

INNOVATIVE DEVELOPMENT OF THE EU: STRATEGIC PRIORITIES OF TECHNOLOGICAL LEADER

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The relevance of the study is due to the fact that one of the countries of the European economic system is Germany, which occupies a leading position in many indicators and in the global technology market. The subject of research of the article is the innovative development of the EU. The goal is the strategic priorities of technological leader - Germany in innovative development of the EU. The objective is to research the comparison of tasks of the national high-technological strategy of Germany and the strategy of the Innovation Union of the EU.

A tool for achieving strategy a rational growth throughout the territory the EU was the creation of an Innovation Union that united the national innovation systems of all member states EU. The essence of building the Innovation Union is to maintenance research and scientific development throughout Europe to improve the scientific and technical base and increase the competitiveness of the EU in the priority scientific fields, simultaneously solving such socio-economic tasks as job creation, improvement education, involvement youth in science, creation of innovative products and services, improvement of the healthcare system, transport infrastructure, as well as increasing energy efficiency, saving natural resources and caring for learning the environment.

Being closely linked to the global idea of building an Innovation Union in Europe, the national strategy of high-technological development in Germany is similar to the overall European strategy goals and objectives. At the same time, Germany is not only one of the members of the Innovation Union, but a leader in technological development in many sectors of the economy.

General scientific methods are used, such as system analysis. The following results were obtained: the national German innovation strategy proposes measures in five key inter-sectoral areas: (1) improving the relationship between science and industry; (2) enhancing R & D and innovation work in private the sector of the economy, (3) to ensure the dissemination of new advanced technologies in the economy, (4) to internationalize scientific research, development and introduction of new technologies, and (5) to promote the development and further of talents.

Conclusions: on the basis of the conducted research, it was concluded that all these proposed strategies of high-technologic development in Germany are aimed at simplifying and reducing the path from idea to implementation innovation, which will continue to ensure the technological leadership of Germany in the EU economic system.

Keywords: high-technological strategy, EU economic system, innovation policy, innovation development, global challenges, national competitiveness.

One of the countries of the European economic system is Germany, which occupies a leading position in many indicators and in the global technology market. This is due to the presence of a strong scientific potential of the country, high level expenditures on the scientific-research and experience-design work (further R & D), as well as the number of patents received per capita. Traditionally, the strength of the German economy was based on the rapid diffusion of new technologies. However, as innovation cycles become shorter, this German advantage is rapidly shrinking. In addition, numerous competitors from European countries and other countries world present a threat to the main positions of German enterprises, and their technological level allows successfully to fight for traditional German sale markets [6]. This necessitates research of features of the strategy high-technological innovation development of Germany in the European economic system.

The development of various aspects of the research of technological leadership led to the advent of scientific scholarship of many scholars, such as the scholars (D. Bpezmits, D. Woops, P. Dagos, J. Kao, P. Koo, M. Popeut) [8-9, 12-14, 17], as well as domestic ones (O. Bilopus, D. Lukyanenko, A. Popuchnik, E. Saveliev, J. Pakhomov, V. Tpfimova, S. Yupiy) [1, 2-5, 7].

The main idea of all programs and strategies European Union is to provide a competitive and dynamic development based on economic laws. Back in 2000, the basis of the future development of the EU economic system was the Lisbon Strategy, one of the main points of which was the maintenance of research and working out, which ensure the technological development of the commonwealth of countries. But due to the fact that by the scheduled date (2010) the main objectives of the strategy have not yet been achieved, this strategy has been replaced by a new — Strategy "Europe 2020", the main idea of which was the development of three basic parameters: reasonable growth (ensuring efficient investments in education, research and development innovation), sustainable growth (involves the use of technologies aimed at environmental development with the efficient use of resources) and comprehensive growth (orientation to overcoming unemployment and poverty eradication).

A tool for achieving strategy a rational growth throughout the territory the EU was the creation of an Innovation Union that united the national innovation systems of all member states EU. The essence of building the Innovation Union is to maintenance research

and scientific development throughout Europe to improve the scientific and technical base and increase the competitiveness of the EU in the priority scientific fields, simultaneously solving such socio-economic tasks as job creation, improvement education, involvement youth in science, creation of innovative products and services, improvement of the healthcare system, transport infrastructure, as well as increasing energy efficiency, saving natural resources and caring for learning the environment [15].

It should be noted that this strategy EU includes solving any tasks aimed at innovation and technological change. Namely, the improvement of the health care system does not involve an increase in the number of staff or hospital beds, but the introduction of qualitative technological changes: new equipment, new methods of fighting diseases; new energy-saving technologies, technologies for the creation of new energy sources, etc. Combining the efforts of all member states EU in the research and scientific development within of the Innovation Union involves the organization of innovative partnerships in Europe, which should contribute to the development of countries. Also, the Innovation Union performs functions a political coordination of action business, universities, research centers that forming an innovation system that brings together all countries EU and provides access to finance not only at the level of individual countries but also across the European Union [15].

The basis for the formation of the Innovation Union of the EU is the programs and strategies for the development of innovation at the national level. At the same time, there is also an inverse relationship – the Innovation Union at the European level aims at stimulating the development of high technologies in the member states of the Union, defining indicators of technological development at the level of more developed in the technological sense of the countries EU. Thus, there may be a two-way relation between the pan-European and national strategies of high-technological development. On the one hand, the pan-European strategy for high-technological development is a combination of national strategies, and, on the other hand, its provisions are the guideline for the formation of tasks of national-level strategies. Therefore, the obtained results of the implementation of the national strategies in the field of technological development formulate the new goals and objectives of the further high-technological growth of the overall strategy of Europe [10].

In order to increase the level of technological development, the Federal Ministry of Education and Scientific Research of the Federal Republic of Germany in 2006 developed the "High Tech Strategy 2020 strategy for Germany", as specified in the wording of 2010 and 2014. The strategy of Germany, as well as the strategy of whole of the European Union is aimed at achieving the set goals by 2020, which will be a time of summing up and correction of future development. "High Tech

Strategy 2020 for Germany" is the first comprehensive strategy for high-technological development in the country, with goals, objectives, tools and methods for stimulating innovation, as well as key areas and industries that will form the basis for the development of the whole economy [16].

Being closely linked to the global idea of building an Innovation Union in Europe, the national strategy of high-technological development in Germany is similar to the overall European strategy goals and objectives. At the same time, Germany is not only one of the members of the Innovation Union, but a leader in technological development in many sectors of the economy. This is illustrated by a comparison of the goals and objectives of the German national strategy and the Innovation Union of the EU, which characterizes the unified strategy of high-technological development in Europe (Table 1).

The set of tasks posed by national and pan-European strategies form the main goal aspire to Germany and Europe – a decent response to global challenges: climate change, lack of natural resources, demographic change, ensuring a high standard of living through the development of high technology that contribute to solve the emerging problems of further development of the EU and the formation of a strong, competitive economy.

The main goal of the high-technological development strategy of Germany – increase its competitiveness, achieve economic growth and welfare, improve quality of life, produce new products and services, restore the position of the leading exporter, ensure efficient use of resources, protect the environment, establish a high level of development of medicine and information technologies. The main objective laid down in Germany's technological development strategy determines and a priority the indicators at the moment, the achievement of which by means of the development of high technologies is the most significant for the further development of the country [16].

The goal, formulated in the strategy EU, is a rather general but strong and competitive economy that is capable of responding to the social, economic or environmental global challenges of implementing the national strategies of high-technological development of all its members, is the main direction of the European Union's development. In order to fulfill each task stated in the strategy, a separate program has been developed, both at the national and European levels. And, as the shows analysis, the goals and objectives of German and pan-European strategies conceptually coincide, which is due to the importance of building an innovation partnership in order to achieve a high level of competitiveness as a priority trend in the development of the European Union's economy.

Similarly, the direction and content are also programs for solving the problems of innovation development. Forming the possibility of obtain funding at both

the national and European level, as well as the possibility of participation in a large number of projects and the search for partners not only within the same country but throughout the EU, which can significantly improve the quality of research work and the likelihood of developing and the further introduction of innovations not only in Germany, but also in Europe as a whole (Table 2).

All EU programs are part of the Eighth Framework Program "Horizon 2020", which provides financing for

all key initiatives announced by strategy "Europe 2020" and the Innovation Union programs. The European Union's programs are comprehensive and aimed at achieving a common goal – development of high technologies in all member states of the EU, in contrast to Germany, which meet the challenges of high-technological development, based on the characteristic economic features of the country.

Table 1

Comparison of tasks of the national high-technological strategy of Germany and the strategy of the Innovation Union of the EU

Strategy of the EU (Innovation Union)	Strategy of Germany
Investing in education, R & D	Increase in R & D investment, attracting private investment
Coordination of National and Pan-European Innovation Strategies	National Innovation Policy - Part of Global and European Policies
Modernization of the education system, creation of high-class universities, attraction of skilled specialists from abroad	Training and retraining of personnel in the priority areas of high-technological development
Providing access to receive financing from the European Regional Fund Development, especially for small and medium enterprises	Creating conditions for the development of medium and small high-technological businesses
Establishing a communication between science and business: innovative ideas should be easily implemented in practice. Easy access to the registration of intellectual property	Unification of economics and knowledge, technologies must have practical application, joint work of enterprises, higher educational institutions, scientific-research funds
Development of partner relations at the european and global levels of various research and development	Assistance to domestic companies in establishing partnerships with high-technological enterprises in leading countries
Spending of R & D should amount to 3% of EU GDP by 2020	Spending of R & D should amount to 3% of Germany's GDP by 2020

Source: [10, 16].

Table 2

Compliance of programs in different directions of innovation development of Germany and the EU

Programs of the EU	Programs of Germany
ERA (European Research Area): increasing the scientific and technological potential of Member States EU; increasing the efficiency of national research systems; joint work of enterprises in innovation clusters	Innokom-ost: development of innovative potential of East German lands
	Unternehmen region: increasing the competitiveness of regions through the participation of their enterprises in innovation clusters
Eurostars, EUREKA: program for maintenance innovative development of small and medium enterprises; access to financing; inspiration of international cooperation, creation of sites for joint work of enterprises from different countries	Zentrale Innovationsprogramm Mittelstand, KMU-innovativ: assistance to enterprises in the development of innovations (financing, consulting, participation in clusters, bringing of product / service to the market)
	EXIST, Invest: stimulating startups to work in a high-technological sector; access to risk capital
LEIT (Leadership in Enabling and Industrial Technologies): development of high-technological sectors; access to financing; stimulation of research, assistance in bringing to the market	Industrie 4.0: maintenance of sectors of high-technological sector, priority for Germany (biotechnology, information technology, space industry, etc.)

Source: [11, 16].

The following features of the German economy include: presence of a large number of small and medium enterprises that make up the backbone of its economy, gap in the level of economic development between the regions of the eastern and western parts of Germany, leading position and the need for strengthening them in such areas as biotechnology, microelectronics, aerospace technology, information technologies, etc. Thus, national high-technological development programs are more specific and clear, but are fully consistent with the objectives of the initiatives EU as part of a global project to create a highly developed and high-technological region called "Europe 2020" [11].

The European Union has realized the importance of high-technological development in the modern world. The development of innovation is the core of current strategy "Europe 2020". Implementation of innovations and technology development in line with the strategy should become the driver for the growth and prosperity of the European Union. Despite the current potential – the presence of large enterprises-leaders in the aerospace, energy, telecommunications, biotechnology and a number of leading research institutes, high-quality education, the EU is still inferior to the United States and Japan in innovative development. Therefore, Europe's innovation development strategy and its innovation policy form the model of innovation and technological development in Germany, which aims to lead Germany to a leading position in the innovative and technological development of not only Europe but also the world.

Historically, in Germany was formed the complex structure of the system of research and innovation activities, which includes many institutions and departments, which is due to the division of functions of R & D management between the federal government and land governments. Since 1972, the Federal Republic of Germany has been operating in the Ministry of Science Research and Technology, which deals with general issues of science and technology policy, planning and management of the whole sphere of scientific and technological activities (with the exception of universities), organizing research in the field of atomic energy, space technology, informatization, new materials, etc. Also, the tasks of scientific and technological development are solved within the framework of the functioning of a number of other federal ministries (education, defense, internal affairs). Financing and control for research and innovation activities is carried out by land governments.

The coordination of the work of the Federal Government of the Federal Republic of Germany with the governments of the federal lands is carried out with the help of the Scientific Council and the organization "Public Scientific Conference", which since 2008 replaced the Commission on the interaction of the federation with the federal lands. The Scientific Council at the request of the Federal Government certifies federal

organizations of the area R & D during this period that received the highest marks. Growing role in supporting R & D plays the European Commission (Germany is one of the largest donors of the EU), which directs funding for scientific research and development in Europe,

The complex structure government management of R & D in Germany did not allow the implementation of a management model based on the implementation of joint programs of scientific and technological development. Therefore, in Germany became popular the branch programs in the most important areas of R & D (energy, environmental protection, etc.).

As it is formed Germany's innovation policy it has evolves a number of distinctive features, including a widely developed network of innovation centers. Today there are more than 400 such centers, which include over 5000 innovative companies, scientific-research institutes and organizations that provide services for the implementation of innovative developments. Innovation centers working in close cooperation with industrial companies are the basis of a national and international cooperative system aimed at maintenance innovative projects of importance for the structural reorganization of the German economy [16].

One of the main tasks of innovation centers – maintenance of small high-technologic firms. In 1988, was created the Federal Association of Technological and Innovative Centers – ADT, which now includes more than 200 members. The Association will organize the interaction of the German centers among themselves, as well as with similar centers in other countries [16].

In Germany, has been formed an effective system of scientific associations, which is an effective instrument for implementing state policy in the field of innovation investment. The most well known of them – the German Scientific-Research Society, Society named after Max Planck, Society named after Fraunhofer, Community named after Helmholtz and others [16].

For example, the German Research Community (DFG), existing on self-government includes: 69 leading universities, 16 inter-university scientific-research centers, 8 academies, and 3 scientific unions. Financing DFG is in the following proportion: 58% funded by the federation and 42% - federal land. It currently allocates annually for needs almost 20000 different research projects more than 1,2 billion EUR. DFG is the central self-governing institution of German science and a major partner for foreign scientific-research organizations that promotes collaboration between scholars, maintenance young scientists and interdisciplinary research, as well as the creation of networks in the field of scientific research [16].

The issue of maintaining Germany's leading position in the world of technology is considered in the country much wider than the mere maintenance of advanced research and development. Proceeding from

the thesis that science is an integral and essential component of German culture, depends on the general recognition of the quality of German technology that the international credibility of the country, and one of its consequences is its place in the world market, the maintenance of a high level of national science is included in the system of state priorities Germany. In

Germany, actively developing research in such innovative areas as nanotechnology, new materials, ICTs, microelectronics, biotechnologies is being implemented that is, the actual trend of developing NBIC-technologies.

Table 3

Functions and tasks of subjects of the system of ensuring technological leadership of Germany in the economic system of the EU

№	Subjects national innovation system	The task of institutional provision of technological leadership of the Federal Republic of Germany								
		Development of the state strategy	Formation of normative-legal environment	Selection of scientific, technological and innovation priorities	Mobilization and distribution financial resources	Spreading technologies	Stimulation innovation activity	Conducting structural reforms	Personnel provision innovation activity	Control over implementation strategy of technological and innovation development
1	Public sector									
	1.1. Institutions for the development and coordination of the strategy									
	a) Governments of the federal states (16 governments)	H	H	I	H	I	H	I	N	H
	б) Federal Government	H	H	I	H	I	H	I	N	H
	в) European Commission	H	H	I	H	I	H	I	N	H
	1.2. Financial organizations									
	a) Federal Ministries	I	I	I	H	I	I	I	I	I
	б) Funds	I	N	I	H	N	I	I	I	I
2	Societies and unions	N	N	I	I	I	I	I	I	I
3	Entrepreneurial sector	N	N	N	I	I	I	I	I	I
4	Scientific sector									
	4.1. Scientific and scientific-research organizations	I	I	I	I	H	I	I	I	I
	4.2. Educational and study institutions	I	N	I	I	H	I	I	I	I
5	Sector of innovation transfer	N	N	I	I	H	N	H	N	I
6	Sector of NGO	N	N	N	N	I	N	N	N	I
7	Sector of foreign partners	N	N	N	I	I	I	I	I	I

Note: "H" - high level of responsibility; "I" - involved; "N" - does not participate.

Source: compiled by the authors according to the data [10-11, 16].

Academic sector in Germany is represented mainly by universities, where both applied and fundamental research is conducted.

In researching the mechanism of providing technological leadership as a set of different institutes that jointly and individually contribute to the creation and

dissemination of new technologies, it has been revealed that to date there is no approach to a qualitative assessment of the level of information interaction of subjects of the system institutions of scientific-research activities and dissemination of technologies as an information system [2].

Therefore, we propose an approach to a qualitative assessment of the level of information interaction the subjects of the system of institutes of scientific-research activity and the spread of technologies based on the criterion of informational communicativeness. The main criterion that characterizes the strategic function of scientific-research activities and the spread of technologies is integrity, and ensures its integrity.

The existence of a direct relationship between the communicative nature of the subjects of the system of institutes of scientific-research activities and the dissemination of technologies was revealed, and the strategic efficiency of the introduction of new technologies and the formation of Germany's technological leadership in the EU market as an economic system, while the dominant tasks of the institutional provision of German technological leadership were identified (Table 3).

These tables represent a matrix of the responsibility of the subjects of the system of institutions in solving

the tasks of institutional provision of technological leadership of Germany in the EU market. Thus, by defining the main aspects of realization the goals of ensuring Germany's technological leadership in the EU, the national innovation strategy proposes measures in five key inter-sectoral areas: (1) improving the relationship between science and industry; (2) enhancing R & D and innovation work in private the sector of the economy, (3) to ensure the dissemination of new advanced technologies in the economy, (4) to internationalize scientific research, development and introduction of new technologies, and (5) to promote the development and further of talents.

All these proposed strategies of high-technologic development in Germany are aimed at simplifying and reducing the path from idea to implementation innovation, which will continue to ensure the technological leadership of Germany in the EU economic system.

ІННОВАЦІЙНИЙ РОЗВИТОК ЄС: СТРАТЕГІЧНІ ПРІОРИТЕТИ ТЕХНОЛОГІЧНОГО ЛІДЕРА

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Актуальність дослідження пояснюється тим, що Німеччина як одна з країн європейської економічної системи, займає лідируючі позиції за багатьма показниками і на світовому технологічному ринку. Предметом дослідження статті є інноваційний розвиток ЄС. Метою є стратегічні пріоритети технологічного лідера - Німеччини в інноваційному розвитку ЄС. Об'єктом дослідження є зіставлення завдань національної високотехнологічної стратегії Німеччини та стратегії Союзу інновацій ЄС.

Інструментом для досягнення стратегії раціонального зростання на всій території ЄС стало створення Союзу інновацій, який об'єднав національні інноваційні системи всіх держав-членів ЄС. Суть створення Інноваційного союзу полягає в проведенні досліджень і наукових розробок по всій Європі з метою вдосконалення науково-технічної бази і підвищення конкурентоспроможності ЄС в пріоритетних наукових областях, одночасно рішення таких соціально-економічних завдань, як створення робочих місць, поліпшення освіти, залучення молоді в науку, створення інноваційних продуктів і послуг, вдосконалення системи охорони здоров'я, транспортна інфраструктура, а також підвищення енергоефективності, економія природних ресурсів і навчання, турботи про навколишнє середовище.

Будучи тісно пов'язаною з глобальною ідеєю створення Союзу інновацій в Європі, національна стратегія високотехнологічного розвитку в Німеччині схожа із загальною метою і цілями європейської стратегії. У той же час Німеччина є не тільки одним з членів Інноваційного союзу, а й лідером в області технологічного розвитку в багатьох секторах економіки.

Використовуються такі загальнонаукові методи, як системний аналіз. Були отримані наступні результати: національна німецька інноваційна стратегія пропонує заходи в п'яти ключових міжсекторальних областях: (1) покращення взаємовідносин науки та промисловості; (2) посилення науково-дослідної та інноваційної діяльності у приватному секторі економіки, (3) забезпечення поширення нових передових технологій в економіці, (4) інтернаціоналізація наукових досліджень, розробка та впровадження нових технологій та (5) сприяння розвитку та подальшому просуванню талантів.

Висновки: на основі проведених досліджень був зроблений висновок про те, що всі пропонувані стратегії високотехнологічного розвитку в Німеччині спрямовані на спрощення і скорочення шляху від ідеї до впровадження інновацій, яке буде продовжувати забезпечувати технологічне лідерство Німеччини в економічній системі ЄС.

Ключові слова: високотехнологічна стратегія, економічна система ЄС, інноваційна політика, інноваційний розвиток, глобальні виклики, національна конкурентоспроможність.

ИННОВАЦИОННОЕ РАЗВИТИЕ ЕС: СТРАТЕГИЧЕСКИЕ ПРИОРИТЕТЫ ТЕХНОЛОГИЧЕСКОГО ЛИДЕРА

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Актуальность исследования объясняется тем, что Германия как одна из стран европейской экономической системы, занимает лидирующие позиции по многим показателям и на мировом технологическом рынке. Предметом исследования статьи является инновационное развитие ЕС. Целью являются стратегические приоритеты технологического лидера - Германии в инновационном развитии ЕС. Объектом исследования есть сопоставление задач национальной високотехнологической стратегии Германии и стратегии Союза инноваций ЕС.

Инструментом для достижения стратегии рационального роста на всей территории ЕС стало создание Союза инноваций, объединившего национальные инновационные системы всех государств-членов ЕС. Суть создания Инновационного союза заключается в проведении исследований и научных разработок по всей Европе в целях совершенствования научно-технической базы и повышения конкурентоспособности ЕС в приоритетных научных областях, одновременно решения таких социально-экономических задач, как создание рабочих мест, улучшение образования, вовлечение молодежи в науку, создание инновационных продуктов и услуг, совершенствование системы здравоохранения, транспортная инфраструктура, а также повышение энергоэффективности, экономия природных ресурсов и обучение заботе об окружающей среде.

Будучи тесно пов'язаною з глобальною ідеєю створення Союзу інновацій в Європі, національна стратегія високотехнологічного розвитку в Німеччині схожа з загальною метою і цілями європейської стратегії. В той же час Німеччина є не тільки одним з членів Інноваційного союзу, а й лідером в області технологічного розвитку в багатьох секторах економіки.

Використовуються такі общенаукові методи, як системний аналіз. Були отримані наступні результати: національна німецька інноваційна стратегія пропонує заходи в п'яти ключових міжсекторальних областях: (1) покращення взаємодії між наукою і промисловістю; (2) розширення науково-дослідницької та інноваційної роботи в приватному секторі економіки, (3) забезпечення поширення нових передових технологій в економіці, (4) інтернаціоналізація наукових досліджень, розробка та впровадження нових технологій і (5) сприяння розвитку та подальшому просуванню талантів.

Висновки: на основі проведених досліджень було зроблено висновок про те, що всі запропоновані стратегії високотехнологічного розвитку в Німеччині спрямовані на спрощення та скорочення шляху від ідеї до впровадження інновацій, яке буде продовжувати забезпечувати технологічне лідерство Німеччини в економічній системі ЄС.

Ключові слова: високотехнологічна стратегія, економічна система ЄС, інноваційна політика, інноваційне розвиток, глобальні виклики, національна конкурентоспроможність.

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