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FROM THE HISTORY OF SCIENTIFIC AND INNOVATIVE ACTIVITY OF GERMANY IN THE 21ST CENTURY

Umarov Sardor Yakubovich

Doctor of Philosophy in Historical Sciences (PhD)

Samarkand State University named after Sharof Rashidov, Samarkand, Uzbekistan

sardor.umarov.2013@mail.ru

Abstract: Innovation has become another important driver of economic restructuring in Germany. New products and new processes offer the opportunity to increase sales and profits and create new jobs. The article analyzes the scientific and innovation processes that took place in Germany after reunification and the issues that were addressed in this process. At the same time, the author thoroughly studied the negative and positive aspects of innovation in the 21st century.

Keywords: Scientific development, regional planning, technological regions, innovative efficiency, investment.

ИЗ ИСТОРИИ НАУЧНОЙ И ИННОВАЦИОННОЙ ДЕЯТЕЛЬНОСТИ ГЕРМАНИИ В XXI ВЕКЕ

Умаров Сардор Якубович

Доктор философии по историческим наукам (PhD)

Самаркандский государственный университет имени Шарафа Рашидова, Самарканд,
Узбекистан

sardor.umarov.2013@mail.ru

Аннотация: Инновации стали ещё одним важным фактором экономической реструктуризации в Германии. Новые продукты и новые процессы позволяют увеличить продажи и прибыль, а также создать новые рабочие места. В статье анализируются научные и инновационные процессы, происходившие в Германии после объединения, и вопросы, которые решались в ходе этих процессов. При этом автор подробно рассматривает как негативные, так и позитивные аспекты инноваций в XXI веке.

Ключевые слова: Научное развитие, региональное планирование, технологические регионы, инновационная эффективность, инвестиции.

XXI ASRDA GERMANIYANING ILMIY VA INNOVATSION FAOLIYATI TARIXIDAN

Umarov Sardor Yakubovich

Tarix fanlari bo'yicha falsafa doktori (PhD)

Sharof Rashidov nomidagi Samarqand davlat universiteti, Samarqand sh, O'zbekiston

sardor.umarov.2013@mail.ru

Annotatsiya: Germaniyada innovatsiya iqtisodiy qayta qurishning yana bir muhim omili bo'ldi. Yangi mahsulotlar va yangi jarayonlar savdo va foydani oshirish hamda yangi ish o'rinlari yaratish imkoniyatini berdi. Maqolada Germaniya qayta birlashganidan keyin kechgan ilmiy va innovatsiya jarayonlari hamda bu jarayonda e'tibor berilgan masalalar tahlil qilingan. Shu bilan birga XXI asrda innovatsiyaning salbiy va ijobiy tomonlari qanday kechganligi muallif tomonidan atroflicha o'rganilgan.

Kalit so'zlar: Ilmiy ishlanma, mintaqaviy rejalashtirish, texnologik hududlar, innovatsion samaradorlik, sarmoya.

The success of the economic development of the united Germany, expressed in the country's leading position in the world market, is associated with the characteristics of the functioning of a single economy based on a mixed model - a limited agreement on regulation between the free market and the government. Also, the specific features of the German economic system include a high degree of centralization of capital and concentration of production, the rapid development of scientific and research activities, and an active social and investment policy.

Innovation has become another important driver of economic restructuring. New products and new processes offer the opportunity to increase sales and profits and create new jobs. Analysis by economic geographers and regional economists over the past few years has shown that, in addition to the specific capabilities of a firm, the regional environment is also of great importance for the formation of market knowledge. Innovative firms are often included in "regional innovation systems", "creative local environments" or "industrial clusters". A high density of economic activity, the presence of highly skilled workers, and appropriate networks between companies, as well as between companies and research institutions, are crucial conditions for competitiveness.

A favorable regional environment offers many positive externalities for companies. Territorial proximity can reduce transaction costs and knowledge diffusion can facilitate collective learning processes leading to new products and processes. In general, large agglomerations offer most of these advantages, but under certain conditions, highly competitive industrial clusters can also develop in rural areas (e.g. medical technology in Tuttlingen/Baden-Württemberg). An important prerequisite for innovation clusters is the availability of highly qualified personnel. The share of qualified personnel and employees in research and development (R&D) is particularly high in large urban agglomerations. This is

where companies' R&D departments, as well as universities and other research institutions, are concentrated.

The organization of scientific and innovative activity in Germany is fundamentally different from the models in England or America. A significant part of it (especially in the field of fundamental research) is carried out within the framework of scientific research institutes (RITs), rather than universities, which are more focused on practical aspects. Development in Germany is carried out in a wide range of fields, including both the exact sciences and the humanities. In recent years, the scientific field has been adapting to the changing needs of society, as can be seen in the establishment of new scientific organizations. Research institutes were established in the 2000s. In particular, the Mercator Institute for China Studies (MERICS, 2013), which studies China, as well as the Center for Eastern European and International Studies (Zentrum für Osteuropa und internationale Studien, ZOIS, 2016), which studies Russia and Eastern Europe, reflect this need [1, c.39].

The following entities can be distinguished in the German research and innovation system, which have different interests and are supported by the state in different ways: (1) large companies, (2) small and medium-sized companies, (3) universities, (4) associations of research institutes and individual research institutes not affiliated with any association. These four groups are supported by the German government. It should be noted that in Germany, a model of innovative development, the "triple spiral", has been created in line with new trends and approaches to state innovation policy. The concept of the "triple spiral" was proposed by G. Itzkowitz and L. Leydesdorff in the 1990s. According to it, additional opportunities for development arise as a result of the interaction between the state, universities and companies, as a result of innovative processes. In Germany, the interaction between universities and companies (mainly large and medium-sized businesses) is carried out on the basis of the principle of dual education. According to it, students spend the last six months of their studies at the enterprise, the topic of their diploma is agreed with the company representatives. The student is assigned two academic supervisors from the university and the company.

Research and development efforts are closely linked to innovation outcomes. The conversion of research and development into marketable innovations (products) has worked better in some regions than in others. A good indicator of regional innovation capacity has been patent applications. Stuttgart, Munich, Düsseldorf, Rhein-Main (Frankfurt), Middle Franconia (Nuremberg), Berlin and Cologne were the leading patent applications in 2000. An analysis of patent density (patent applications per 100,000 inhabitants) shows that even highly innovative federal states such as Baden-Württemberg and Bavaria have proven to be capable of developing high-tech innovation. In 2000, the highest patent densities were found in the regional planning areas of Stuttgart (141.3), Munich (129.4), East Württemberg (113.6), Bodensee-Oberswaben (105.7) and Middle Franconia (110.2). Overall, the patent data showed a sharp difference between West and East, which remained fairly stable in 2003.

In the early 2000s, many East German technology regions, although they had a relatively high share of highly skilled workers, were unable to reach the Western average in terms of patent applications and other indicators of innovation. This indicates serious problems in R&D productivity in East Germany. Positive cluster effects are still not well developed in East German regions. It is unlikely that the state-funded infrastructure for research and education is the cause, as much has happened in the past few years. However, the manufacturing sector, which carries out R&D and produces most of the technological innovation, was very weak. In addition, the scale structure of companies was not advantageous. East German manufacturers were much smaller and weaker in terms of sales volume than their Western counterparts.

However, by 2003, innovation efficiency - the ratio between revenue from innovation and expenditure on research and development - lagged far behind Western standards [2, s.746]. For the competitiveness of firms, not only the development of new products, but also their successful marketing is important.

Overall, innovation in the German economy declined in the early 2000s. Due to this weakness in innovation, Germany gradually lost ground in international technology markets, especially in advanced technologies, starting in the early 1990s. The German economy was still heavily dependent on traditional technologies and, especially in exports, on automobile production [3, s.34].

Germany is among the world's top 10 countries for innovation. In 2020, Germany spent 241 billion euros on education, research and the sciences. Today, Germany is distinguished by the breadth of its vocational and higher education systems and the world-leading research it conducts.

Germany has a global reputation for its strength in innovation and its extensive academic and research system. The country's 420 higher education institutions are the foundation of this success [4].

Industrial research is another important element of Germany's status as a location for higher education. One indication of this strength is that Germany ranks among the world's leading countries in terms of the number of patent applications. Germany's four major non-university research institutes: the Fraunhofer-Gesellschaft, the Helmholtz Association, the Leibniz Association and the Max Planck Society, have an excellent international reputation and play a significant role in Germany's scientific and academic success.

Science and research have a high reputation in Germany. Business and politicians have consistently increased budgets for research in recent years.

In 2006, Germany developed a unique tool in the form of its High-Tech Strategy. Since then, research projects under the High-Tech Strategy have led to numerous innovations, from energy-saving LED lamps to tissue-engineered heart valves.

Germany is investing heavily in research and science to ensure that this innovative energy continues to thrive. This puts the Federal Republic among the leading countries in investing around 3% of GDP in research and development each year. By 2025, this is set to amount to at least 3.5% of public spending [4].

The federal government aims to use its "Future Strategy" study as an effective way to pool resources. As part of this, the government has identified key "future areas". These include developing modern technologies for competitive and climate-neutral industry, creating a sustainable agricultural and food production system, strengthening technological sovereignty, and developing a sustainable healthcare system that uses the potential of biotechnology and medical processes. The development of the first Covid-19 vaccine is a successful paradigm of state funding. The vaccine was developed by the Mainz-based company Biontech, whose founders Özlem Türeci and Uğur Şahin also teach at the University of Mainz. The state has provided significant support for the development of the vaccine at Biontech and other centers.

In 2020, research expenditure amounted to 3.13% of Germany's GDP. Germany also ranks internationally as the fourth most research-intensive economy in the world. In 2020, research expenditure in Germany amounted to just under €107 billion. The business sector spent €71 billion, while universities and non-university research institutes spent €19.3 billion and €15.6 billion, respectively. The strength of cutting-edge research in Germany is reflected in the number of publications published by researchers. In 2022, Germany ranked highest in Europe in the Nature Index, which assesses the publication performance of research and higher education institutions [4]. Against international competitors, Germany came in third place, ahead of the US and China.

In 2018, the High-Tech Strategy until 2025 was adopted and focuses on seven priority areas: health and care, sustainability, climate protection and energy, mobility, city and country, security, business and work. Specific goals of the High-Tech Strategy until 2025 include combating cancer, reducing plastic in the environment and increasing greenhouse gas neutrality in industry.

There are around 1,000 state-funded research institutes in Germany. In addition to Germany's universities, four major non-university research institutes form the backbone of the German research system. The Max Planck Society (MPG), founded in 1948, is a leading non-university center for fundamental research in the natural, biological and social sciences and the humanities. The Max Planck Society employs around 7,000 scientists and researchers, 3,400 doctoral students and 2,200 research assistants in its 86 institutes and research institutes, some of whom are based outside Germany. More than half of the academics and researchers (54.6%) are foreign nationals. Since the Max Planck Society was founded, more than 20 Nobel Prizes have been awarded to researchers.

The driving force behind Germany's economic growth is the flourishing culture of innovation in German companies. To ensure and enhance this success, Germany invests more than 3% of its GDP in research and development. This investment amounts to more than 100 billion euros per year [4].

Although Germany was defeated in two world wars, it has managed to become one of the most economically developed countries in the world in 80 years. Experts often emphasize that the unique character of the Germans has contributed to their economic success.

Germans are interested in long-term rather than short-term efficiency. They work very carefully. Much attention is paid to education here. High demands are made on children. As in Japan, in this country, they expect their children to study well at school, and if their learning is slow, they immediately hire a tutor.

Mutual understanding is important for them, so ordinary employees, along with managers, participate in decision-making. German managers increase the enthusiasm of their subordinates by appropriately encouraging them for their achievements. They treat each other as partners.

In difficult situations, Germans are willing to sacrifice their own interests for the good of society. The country has low levels of corruption and crime, and most countries devote all their energy to fighting these two evils.

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РАЗРАБОТКА СИСТЕМЫ МОНИТОРИНГА СЕРВЕРОВ С ПОСТРОЕНИЕМ АНАЛИТИЧЕСКИХ ГРАФИКОВ

¹Кузьмин А.В., ²Медведева О.А., ³Хамидова М.Н.

¹Студент кафедры информационных систем
Казанский федеральный университет, г. Казань, Россия

²К.ф.-м.н., доцент кафедры информационных систем
Казанский федеральный университет, г. Казань, Россия

OAMedvedeva@kpfu.ru

³Студент кафедры точных наук и информационных технологий
Филиал Казанского федерального университета, г. Джизак, Республика Узбекистан

Аннотация: Данная работа посвящена разработке интегрированной платформы для мониторинга серверов с построением аналитических графиков. Платформа предлагает интуитивно понятный веб-интерфейс, который упрощает взаимодействие с системой, обеспечивает гибкую настройку оповещений и построена на модульной архитектуре, что обеспечивает ее расширяемость и интеграцию с другими сервисами.

Ключевые слова: мониторинг серверов, визуализация метрик, веб-интерфейс, интеграция, информационные технологии, цифровые инструменты.

DEVELOPMENT OF A SERVER MONITORING SYSTEM WITH THE CREATION OF ANALYTICAL GRAPHS

¹Kuzmin A.V., ²Medvedeva O.A., ³Khamidova M.N.

¹Student, Department of Information Systems
Kazan Federal University, Kazan, Russia

²PhD Associate Professor Department of Information Systems
Kazan Federal University, Kazan, Russia

OAMedvedeva@kpfu.ru

³Student, Department of Exact Sciences and Information Technology
Branch of Kazan Federal University, Jizzakh, Uzbekistan

Abstract: This work is devoted to the development of an integrated platform for server monitoring with the construction of analytical graphs. The platform offers an intuitive web-interface that simplifies interaction with the system, provides flexible alert configuration, and is built on a modular architecture, ensuring its extensibility and integration with other services.

Keywords: server monitoring, metrics visualization, web-interface, integration, information technology, digital tools.