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UNEVEN DEVELOPMENT OF PRODUCTION INNOVATIONS AND CONSUMER INNOVATIONS AND ITS CONSEQUENCES FOR ECONOMIC GROWTH

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Abstract

The article describes the mechanism of influence of production innovations and consumer innovations on the structure of supply and demand for resources in the national economy. The reasons and possible options for the uneven development of production innovations and consumer innovations are considered. The mechanism of influence of uneven development of production innovations and consumer innovations on economic growth is revealed.

Keywords: innovation, production innovations, consumer innovations, uneven development, economic growth.

НЕРАВНОМЕРНОСТЬ РАЗВИТИЯ ПРОИЗВОДСТВЕННЫХ И ПОТРЕБИТЕЛЬСКИХ ИННОВАЦИЙ И ЕЁ ПОСЛЕДСТВИЯ ДЛЯ ЭКОНОМИЧЕСКОГО РОСТА

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Реферат

В статье описывается механизм воздействия производственных и потребительских инноваций на структуру предложения и спроса на ресурсы в национальной экономике. Рассмотрены причины и возможные варианты неравномерности развития производственных и потребительских инноваций. Раскрыт механизм влияния неравномерности развития производственных и потребительских инноваций на экономический рост.

Ключевые слова: инновации, производственные инновации, потребительские инновации, неравномерность развития, экономический рост.

Introduction

The mechanism and results of the impact on economic growth of innovations in the field of production goods (hereinafter referred to as production innovations) and innovations in the field of consumer goods (hereinafter referred to as consumer innovations) are fundamentally different. While production innovations aimed at developing technologies ensure growth in aggregate supply, consumer innovations aimed at improving and creating fundamentally new consumer goods ensure growth in aggregate demand.

Innovations develop unevenly. Joseph Schumpeter [1] substantiated the idea that the development of innovations is discrete in time. At the same time in the concept of techno-economic paradigms the emphasis is placed precisely on the development of technics and technology, that is, on production innovations, and the role of consumer innovations is not studied separately from production innovations. However, specific techno-economic paradigm and consumer innovations generated in it are not an inseparable whole and they may not coincide in time and territorially, across countries.

The purpose of this study is to examine how unevenness and imbalance in the development of production innovations and consumer innovations affect the functioning of the national economy and economic growth. It is expected to solve the following problems:

1. study the mechanism of impact of production innovations and consumer innovations on the structure of supply and demand for resources in the national economy;
2. analyze the reasons and possible options for the uneven development of production innovations and consumer innovations;
3. analyze the mechanism of influence of uneven development of production innovations and consumer innovations on economic growth.

1 Impact of production innovations and consumer innovations on the structure of supply and demand for resources in the national economy

Innovation processes in the economy take place in contradictory conditions of limited resources and unlimited needs [2]. Accordingly, efforts to create and implement innovations are realized in two main directions: saving resources and better meeting the needs and wants of people and society.

It is necessary to distinguish between innovations in the field of production goods (in other words, in the field of engineering and technology) and innovations in the field of consumer goods. Consumer goods are understood as goods and services intended to directly satisfy human needs and wants. Production goods are goods and services used in the production process (equipment and technology).

Production innovations are aimed at solving two problems:

1. saving resources used for production;
2. opening up opportunities for creating innovative consumer goods, the production of which was impossible at the previous level of technological development.

As a result of production innovations, savings on certain types of resources and the replacement of some types of resources with others are achieved. Therefore, the structure of resource consumption in the production sector is changing.

Consumer innovations are aimed at improving consumer goods, expanding their range and improving their quality, as well as creating fundamentally new consumer goods. The role of consumer innovations is that the emergence of innovative consumer goods creates new needs and wants among the population and stimulates the population to acquire these goods, even without waiting for the complete physical wear and tear of old, previously purchased things with similar functions.

The demand from the population for innovative consumer goods gives rise to a corresponding need in the production sector for various resources necessary for the production of these goods. Changes in the population's demand for consumer goods lead to changes in the structure of resources required for the production of these goods.

Thus, the structure of the supply of resources changes under the influence of production innovations aimed at improving production processes, and the structure of the need for resources changes under the influence of consumer innovations aimed at meeting the potential needs of the population (see Figure 1).

Therefore, these structures are not identical, they do not coincide. At the level of the national economy, the supply of certain types of resources does not always equal the need for them.

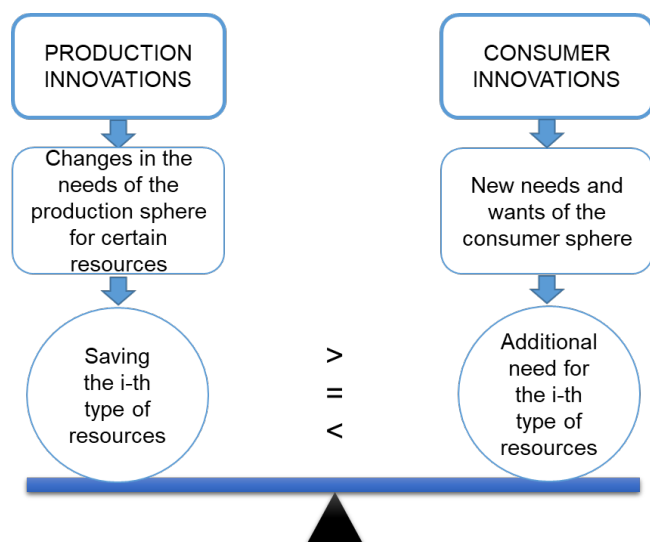


Figure 1 – Changes in supply and need for various types of resources under the influence of production and consumer innovations [Note. Own development]

2 Uneven development of production innovations and consumer innovations

Joseph Schumpeter in his work “Economic Cycles” [1] substantiated the idea that the development of innovations is discrete in time, that the introduction of innovations occurs in “clusters”. Over time, the terms “waves of innovation” and “techno-economic paradigms” began to be used more often. The concept of techno-economic paradigms occupies a significant place in the modern theory of innovative development.

At the same time, in published studies on this topic [3, 4, 5, 6, 7], the role of consumer innovations was not studied separately from production innovations. Innovative consumer goods, as a rule, are perceived in indissoluble connection with the corresponding techno-economic paradigms, as their inseparable part.

For example, according to the definition of S.Yu. Glazyev, the techno-economic paradigm is a holistic and sustainable formation, within which a closed cycle is carried out, starting with the extraction and receipt of primary resources and ending with the release of a set of final products corresponding to the type of public consumption. The complex of basic sets of technologically related industries forms the core of the techno-economic paradigm [5]. That is, this definition mentions “a set of final products corresponding to the type of public consumption” [5, p. 11], but it is not considered separately from the technological structure.

Yu.V. Yakovets, for example, suggests the following structure of the techno-economic paradigm:

- the core or basic innovations that form the qualitative characteristics of the paradigm;
- production technologies that form the basis for the restructuring of the sphere of material production;
- technologies of the non-productive area of the economy, used in the service sector, in personal consumption and in military affairs [6, P. 167–173].

In this definition, “technologies in the non-productive area of the economy, used in the service sector, in personal consumption” are taken into account, but are not considered separately from the techno-economic paradigm.

However, production innovations and consumer innovations play different roles in economic growth. In addition, consumer goods can be sold and consumed outside the corresponding techno-economic paradigm they belong to. In connection with the above, it is necessary to study the role of consumer innovations in economic development, considering them not as an inseparable part of the techno-economic paradigm, but as a separate influencing factor.

Further we will mean that the consumer-economic paradigm is a set of interrelated methods and processes of satisfying the personal needs and wants of the population, for which consumer goods are produced using equipment and technologies of the corresponding techno-economic paradigm. In consumer-economic paradigm consumer goods predominate, which cannot be produced using technologies of lower techno-economic paradigms [8].

In an economic system, at any given time, several techno-economic paradigms exist simultaneously. Among them the main, dominant paradigm can be distinguished, which characterizes the main directions of the economic system development at this moment [9, p. 801]. In the same way, at any given time, several consumer-economic paradigms exist simultaneously in the national economy.

The current techno-economic and consumer-economic paradigms may not coincide both in time and territorially, across countries. Almost any consumer goods of earlier paradigms can be produced using the equipment and technologies of later paradigms. For example, ordinary bread can be baked both in a village oven and in a bakery using various types of industrial equipment (II–IV paradigm), in a home electronic bread maker (V paradigm), and in the near future, perhaps with involving a home android robot or printed on a 3-D food printer (VI paradigm). Cleaning the floor in a home can be done with a broom and a damp cloth, an electric vacuum cleaner (IV paradigm), a robotic vacuum cleaner (VI paradigm), and using an android robot (VI paradigm).

And vice versa, almost any consumer goods of later consumer-economic paradigms can be imported into a country that does not have the appropriate techno-economic paradigm, is not capable of producing such goods, but is at earlier stages of technological development. For example, today the population of many countries that do not have the technology to produce computers and mobile phones (V paradigm) actively use these goods.

3 Impact of changes in the structure of demand and supply of resources on economic growth

Speaking about saving resources in the context of innovative development, it is necessary, first of all, to consider labor resources. The peculiarity of this analysis is that a person acts not only as a production resource, but also as a consumer of the final product, as the final goal of production, and thus ensures economic circulation.

The economic mechanism of changes in supply and demand for labor resources under the influence of production innovations and consumer innovations is presented in Figure 2. The result of production innovations is often an increase in labor productivity and savings in labor resources, which can be quantitatively presented as a fund of saved working time. This saved working time can potentially be used by society to produce additional volumes of production and consumer goods. However, the production of additional volumes of consumer goods is expedient and possible only if there is demand for them from the population. In turn, the demand for production goods depends on the demand for consumer goods created with their help.

In this case, three options for the development of innovation processes in the national economy are possible.

1. Production innovations develop faster than consumer innovations. If innovations occur mainly in the direction of improving production processes, which causes a sharp increase in labor productivity and an increase in the output of traditional consumer goods, and at the same time not enough attention is paid to improving the consumer goods themselves, then, sooner or later, there will be oversaturation of markets with traditional consumer goods. Even if traditional goods that the population already possesses are offered to them at reduced prices, people still do not want to purchase what they already have in excess quantities. Producers cannot sell the volumes of goods produced, which may be the beginning of a recession in the economy [10].

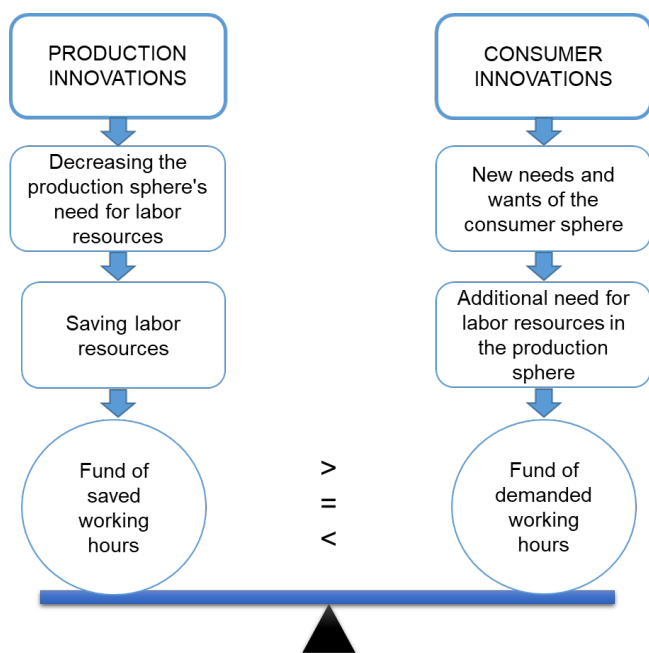


Figure 2 – Changes in supply and demand for labor resources under the influence of production innovations and consumer innovations [Note. Own development]

In such a situation, the fund of saved working time is greater than the fund of additionally demanded working time. The lag of consumer innovations from production innovations limits economic growth from the side of aggregate demand. Without consumer innovation, the volume of consumption and production of goods per capita can be reproduced from year to year only on the same scale, but not on an expanded scale (simple reproduction).

2. Production and consumer innovations develop equally. The working time saved as a result of increased labor productivity is used entirely to create in-demand innovative consumer goods. The fund of saved working time is equal to the fund of additionally demanded working time.

A simultaneous increase in aggregate demand under the influence of consumer innovations and aggregate supply under the influence of production innovations transfers the national economy to a state in which a greater volume of national production and consumption is achieved, that is, economic growth occurs.

3. Production innovations develop slower than consumer innovation. Innovative development is uneven, there are leading countries and catching up countries. The needs of the population of catching up countries can be formed by innovative consumer goods that are already produced in countries that are the leaders in innovative development. But this innovative consumer goods cannot yet be produced in catching up countries, since catching up countries have not achieved the appropriate level of technological development.

In such a situation, the fund of demanded working time is greater than the fund of saved working time. The lag of production innovations from consumer innovations limits economic growth from the aggregate supply side.

Next, we will consider changes in the supply and demand for material resources under the influence of innovation.

At the level of the national economy, saving most types of material resources ultimately means saving labor costs at all stages of production of these resources. The replacement of one material resource with another in production can be considered as a redistribution of labor resources from one type of production to another.

Therefore, the consequences of the impact of innovation on saving or increasing the consumption of most types of material resources can be

considered through saving or increasing the consumption of labor resources. An exception to this rule is scarce resources.

For the purposes of this research, by scarce resources we mean those that are in limited availability in the individually considered country. The amount of such resources in the national economy cannot be arbitrarily increased in accordance with increased needs.

For individually considered countries, such resources may, for example, be oil, productive arable soils, water resources in the regional aspect, working radio frequency bands, rare earth metals, etc. They can neither be produced within the country nor imported in required quantity from other countries. They cannot be effectively replaced by other, more accessible resources, including labor.

Therefore, when predicting the consequences of the development of production innovations and consumer innovations, in particular when solving problems about the impact of innovations on economic growth, changes in the consumption of scarce resources cannot be expressed in terms of labor costs. Scarce resources must be analyzed separately.

Here it is necessary to pay additional attention to the fact that changes in the needs and wants of the population and society under the influence of innovations can lead to both an increase and a decrease in the consumption of various types of resources, including scarce ones. For example, at one time the spread of a car with an internal combustion engine led to an increase in the consumption of gasoline and diesel fuel, and the transition to electric vehicles, which currently takes place, leads in a number of countries to a decrease in the consumption of these resources.

Below, with regard to scarce resources, two possible situations in the national economy are considered. When considering them, we proceeded from the assumption that consumer innovations lead to an increase in the need for a scarce resource, and production innovations lead to a decrease.

1. Production innovations develop slower than consumer innovation. This is the very situation due to which certain types of resources become scarce. The need for a resource has already developed as a result of consumer innovations, but the available (or produced) quantity of this resource cannot be increased with the existing level of technology to fully satisfy the need. It is the accelerated development of consumer innovations compared to production ones that makes certain types of resources scarce.

In this situation, the lag of production innovations from consumer innovations limits economic growth from the aggregate supply side.

2. Production innovations develop faster than consumer innovations. As science and technology develop, solutions can be found to save a certain scarce resource, or even completely abandon its use. In this case, the resource ceases to be scarce, and the needs and wants of the population can be satisfied.

In this situation, an increase in aggregate supply in the presence of aggregate demand, that previously could not be satisfied, transfers the national economy to a state in which a greater volume of national output and consumption is achieved, that is, economic growth occurs.

Conclusion

Production innovations cause changes in the structure of the supply of production resources, and consumer innovations cause changes in the structure of the need for production resources. As a result, at the level of the national economy, the supply of certain types of production resources often does not equal the need for them. At the same time, both production and consumer innovations develop unevenly both over time and territorially, across countries.

For countries that are leaders in innovative development, the lag in the development of a new consumer-economic paradigm from the developed new techno-economic paradigm is fraught with oversaturation of domestic markets and a subsequent recession in the economy. The export of excess amounts of consumer goods to other countries, to new geographic markets, can postpone the problem of oversaturation and recession for some time.

As a result of the export of innovative consumer goods from countries that are leaders in innovative development to catching up countries, in these catching up countries the opposite situation may occur an advanced development of the consumer-economic paradigm compared to the techno-economic paradigm. In exchange for imported innovative consumer goods, catching up countries usually export their natural resources, reducing their reserves. At the same time, in a catching-up country, the demand of the population is "diverted" from consumer goods produced within the country to imported goods. This situation is not conducive to the development of the manufacturing sector of the catching-up country. Instead of investing in the innovative development of the production sector, limited resources of society are directed to expanding consumption.

Comparing the degree of correspondence between the techno-economic and consumer-economic paradigms in the national economy will allow to foresee in advance the possibility of a slowdown in economic growth for countries that are leaders in innovative development, as well as to foresee the threat to the development of countries taking a catching-up position in innovative development. The balanced development and application of production and consumer innovations are necessary to ensure a sustainable and continuous increase in the standard of living of the population.

References

- Schumpeter, Joseph. Business Cycles: a Theoretical, Historical, and Statistical Analysis of the Capitalist Process / J. Schumpeter. – New York, Toronto, London : McGraw-Hill Book Company, 1939. – 461 p.
- Bajnev, V. F. Ideologiya kak ekonomicheskaya kategoriya / V. F. Bajnev // Ekonomicheskaya nauka segodnya. – 2015. – № 4. – S. 21–33.
- SHumpeter, J. A. Teoriya ekonomicheskogo razvitiya (issledovanie predprinimatel'skoj pribyli, kapitala, kredita, procenta i cikla kon'yunktury) / J. A. SHumpeter ; per. V. S. Avtonomov, M. S. Lyubskij, A. YU. CHepurenko ; obshch. red. A. G. Milejkovskogo. – M. : Progress, 1982. – 456 s.
- Yakovec, YU. V. Cikly. Krizisy. Prognozy / YU. V. YAKovec. – M. : Nauka, 1999. – 448 s.
- Nanotekhnologii kak klyuchevoj faktor novogo tekhnologicheskogo uklada v ekonomike / pod red. S. YU. Glaz'eva, V. V. Haritonova. – M. : Trovant, 2009. – 304 s.
- Yakovec, YU. V. Ekonomika Rossii: peremeny i perspektivy / YU. V. Yakovec. – M., 1996. – 280 s.
- SHumpeter, J. Kapitalizm, Socializm i Demokratiya / J. SHumpeter ; predisl. i obshch. red. V. S. Avtonomova. – M. : Ekonomika, 1995. – 540 s.
- Zen'chuk, N. F. Tekhnologicheskie i potrebitel'skie układy i ih sootvetstvie / N. F. Zen'chuk // ZHurnal Belorusskogo gosudarstvennogo universiteta. Ekonomika. – 2023. – № 1. – S. 86–93.
- L'vov, D. S. Teoreticheskie i prikladnye aspekty upravleniya NTP / D. S. L'vov, S. YU. Glaz'ev // Ekonomika i matematicheskie metody. – 1986. – № 5. – S. 793–804.
- Mal'kevich, N. D. Zakonomernosti v razvitii ekonomiki / N. D. Mal'kevich, I. N. Tihomirov, N. F. Zen'chuk. – Gomel' : BelGUT, 2003. – 91 s.

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