УДК 330.341.1:338.439 DOI: 10.30857/2786-5398.2025.3.9

Tsui Tszypen, Olena Yu. Budiakova
Kyiv National University of Technologies and Design, Ukraine

EVOLUTION OF THE MAIN MODELS OF INNOVATIVE DEVELOPMENT MANAGEMENT IN THE CONTEXT OF IMPLEMENTING SUSTAINABLE DEVELOPMENT GOALS

The purpose of the article is to study the evolution of the main models of innovative development management in the context of implementing sustainable development goals. The study is based on the genesis of innovative development management processes in the context of implementing sustainable development goals. The analysis results show that the evolution of innovative development management models in the context of sustainable development goals has gone from linear and infrastructure models to integrated systems that take into account social, environmental and economic aspects of life. Modern innovative development management models focus on the circular economy, eco-innovation, partnership and inclusive growth, integrating innovations into sustainable development to achieve strategic goals such as clean energy, responsible consumption and production. It is justified that innovative development is considered as part of a broader system that includes social, environmental and economic aspects. Modern management models are adapted to achieve sustainable development, in particular. circular economy, partnership, eco-innovation, social innovation, inclusive growth, digitalization and conservation of the planet's resources. The conclusions are drawn that long-term innovation policy should be aimed at creating conditions for the socio-economic development of the country on an innovative basis using direct and indirect instruments of economic influence, at forming a new type of economic system, the so-called techno-economic system, in which the functioning of the mechanisms for managing a modern mixed economy is directly related to the influence of the system of technical and social innovations.

Keywords: *innovation; innovation sphere; innovation projects; knowledge economy; innovation; modeling; sustainable development; market initiatives; social innovations.*

Цуй Цзипен, Олена Ю. Будякова
Київський національний університет технологій та дизайну, Україна

ЕВОЛЮЦІЯ ОСНОВНИХ МОДЕЛЕЙ УПРАВЛІННЯ ІННОВАЦІЙНИМ РОЗВИТКОМ В УМОВАХ РЕАЛІЗАЦІЇ ЦІЛЕЙ СТАЛОГО РОЗВИТКУ

Метою статті є дослідження еволюції основних моделей управління інноваційним розвитком у контексті реалізації цілей сталого розвитку. Дослідження побудовано на генезі процесів управління інноваційного розвитку в умовах реалізації цілей сталого розвитку. За результатами аналізування встановлено, що еволюція моделей управління інноваційним розвитком в контексті цілей сталого розвитку пройшла шлях від лінійних та інфраструктурних моделей до інтегрованих систем, що враховують соціальні, екологічні та економічні аспекти життя. Сучасні моделі управління інноваційним розвитком акцентують увагу на циркулярній економіці, еко-інноваціях, партнерстві та інклюзивному зростанні, інтегруючи новації в сталий розвиток для досягнення стратегічних цілей, таких як чиста енергія, відповідальне споживання та виробництво. Обгрунтовано, що інноваційний розвиток розглядається як частина більш широкої системи, яка включає соціальні, екологічні та економічні аспекти. Сучасні моделі управління адаптуються для досягнення сталого розвитку, зокрема. циркулярна економіка, партнерство, еко-інновації, соціальні інновації, інклюзивне зростання, цифровізація та збереження ресурсів планети. Зроблено висновки, що довгострокова інноваційна політика має бути спрямована на створення умов

для соціально-економічного розвитку країни на інноваційній основі за допомогою прямих та непрямих інструментів економічного впливу, на формування економічної системи нового типу, так званої техноекономічної системи, в якій функціонування механізмів управління сучасною змішаною економікою безпосередньо пов'язане з впливом системи технічних та соціальних інновацій.

Ключові слова: *інновації; інноваційна сфера; інноваційні проєкти; економіка знань; нововедення; моделювання; сталий розвиток; ринкові ініціативи; соціальні інновації.*

Problem statement. The practical implementation of the innovative path of sustainable economic development involves the formation of a certain development model. An innovative model of sustainable economic development is a theoretical expression of innovative priorities, directions, structures, motivation systems, strategies, mechanisms, etc., which are aimed at forming an innovative type of development of the national economy.

Unresolved parts of the problem. In each country, the formation of such a model, of course, occurs under the influence of many factors of both the external and internal environment. But, despite the sufficient diversity of models of innovative development of national economies, three main models have been formed in the world.

Analysis of literary sources. The modern institutional and technological concept is the result of a long period of development of paradigms of innovative development and general economic progress of scientific thought. The new paradigm outlined the subject of research of a cohort of modern theories, and the practical implementation of the results makes it possible to make a technological breakthrough in the medium and long term, forming the foundation for further innovative development in the context of the implementation of sustainable development goals.

The purpose of the article is to study the evolution of the main models of innovative development management in the context of implementing sustainable development goals.

Presentation of the main material. The first model. Orientation to reserves in science and implementation of large-scale target projects covering all stages of the scientific and production cycle. Targeted economic policy in this case involves the use of an appropriate range of measures without their orientation to specific industries. The main thing is to exclude factors that negatively affect the susceptibility of production to innovations regardless of the sector of the economy [2].

Such a model is presented in the USA. At the end of the 19th century, only 139 research laboratories operated in American industry, and over the next twenty years 553 new ones were added to them. These and other data indicate a rapid growth in the first decades of the 20th century. the number of scientific departments of private companies in the American economy, especially in such industries as chemical and petrochemical, metallurgy and machine tool building. As a result, the presence of a scientific department in a corporation ceased to be a rare exception; it became the same norm as the functioning of accounting, financial and other services. Large companies realized the importance of organizing their own scientific laboratories to create new products and technical means that provide competitive advantages. If this required additional large expenses to finance the relevant research, the management of such companies went for it.

Research laboratories of corporations, created on their initiative, at their expense and without any assistance from the state, acquired during this period the features of the main dominant element of the innovation system that was being formed. In the mid-1920s. in the USA such an innovation system was represented by several hundred research complexes of corporations, while the number of state laboratories and research institutions was very small. The dominance of market factors in the formation of the sphere of innovative developments at the first stages of the development of the capitalist economy is mainly characteristic of European countries [3].

A feature of the formation of the American national innovation system in the late 19th – early 20th centuries. is the close relationship between industrial corporations and universities. Decentralization of higher education, financing of state educational institutions by the state authorities, and not from the federal budget, meant a tight binding of the content of educational courses and areas of research to the economic needs of each region. The American system of higher education was inferior to the European one in the quality of scientific training, but it was superior in scale and integration in solving the practical needs of corporations, which were growing rapidly. State universities responded quickly to the emergence of new technologies and industries, expanding the training of engineers, geologists, and builders. In turn, industry quickly mastered new production methods due to the necessary number of new personnel – technical specialists [5].

Differing from the assessment of the scientific level of research, we can state that before the Second World War, a research system was formed in the USA, aimed at disseminating scientific knowledge in accordance with the needs of growing industry. The higher education system trained engineers and other specialists in extremely large quantities. And, as a result, the number of specialists who applied technical knowledge to solve the problems of industry and agriculture turned out to be much greater than those who could be called scientists. It was this path that allowed the USA to quickly catch up with Europe in technological, and then in scientific development. The same option was implemented in post-war Japan, and later in South Korea – mass training by the higher education system of technical specialists who implemented a catch-up strategy [5].

In the post-war period, the status of university science changed radically – the provision of contracts for scientific and research developments and funding through state channels began to determine the scale, structure and priorities of research. In the United States, before World War II, government funding was a small percentage of university budgets, but the powerful flow of wartime contracts determined the future of many higher education institutions as research universities, that is, those in which large and long-term programs are implemented. For example, the budget of the Massachusetts Institute of Technology (MIT) in the prewar period was replenished from outside by only 7%, and the main item of income was tuition fees. Already in the first years of the war, the amount of defense research contracts alone exceeded the entire budget of 1939. MIT became a leading center of basic science of defense importance and maintains this position to this day [6].

Active state policy towards universities, especially research universities, as well as powerful financial support ensured, according to American experts, the privileged position of this segment of the US education system, its separation in terms of material and personnel support from school and vocational education.

In the second half of the 1980s – 1990s, the stage of formation of new functions of universities in national innovation systems began. Thus, various technology transfer centers were created and developed – innovation centers, technology parks, incubators of new technologies, which contributed to the selection of promising scientific developments and the dissemination of new technologies for the benefit of small and medium-sized businesses. At the same level, other forms of interaction between scientists and entrepreneurs were tested and in many cases proved successful, for example, venture financing mechanisms.

The second model. Focus on the dissemination of innovations, the creation of a favorable innovation environment, the rationalization of the structure of the economy. The Second World War and the post-war period, when large-scale nuclear and space projects began to be implemented, changed the face of science and national innovation systems as a whole. A significant expansion of the network of state laboratories and institutes, an increase in the share of state funding and the strengthening of the regulatory functions of the state in the field of science became a powerful impetus for the evolution of national innovation systems in the second half of the 20th century [6].

These trends were most clearly manifested in Great Britain, France and Germany. In a number of other economically developed countries, in which the private sector was and remains the leader of scientific and technological development (for example, in Sweden), governments implement science policy in more modest volumes, relying on indirect measures that stimulate innovative activity. In the 1960s and 1970s, the implementation of various functions in the field of science by the state became stable, and scientific and/or scientific and technical policy became an independent, often one of the central areas of state regulation.

The special contribution of the state to the formation of national innovation systems is also associated with its role in the development of education systems. Thus, the creation of a unique Prussian system of technical education in the second half of the 19th century. was and remains one of the greatest achievements in this area. The preservation and development of this system throughout the 20th century. is considered by many researchers to be one of the main competitive advantages of German companies, whose technical staff has always been recognized as the best in the world. European researchers [4], who compared different national models, also argue that the inability of the British government to create a similar system of vocational technical education and training to the Prussian system was one of the factors in the loss of its competitive advantages by industry.

The uniqueness of the German technical education system was, in particular, that in addition to its own pedagogical activity, it performed the functions of disseminating new technologies through retraining and consulting engineers and technicians in technical academies, museums, and regular exhibitions of technical achievements. Each of these segments reacted actively to the emergence of technical innovations both in Germany and in other countries of the world. The active role of the state was manifested not only in the financial support of this system, associated with the traditionally high state intervention in economic development, but also in targeted efforts to overcome the technical gap that existed in the 19th and early 20th centuries with the leader of that period – Great Britain. Stimulating the import of technical innovations, training and sending specialists abroad, a system of bonuses, technical expertise, and consultations at state expense contributed to the establishment of high standards of technical development and scientific and engineering activity in industry.

The third model. Focus on stimulating innovations through the development of innovative infrastructure, ensuring the perception of scientific and technological progress and coordination of actions of various sectors in the field of science and technology, including small businesses in innovation processes through entry into technological chains of large firms. This model is characterized by a targeted stimulating industrial policy, which consists in directing it to specific priority industries. As the main element of state regulation and a tool for innovative development of the economy, economic and social development plans and comprehensive programs that take into account the strategic trends of the development of countries are mainly highlighted. Technological development of Japan in the 1980s was carried out according to strategic directions of innovative development. Despite the fact that we are talking about mechanisms that appeared more than 30 years ago, some of them with some modification can be used today in solving similar problems in Ukraine.

Using the example of the Japanese economy, the most effective mechanisms for activating innovative development can be identified:

- parallel implementation of scientific and technical programs;
- joining strategic international alliances, creating technopolies;
- creating telecommunications networks;
- having venture capital and venture firms;
- selective promotion of imports, etc.

Thus, the mechanism of parallel implementation of scientific and technical programs pursues the solution of a number of tasks: creating competition among developers, joining forces, maintaining constant contacts between developing companies. Strategic international alliances aim to gain access to the latest foreign developments, stimulating companies located in a given country but owned by foreign owners, and conducting joint R&D. The creation of technopolies is focused on the development of the regional economy, the modernization of stagnant industries, and strengthening the union of science and production [1].

Modern indirect methods of state regulation in this model involve encouraging scientific and technical cooperation, developing innovation infrastructure, developing long-term technological forecasts, simplifying procedures for creating innovative companies.

Conclusions and prospects for further research. The analysis of innovative development in different countries allowed us to identify the main types of state innovation policy.

1. Development and implementation of a technological push policy. The main goals and priority areas of scientific and technological and innovative development are set by the state, on the basis of which methods of stimulating innovative activity are determined, which should be carried out through improving management in the scientific and technological and innovative spheres.

2. Market orientation policy. It assumes the leading role of the market mechanism in the allocation of resources and determining the directions of development of science and technology, as well as limiting the role of the state in stimulating fundamental research.

3. Development and implementation of a social orientation policy. It is aimed at obtaining social results from the regulation of scientific and technological progress. Decision-making processes take place with the involvement of the general public under the conditions of achieving socio-political consensus.

4. Formation and implementation of a policy aimed at reforming the economic structure of the economic mechanism. At the present stage, such a policy, along with the market policy, is used by Japan and should be applied by Ukraine.

Long-term innovation policy should be aimed at creating conditions for the socio-economic development of the country on an innovative basis through direct and indirect instruments of economic influence, at forming an economic system of a new type, the so-called techno-economic system, in which the functioning of the management mechanisms of the modern mixed economy is directly related to the influence of the system of technical and social innovations.

The implementation of state innovation policy requires the formation of a strategy for innovative sustainable development.

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