respect, the internationalization of innovations entails division of a value chain: research, innovations, production, and value creation are no longer concentrated in one and the same location.

Below we consider the taxonomy of globalization of innovations, which identifies three basic categories of actors and prospective forms of globalization of innovations. The following actors were singled out: companies, individuals, universities and public research centers. Public authorities can either promote or impede the globalization of innovations by implementing different policies, initiatives and instruments (Table 1).

The production of goods and services for the global market invoked a logical use of knowledge aimed at apprehending, developing and producing these innovations from global resources. Industrial countries (North America, Europe and Japan) have for a long time dominated in global R&D, accounting for the majority of global knowledge resources, which was preconditioned by investments in R&D and human resources for knowledge and technologies.

Table 1

**The taxonomy of globalization of innovations**

| Category  | Actors                               | Forms   |
|---|--------------------------------------|---|
| International implementation of nationally produced innovations | Firms and individuals                | Exports of innovative products<br>Transfer of licenses and patents<br>Foreign production of goods designed and developed in the home country                                    |
| Global generation of innovations                                | Multinational companies              | R&D and innovation activity in both host country and home country<br>Purchase of operating R&D laboratories and greenfield R&D investments in the parent company's home country |
| Global science and technology cooperation                       | National and multinational companies | Joint ventures for special innovation projects<br>Production contracts on exchange of technical information and/or equipment  |

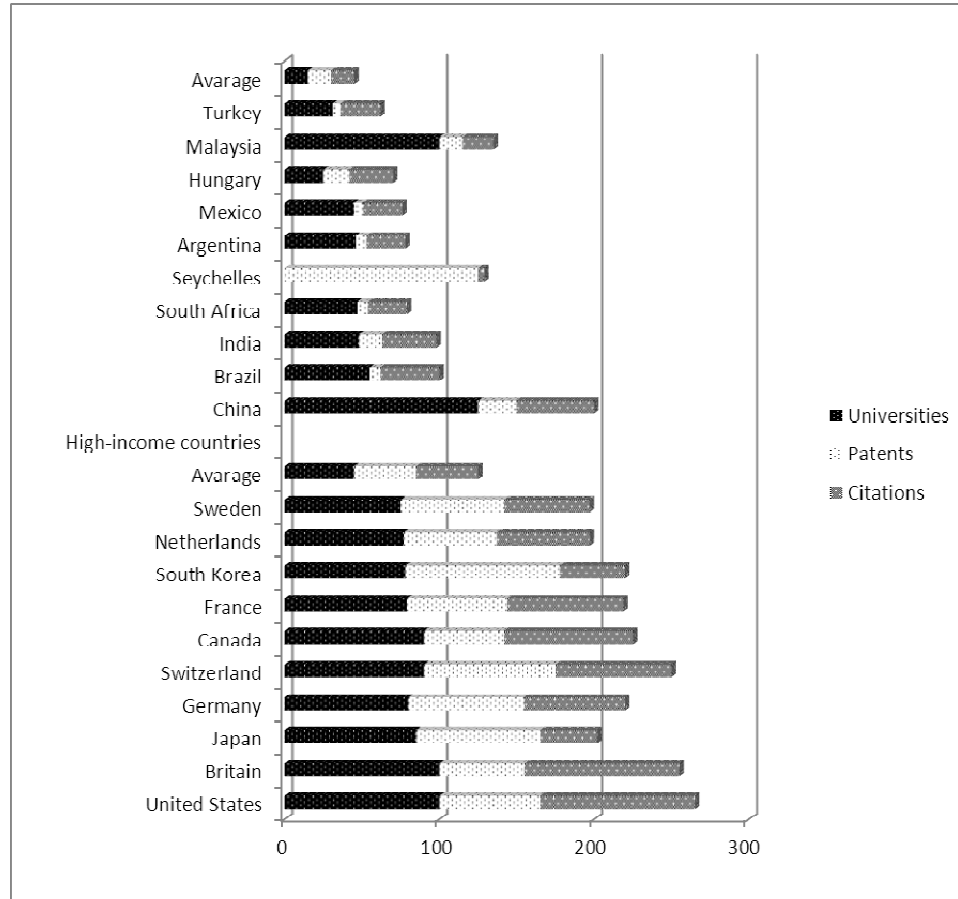
Source: Swaag Serger & Wise, 2012, p. 7.

This domination has been repeatedly challenged by the developing countries, which increase their supply and demand for knowledge and innovations. China, Brazil and India are probably the most outstanding examples of the countries where domestic research and development investments and the number of students, engineers and researchers have been rapidly growing and at the same time attracting considerable foreign R&D investments into large local markets. As a result, the center of gravity for knowledge and innovation resources is shifting to the developing countries, such as China and India, which steeply accumulate their knowledge resources. As a result, their significance as drivers of innovation is growing thanks to technological capacity accumulation. In particular, the number of European, Japanese and American companies which move their research and development to China and India tends to increase. It is worth to mention that China is steeply accumulating its scientific capacity as well, which is expressed in the increasing citation of their scientific publications (Figure 1). China and other «new science nations» steeply increase their science and production capacity, thus forming a «complex leading science and technology authority» (Economist, 2015).

Today, the developing countries account for as much as a half of global exports. Their share in trade increased from 9.4% of global GDP in 1970 to 24.4% in 2014. Over the period from 2000 to 2011, Internet goods grew 480% on average, and more than 2500% in Africa.

Figure 1

**The quality of innovations**



Source: Cornell University, 2015.

However, innovations are very important for the developed countries as well. Countries that are lagging behind often concentrate their attention on using and further imitating technologies obtained from the developed countries. On the other hand, developed countries absorb talents from the developing countries. As a result, rich countries are perceived as being «smarter».

The number of patents is an indicator which is not complete enough to characterize an innovation system of a country. The number of issued patents is the result of policy pursued in this sphere.

Innovative development is no longer the prerogative of high-income countries (Figure 2, Figure 3). The effectiveness of innovation policy implementation in the developing countries is depicted in the rankings of the Global Innovation Index (GII).

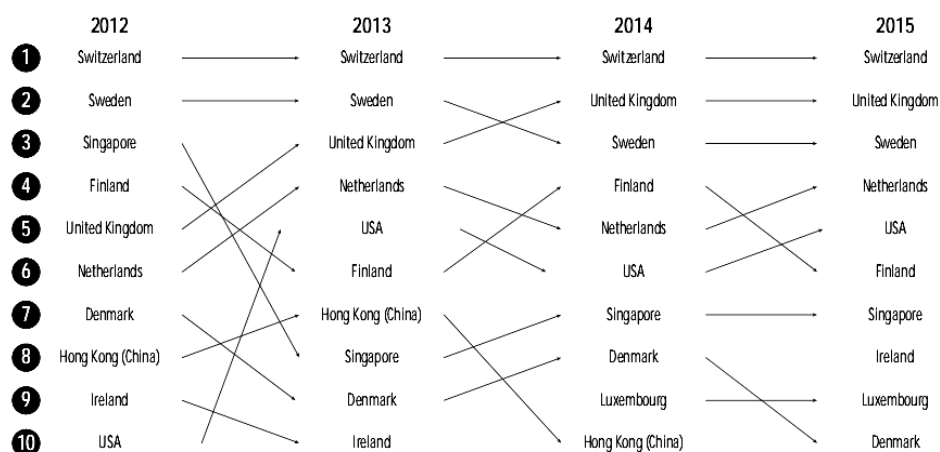
The analysis of data presented in the GI allows drawing the following conclusions.

Switzerland, United Kingdom, Sweden, the Netherlands, and the USA are the five most innovative nations in the world. At the same time, China, Malaysia, Vietnam, India, Jordan, Kenya, Uganda, and other countries of this income group are characterized by the leading innovative development indicators.

The top countries of the GI Index managed to create a tightly interconnected ecosystem, in which human capital investments and strong innovation infrastructures are spurring high levels of creativity. In particular, most indicators for the top 25 countries of the GI ranking show that these countries have advantages in such areas as Information and Communication Technologies and Business Sophistication, including such sub-categories as Knowledge Workers, Innovation Linkages and Knowledge Absorption, as well as produce high levels of output, including creative products and services.

Figure 2

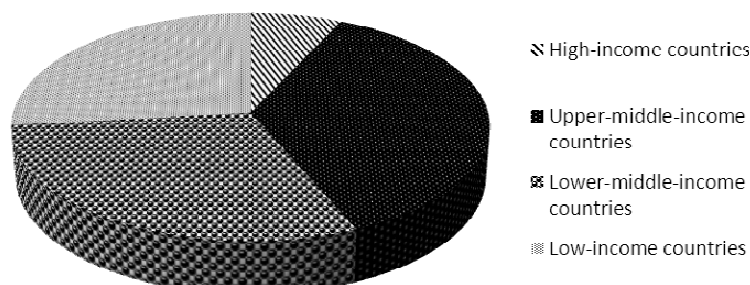
**Changes in Top 10 of GI in 2012–2015**



Source: Cornell University, 2015.

*Figure 3*

**Innovative success in 2011–2014, %**



Source: developed by the author based on data of [www.globalinnovationindex.org](http://www.globalinnovationindex.org).

However, innovations are measured not only in terms of quantity, but more importantly, in terms of their quality. The quality of innovations, for example, can be measured as university productivity, level of citations, number of global patent implementations (Figure 1). The USA hold the top position, followed by a group of other high-income countries, such as Great Britain, Japan, Germany, and Switzerland.

Top middle-income countries continue to narrow the gap in the quality of innovations: The leading country in this respect is China, followed by Brazil and India which head towards quality improvements in their higher educational institutions. The comparison of economic and innovation capacity growth rates shows, for example, that in South Africa, the rate of innovations development exceeds the rate of economic growth.

At the same time, the GII 2015 confirms that the global innovation gap remains. Thus, the countries in the top 10 (Figure 3) and top 25 have not changed, except for the Czech Republic which replaced Malta in top 25.

In the mentioned report, the countries whose indicators are at least 10% higher than those of the other countries in the group (as determined by GDP levels) are called «innovation success». Over the period from 2011 to 2014, China, India, Jordan, Kenya, Moldova, Malaysia, and Vietnam have reached innovation success among countries of their group. Eleven countries (Armenia, China, Georgia, India, Jordan, Kenya, Malaysia, Moldova, Mongolia, Uganda, and Vietnam) are in a better position with respect to innovations since they satisfy the following requirements: (1) their GDP over the recent years including 2013-2014, as assessed by the GII, has been much higher than in the other economies; (2) they



have been leading among countries of their group in at least 4 innovative outputs.

Innovation success is a key to knowledge and technology development and production of goods for the most demanding consumers. Low-income countries leading in their country group focus on removing structural barriers to innovation, such as insufficient access to financing and underdeveloped linkages within the innovation system. On the contrary, the efforts of higher-income countries are concentrated on investment accumulation, encouragement of innovation activity, and human capital development.

The scientific literature on innovation systems puts emphasis on the role of human capital and research and development institutions as innovative factors of production (output). Research and development is one of the key policy areas, which can ensure accumulation of technological capacity, innovation and economic growth. Assuring accessibility and usability of technologies is necessary for income growth. High-income countries can benefit from more sophisticated innovation systems, in which education and scientific research can effectively supply knowledge and skills to stimulate innovations.

The competitiveness of countries and individual companies depends on their innovation capacity. Although innovations are the cornerstone of policy in most countries of the world, the focus of innovation policy in the developing countries is different from that in the developed countries.

Companies in the developing countries are highly heterogeneous. In this country group, leading businesses are characterized by basic technology and low quality of human capital. Introducing innovations and implementing better technology to increase productivity of these manufacturers will have a significant effect on economic development, employment, poverty reduction, and sustainable development of the country.

The experience of developing countries also shows that introduction of technologies is not sufficient enough to support the high growth scenario. These countries must invest in innovations, whereas state support is instrumental for their popularization.

In the developing countries, innovations are viewed as a key to solving actual social problems, in particular environmental pollution, health-care problems, poverty, and unemployment. Thus, the role and significance of innovations reach beyond the framework of objective economic success. Innovations should be viewed through the prism of sustainable development, as they will help to solve the above-mentioned problems.

Instead of investing in R&D, businesses from developing countries (in most cases) attempt to make immediate use of the benefits generated by international technology transfer.

The developing countries should focus on acquiring and disseminating knowledge and stimulating the innovation process. Factors that would be favorable in this respect include political stability, good professional and higher education, developed infrastructure, information and communication technologies, enhanced connections and interaction between research institutions and public financed companies. This is why effective coordination between ministries, private and public sectors is very important.

The GII report offers six basic principles for development and implementation of the most effective innovation strategies.

Principle 1. Innovation policy should focus on maximization of innovations in all industries. Although production as a whole, and high-technology in particular, is an important element of innovative activity, the maximization of innovations calls for maximization of innovative development in all industries.

Principle 2. Innovation policy should support all types and stages of innovation activity. One of the biggest mistakes made by countries when introducing innovative strategies is to narrow their focus mainly on high-technology products. Countries should pay more attention to strategies of productivity growth across the entire economy, rather than shift from sectors with lower value added and increase the share of sectors with higher value added.

Principle 3. Creation of opportunities for churn and creative destruction<sup>1</sup>. To achieve innovation success, countries have to do more than simply use innovative components of value added that are already being used in the leading countries. They must include «disruptive» innovations, which are often generated by new market participants.

Principle 4. Supporting low prices on imports of capital goods, especially information and communication technologies. Innovation becomes weaker without new capital investment, growth of labor productivity stagnates, competitiveness of enterprises declines. In addition, limitations on tariffs and other trade barriers play an important role.

Principle 5. Support to creation of key innovation inputs. Businesses need access not only to best inputs in their group, but also to key innovations, including digital infrastructure, qualified work force and knowledge, etc. For example, the National ICT Master Plan of Kenya for 2013/14–2017/18 presented in April 2014 plays an important role in developing comprehensive strategies of distributed infrastructure development, in particular wireless and broadband Internet access all across Kenya. For example, the developed infrastructure generated

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<sup>1</sup> Creative destruction (a situation, when every successful innovation makes the previous series of innovations outdated; effective manager or entrepreneur should always strive to overcome the limits of available technology and implement innovations which disrupt the old technology base, but allow achieving an absolutely new level of costs and quality (the concept was introduced by J. Schumpeter)).

massive use of mobile money and mobile public services. Countries increasingly recognize talent as a vital source of competitive advantage, thus putting education and professional training at the core of their innovation strategies. At that, an indispensable role here belongs to entrepreneurship.

Principle 6. Developing national innovation strategy and productivity improvement strategy, as well as forming supporting organizations. Apart from innovation strategies, many successful countries established national innovation institutions specifically meant to encourage innovations. For example, Kenya, India, Malaysia, Thailand, and Vietnam instituted national innovation agencies. National innovation funds also develop innovation strategies delineating the plans as to how their countries can compete and win in the conditions of new global innovation economy. For example, in Kenya, the National Science, Technology and Innovations Policy is focused on the significance of integrating science, technology and innovations into all sectors of the economy.

Thus, countries striving to reach national innovation success should ensure that all four levels of the pyramid are in place as a way to success based on key network conditions; support for effective tax, trade and investment environment; support for key factors of productions; and the innovation productivity policy.

Governments should comprehensively think through how different elements of the state policy could affect the ability of enterprises and industries to compete in an increasingly innovative global economy.

It is also worth to mention the results of a study presented in the GII – a survey of more than 400 business leaders from different countries meant to assess business perspectives of the innovation policy. Thus, managers were generally positive and confident with respect to evaluating their own innovation capacity. More than a half of them evaluated their work as «excellent» and «very good» in all areas. They undertook radical innovations and cooperation with external partners only when there was an extreme need for improvement. As much as 80% of the interviewed replied that conditions in their countries allowed reaching the strategic goals of innovation. This result testifies to the fact that political environments in these countries are supportive of innovations (Cornell University, 2015).

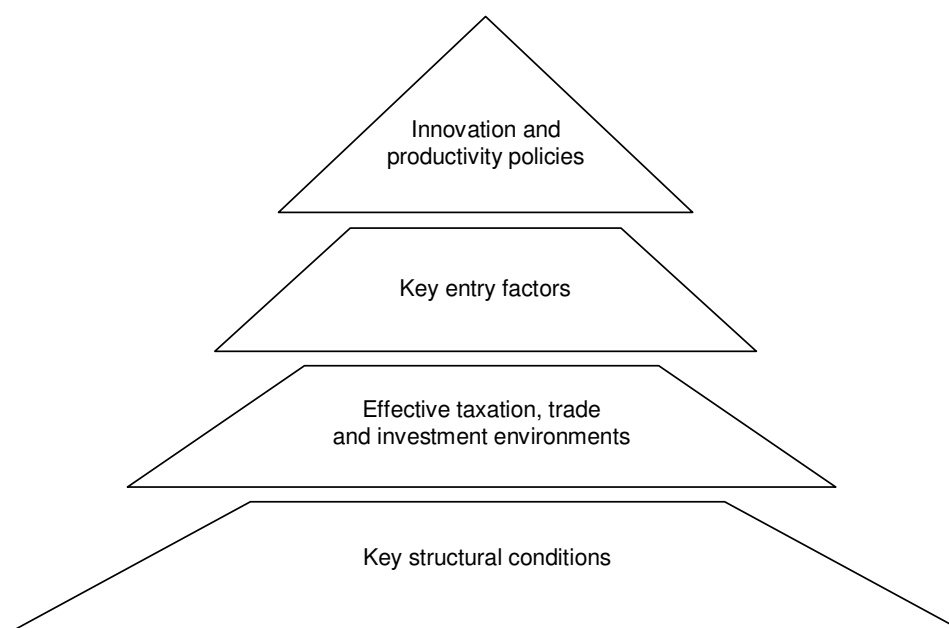
The responses also reflect the need for policy makers to maintain a forward-looking orientation and create political framework for support of innovations not only today, but also in the future.

More than 60% of respondents assessed policy measures aimed at supporting different models of internal or collaborative innovations as «important» and «extremely important». In addition, 69% of respondents view policy measures aimed at supporting the internal innovation model as «important» and «highly important». As further innovation policy steps, the respondents suggested to adopt prospective legislature aimed at ensuring sustainability in innova-

tive environment; provide market participants with instruments of regulation forecasting; improve and harmonize the regulatory base to ensure continuous implementation into the international market (Cornell University, 2015).

Figure 4

**Main innovation priorities**



Source: Economist, 2015.

The interviewed were asked to name three actions that in their opinion could ensure effective conditions for innovation activity in the country: (1) enhancing (increasing) innovative and entrepreneurial skills; (2) providing infrastructure for large-scale R&D (for example, laboratory facilities, equipment, etc); (3) providing direct R&D financing.

Thus, the global innovation economy continues to increase the pace of its development. Globalization and innovation processes are increasingly interrelated. Traditionally, the most innovative countries of the world are the USA, Great Britain, Sweden, the Netherlands, and Switzerland.

Developing countries are actively promoting their innovations, even though the quality of their innovations is generally much lower than that in the developed countries. Thus, the global technological gap persists.

The focus of national strategies also varies. As a result, developed countries implement innovations across all spheres simultaneously. On the contrary, the developing countries are characterized by heterogeneity in terms of areas for implementation of innovations.

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