# Comparative Characteristics of Technology Transfer in Developed Countries

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**Abstract:** The research into innovation transfer in the global economy is a very urgent issue under the modern conditions of development of any country. Comparative characteristics of technology transfer in such countries and regions as the USA, EU, Asia, presented in the article, permit us to detect certain patterns of this process inherent both in developed and developing countries. The analysis made in the article can be useful for developing technology transfer processes in the Danube countries' economy. The analytical method used in this research allowed us to determine the factor that is crucial for the growth of the world market of high-technology products and services. The analysis was conducted on several criteria such as the level of expenditure on R&D in the whole global economy, as well as in individual countries and regions. Besides, there were taken into account the added value of high-tech industries and the share of expenditure on R&D in total production costs. The conclusions regarding the effectiveness of funds allocated for scientific research and experimental development in the U.S. can be drawn on the basis of data presented in the paper on the amount of added value of the U.S. high-tech industries.

**Keywords:** innovation; research and development (R&D); added value; technology transfer

## Danubian Economy and Legislation. Danubian Economy

The economies of Danube counties have a lot common features. This fact determined by the access of these countries to the Pan-European River "arterial road" – Danube.

The investigation of the international experience in the field of transfer of technology in developed countries represented below, will be possibly useful for developing of the technology transfer processes of these countries, and consequently entail the developing of economic processes as well.

Behind the status of the world community nowadays is laid not the military power and economic performance but the ability to produce and sell high technologies.

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From this point of view the countries are divided into those that produce raw materials, commodity, technology and the ones that produce scientific knowledge and high technology.

The group of high-tech industries with the "high-level" technology usually includes the industries that launch a scientific product oriented towards the mass market customer.

In OECD countries there are four high-tech industries such as aerospace engineering, computers and office equipment manufacturing, electronics and communications equipment manufacturing, pharmaceutical industry. The production, introduction and widespread distribution of new products, services, technological processes become the key drivers of increase in output, employment, investment, foreign trade, product quality improvement, labor and material cost saving, industrial management improvement and efficiency. All this determines the competitiveness of the organizations and their products in the domestic and international markets, improves the social and economic situation in the country. That is why in the XXI century the essential condition for a rapid progress of social and economic development is the effective innovation policy, for the dynamic social and economic development of many countries of the world is solely based nowadays on innovations with strategically important effects.

The countries producing technology, scientific knowledge and high technology are the world economic, technological, scientific, and military leaders as well. This complex of industries is a forward advanced strategy, as the development and state support of high technology becomes not only a relevant economic but also a relevant political issue.

The innovative capacity of an economy is determined by the ability to create and disseminate innovation in all its spheres. The specific features of innovation as a good are such that on the one hand the necessity for it is influenced by supply and demand, but on the other hand the need for it arises in a competitive environment. For example, in the Japanese innovative system in 80% of cases it is business that poses questions.

Japan is the leader among the developed countries regarding the amount of expenditure on R&D in total production costs (Graphical chart 1). Thus, the expenditures in 2009 amounted to 3.3% of GDP. This rate decreased in relation to 2008 and 2007 by 0.1%. But even decreased it is 0.5% higher than in the U.S. and 1.5 % higher than in the EU.

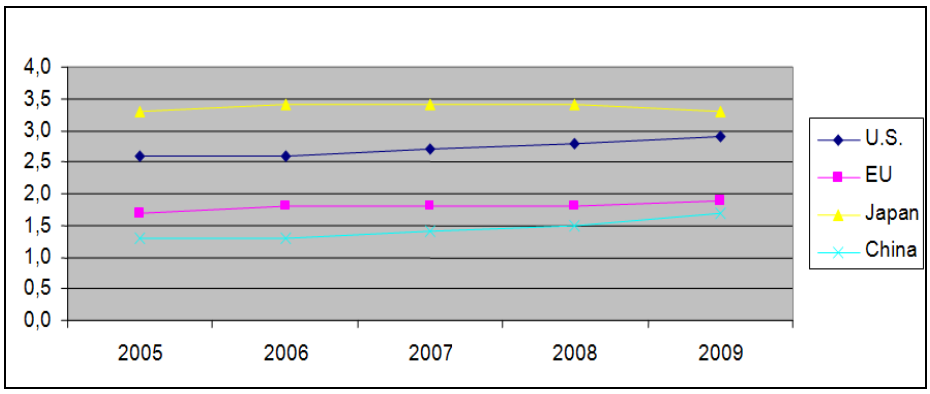


**Figure 1. The Share of Expenditures on R&D in Total Production Costs, % of GDP**

*Source: Organization for Economic Co-operation and Development*

However, under current conditions of development, leadership in the field of high technology is not guaranteed to anyone primarily because the development of the world is based on the use of completely new intellectual assets. This means that everyone has a chance to be the first, but along with this each may lag far behind.

At the same time, there is no any universal formula of innovative development, which is suitable for all countries at a time. To be successful the government has to exploit its strengths and cope with its weaknesses. The innovative system in different countries has developed differently.

The commercialization of innovations is implemented most efficiently in the United States. However, this does not mean that the proportion of a qualitative product issued by the U.S. research laboratories is higher than in other developed countries. The USA secret lies in the amount of R&D funding. The U.S. still remains the leader in this field. Thus the research costs in the United States in 2009 amounted to 300.5 billion USD. It is $110 billion more than in the EU and $100 billion more than in the 10 largest countries in the Asian continent. (Graphical chart 2)

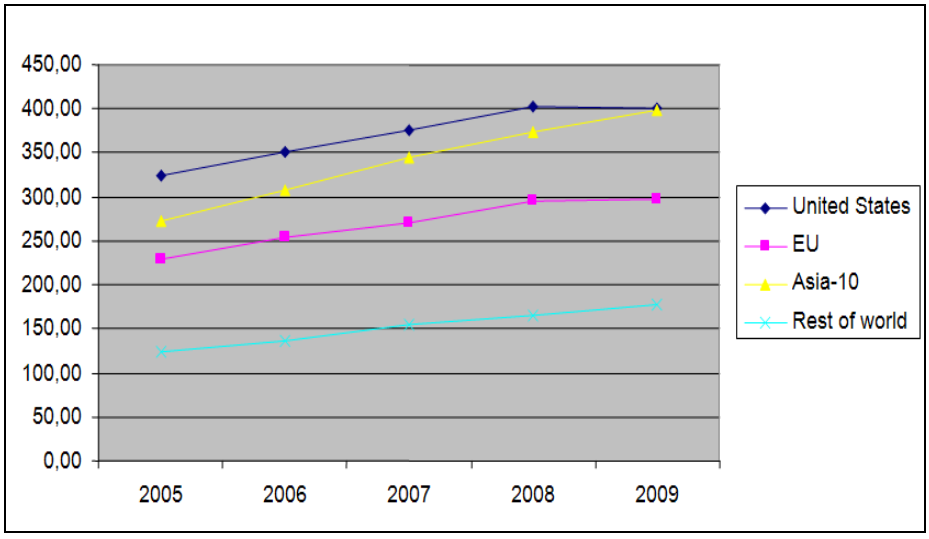


**Figure 2. Expenditure on R&D in the USA, EU, 10 Asian Countries, Other Countries, USD bln**

*Source: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2011) of Organization for Economic Co-operation and Development, Main Science and Technology Indicators (2011-1 and previous years) and United Nations Educational, Scientific and Cultural Organization Institute for Statistics, http://stats.uis.unesco.org.*

In developed countries the rate of growth of knowledge-intensive industries in the average 1.5-2 times higher than the growth rate in the industry as a whole. This indicates that in developed countries a high-tech complex determines the economic growth and "pulls" the rest of the economy forcing it to adapt to high technology.

In addition there is created the added value, which is also a very important indicator. According to this criterion the United States continues to lead as well. The amount of the added value of high-tech industries in the United States in 2010 amounted to 386 billion USD, which is 113 billion USD more than in the EU and 205 billion USD more than in Japan. The USA according to this indicator gets even over China by $ 122 billion, where the rate of the economy growth is increasing even in times of crisis.

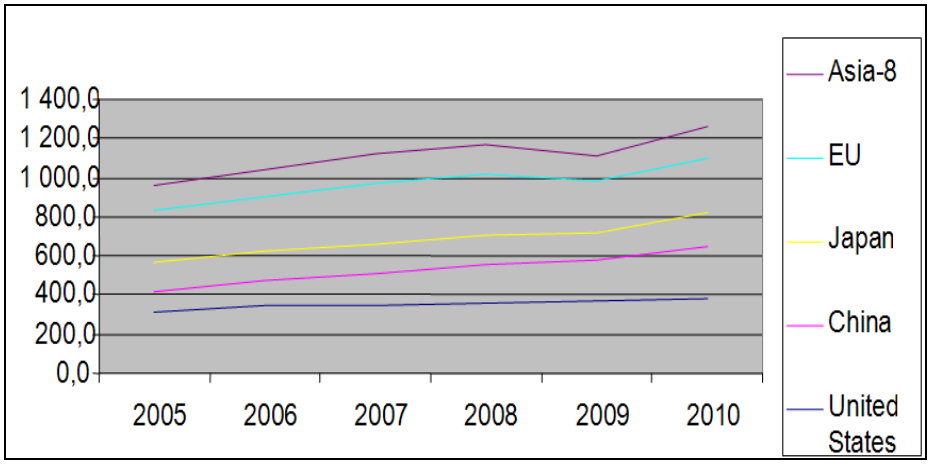


**Figure 3. Added Value of High-tech Industries by Country: 2005-2010, USD bln**

*Source: IHS Global Insight, World Industry Service Database*

The analysis of the high-tech markets performance indices according to Global Insight World Industry Service database in 70 countries around the world, producing 97% of the world GDP, indicates that the global market of high-tech products has been significantly growing since 1980s. In 2009 this index amounted to 1274.2 billion USD (Graphical chart 3). This is due to a total reorientation of developed and some developing countries towards the production of high-tech products.

High-tech industries have brought major contribution to the growth of the manufacturing sector of the world economy. Over the past 20 years the growth rate of the gross income of high-tech industries has been much higher than the rate of income growth in other sectors. The global economic activity in the high-tech sector was especially sizeable in the period of 2005-2009. During this period the average annual increase in income of high-tech industries was 8.3% and was significantly higher than the increase in income of other industries.

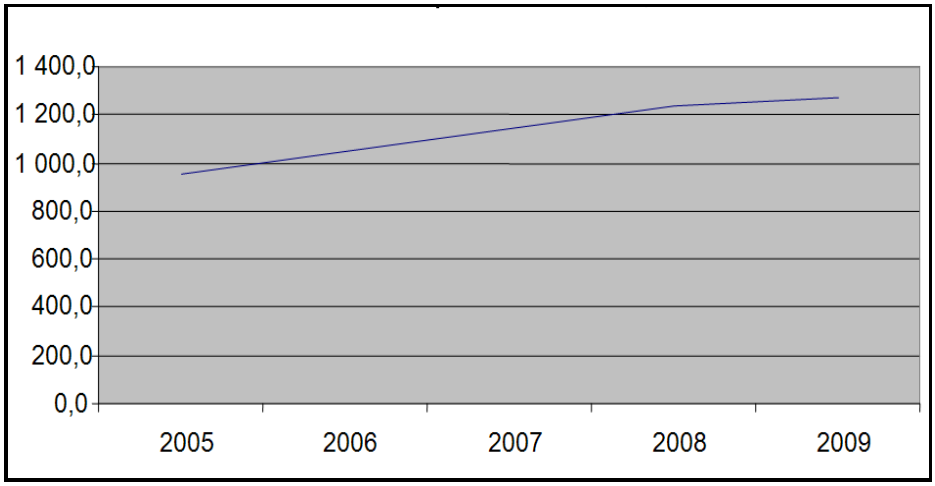


**Figure 4. Assessment of Global Expenditures on R&D, USD bln**

*Source: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2011) of Organization for Economic Co-operation and Development, Main Science and Technology Indicators (2011-1 and previous years) and United Nations Educational, Scientific and Cultural Organization Institute for Statistics, http://stats.uis.unesco.org.*

Each country is trying to follow a certain specialization securing for them a segment of high-tech market. An illustrative example is China's monopoly position in the market of office and computer equipment. Another example is the breakthrough of Finland in telecommunication industry. Despite the general trend of loss of the EU position in the market of radio, television and communication equipment similar trends were observed in Ireland, which gradually increases its weighting in the markets of medical equipment, precision and optical instruments, and pharmaceuticals. The United States as an absolute world leader of high-tech production slightly reduced its aerospace market share but strengthened its position in other high-tech market segments.

Based on the above stated, we can conclude that the development of the high-tech sector of economy has a crucial contribution to the global economy growth outpacing the rate of growth of the traditional economic activities.

The regional transformation in the market of high-tech products and services is in favor of the USA, EU and Japan, whereas China is not yet able to take a serious position in the market.

In order to retain the leading position in the market of high-tech products and services the countries follow a certain specialization getting a foothold in a specific segment of the high-tech market.

The development of the world market of high-tech products and services is affected by the following organizational and institutional factors:

- maintaining a high level of funding of R&D and innovation in developed economies and concentrating financial resources in high-tech industries;
- diversifying the methods of government encouragement of R&D.

The high level of funding of R&D and innovation in the high-tech sectors of developed and some developing economies are becoming the major determinant in the growth of the world market of high-tech products and services.

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