

Article

International Experience in The Management of Innovation Activities of Industrial Enterprises and Prospects for its Application in The Republic of Uzbekistan: The Cases of Malaysia, South Korea, and Germany

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Abstract: The article examines foreign experience in managing the innovation activities of industrial enterprises using the examples of Malaysia, South Korea, and Germany. The study analyzes key models of innovative development, instruments of state support, and institutional mechanisms for stimulating innovation. Based on statistical data, a comparison of indicators of innovation activity and investments in research and development is conducted. Particular attention is paid to the prospects for adapting these models within the industrial policy of the Republic of Uzbekistan. The results of the study show that the integration of government support, industrial clustering, and the development of innovation infrastructure can significantly increase the competitiveness of the country's industrial sector.

Keywords: Innovation, Industry, Innovation Management, National Innovation System, Industrial Policy, South Korea, Germany, Malaysia

1. Introduction

In the context of global competition, innovation has become a key driver of economic growth and industrial competitiveness. Contemporary studies indicate that the innovation activities of enterprises have a direct impact on labor productivity, economic development, and the sustainability of the national economy.

The formation of national innovation systems is one of the most important prerequisites for a country's technological development. A national innovation system is defined as a set of institutions that interact in the process of creating, disseminating, and utilizing new knowledge and technologies.

International experience demonstrates that the world's most successful economies actively invest in research and development (R&D). According to international studies, global expenditures on research and development exceed USD 2.5 trillion annually [1].

Among the countries that have demonstrated the most successful models of industrial innovation development are South Korea, Germany, and Malaysia. South Korea is one of the global leaders in terms of investment in research and development, with R&D expenditures accounting for approximately 4.9% of GDP. Germany, in turn, occupies a

leading position in Europe in the development of industrial innovation systems and cluster policy [2].

In recent years, the Republic of Uzbekistan has also pursued an active policy of industrial modernization and the formation of an innovation-driven economy. The development of a national innovation system is considered one of the key factors in enhancing the competitiveness of the country's economy [3].

The purpose of this study is to analyze foreign experience in managing the innovation activities of industrial enterprises and to assess the possibilities for its application in the Republic of Uzbekistan [4].

2. Materials and Method

The methodological framework of the study is based on comparative analysis, statistical analysis, and the institutional approach.

The information base of the research includes:

- Statistical Data From International Organizations;
- Analytical Reports Of International Institutions;
- Studies In The Field Of Innovation Economics [5-6].

Particular attention is given to the analysis of research and development expenditures, which constitute one of the key indicators of a country's innovative development [7].

The study also utilizes data from international statistical databases containing information on innovation activity indicators across various countries.

3. Results and Discussion

An analysis of international statistics reveals significant differences in the levels of innovative development among countries.

Table 1. Investments in Research and Development (R&D) [2]

Country	R&D Expenditure (% of GDP)	Key Innovation Sectors
South Korea	4.9	Electronics, Robotics
Germany	3.1	Mechanical Engineering
Malaysia	1.0	Electronics
Uzbekistan	0.2–0.3	Industry

A high level of investment in research and development (R&D) is one of the main factors contributing to a country's technological leadership [8].

South Korea is one of the most successful examples of innovation-driven industrialization. The country has implemented an active government policy aimed at supporting innovation and promoting the development of high-tech industries [9].

The key elements of South Korea's innovation system include:

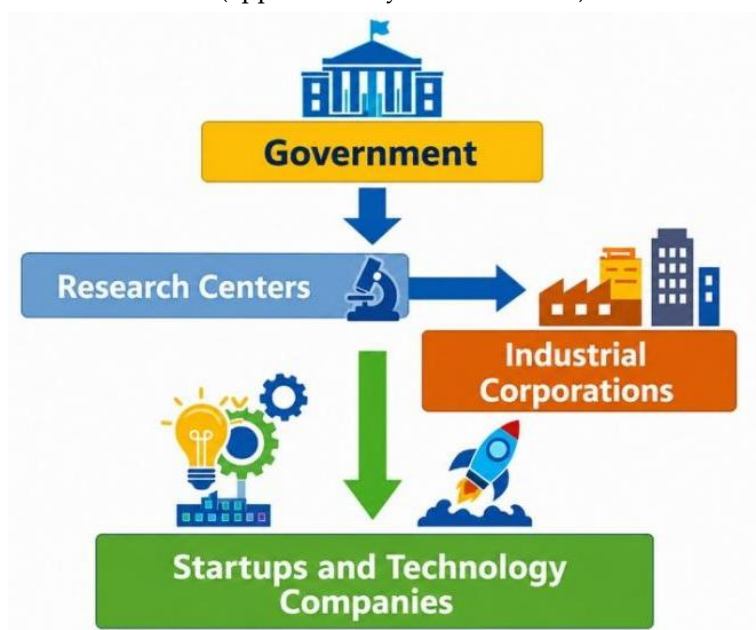
- Large industrial corporations;
- Government investment programs;
- Technology parks;
- Cooperation between science and business [10].

South Korea demonstrates one of the world's most successful models of innovative industrial development. Government programs focused on industrial modernization and technological investment have played a crucial role in achieving this success [11-12].

Table 2. Main Elements of South Korea's Innovation System [3]

Element	Characteristics
Government Investment	Large-scale R&D programs
Industrial Corporations	Samsung, Hyundai
Technology Clusters	Innovation and technology parks
Public-Private Partnerships	Active support for startups

The Government of South Korea plans to increase research and development (R&D) expenditures to 35.3 trillion won (approximately USD 25 billion).

**Figure 1.** Structure of South Korea's Innovation System

Source: Developed by the author

In Germany, government investment plays a crucial role in financing research and development activities, thereby fostering the creation of new technologies and enhancing industrial competitiveness [13].

Germany has implemented an innovation development model based on close cooperation among research institutions, industrial enterprises, and the government [14].

Table 3. Key Elements of Germany's Innovation System [4]

Element	Function
Fraunhofer Institutes	Applied research
Technology Clusters	Innovation regions
Industrial Corporations	Siemens, Bosch
SME (Small and Medium-sized Enterprises) Support	Innovation support programs

The Fraunhofer Institutes play a particularly important role in Germany's innovation system. These research institutions specialize in applied research and the development of new technologies for industry, serving as a bridge between scientific research and industrial application.

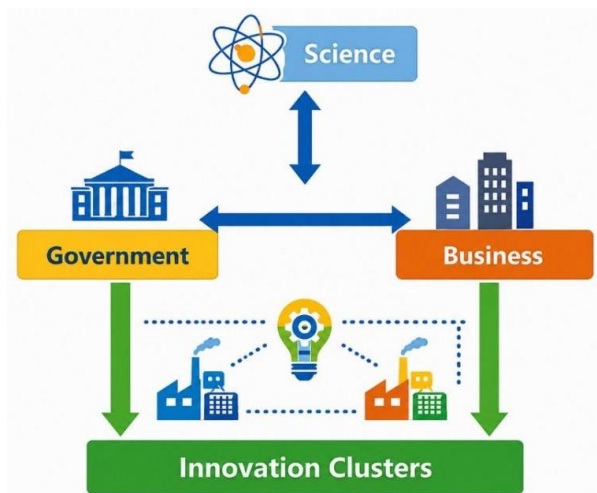


Figure 2. Model of Innovation Cooperation in Germany

Source: Developed by the author

Furthermore, an important component of Germany’s innovation system is the support provided to small and medium-sized enterprises (SMEs), which actively implement innovations and contribute to the development of technological clusters [15]. Malaysia demonstrates a successful experience in developing an innovation-driven economy through the attraction of foreign investment and the establishment of technology parks.

Table 4. Main Instruments of Malaysia’s Innovation Policy [5]

Instrument	Description
Technology Parks	Development of startups
Investment Programs	Support for innovation
Educational Programs	Human capital development and workforce training

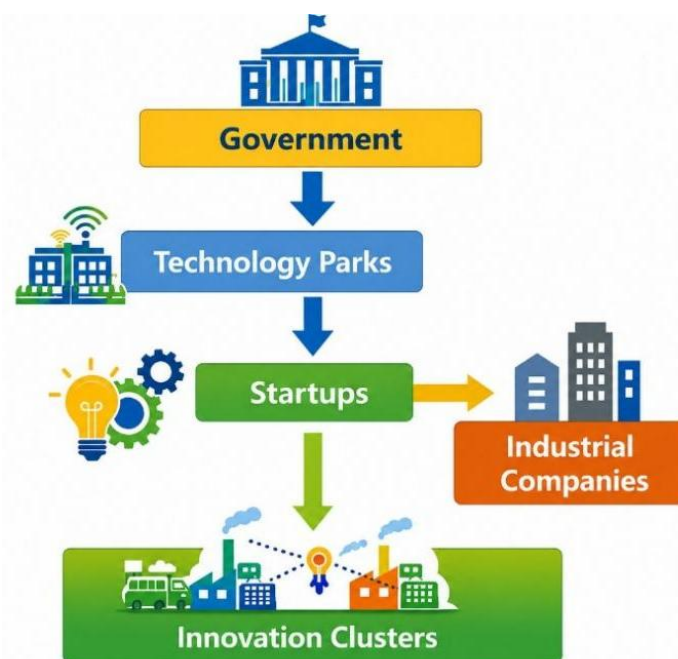


Figure 3. The Innovation Ecosystem of Malaysia

Source: Developed by the author

The main instruments of Malaysia's innovation policy include:

- The establishment of technology parks;
- The development of innovation clusters;
- Government programs supporting startups.

This strategy has enabled the country to significantly enhance the technological development of its industrial sector [16].

4. Conclusions

An analysis of international experience shows that effective management of innovation activities in industrial enterprises requires a comprehensive approach.

The key factors of successful innovation-driven development include:

- An active government policy supporting innovation;
- A high level of investment in research and development;
- A well-developed innovation infrastructure;
- Effective collaboration between science and business.

Uzbekistan possesses a substantial scientific and industrial potential, highly qualified researchers and practitioners, as well as opportunities for conducting research in the field of innovation development. However, the orientation of this significant national asset toward the creation and commercialization of specific innovations remains relatively weak. Another major challenge is the shortage of domestic financial resources and the limited attraction of additional funding for innovation activities. In this regard, the country's economic policy should focus on fostering and supporting new high-tech small enterprises and developing a venture capital industry. Such measures would contribute to strengthening the intellectual and technological potential of the country.

In recent years, the Republic of Uzbekistan has also undertaken significant measures to promote an innovation-driven economy. In particular, programs aimed at industrial modernization and the development of the national innovation system have been implemented.

However, the level of expenditure on research and development in the country remains relatively low compared with the world's leading innovative economies.

The conducted research has demonstrated that foreign experience in managing the innovation activities of industrial enterprises can be successfully adapted to the conditions of the Republic of Uzbekistan.

The most promising areas for applying international experience include:

- The development of innovation clusters;
- The establishment of technology parks;
- Increasing investment in research and development;
- Strengthening cooperation between science and industry.

The implementation of these measures will enhance the innovative activity of enterprises and ensure the sustainable development of Uzbekistan's industrial sector.

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