

The secret of Taiwan's innovative development breakthrough comparing with the Ukraine, Belarus and Georgia

In the modern world, where high technologies are developing rapidly from year to year, a prosperous future is open only to those countries, which are setting their priority in favor of the economy innovative development. The transformation of a raw-material and industrial model of the economy into post-industrial and science-based economy means, first of all, the investments into creation of high technologies. One of the examples economic miracles in the modern history is Taiwan, a county, which in a fairly short period of time has shown an exceptional example of economic transformation, giving itself the right to be considered as a modern innovative model of economy with an impressive development potential and the ability to manage effectively the potential for innovation. Let us try to use the example of Taiwan to reveal the cause-and-effect relationship between economic growth and innovation development, comparing it with the achievements of some Eastern European countries over a certain period of time.

With the development of cyclical economic processes, we got entrenched trends as for continuous economic growth, they led to the ever-growing need to improve all parts of the economy. The term “innovation” comes from the Latin word “*inovatis*” (*in* – in, *novus* – new) and means “update, novelty, change”. In economics, the concept of “innovation” has become accustomed relatively recently¹. Innovation in the modern sense is a new idea, creative thoughts, a new imagination in the form of a device or method. Innovation is often also seen as the application of better solutions that meet new or existing market needs. This innovation is due to the emergence of more efficient products, processes, services, technologies or business models that are given to markets, governments and society. The innovation process is a set of

¹ Innovation management: textbook./ chief editor. O.P. Molchanova. [M. Abrameshin A.E., Voronina T.P., Molchanova O.P., Tikhonova E.A., Shlenov Y.V.]: Vita-Press, 2001. 448 p.

scientific and technical, technological and organizational changes that occur in the implementation of innovations². In the world practice, the state strategy is a system of political intentions with precise goals, which should: first of all, be developed through a meaningful dialogue of all public institutions and citizens of the state, and secondly, have a time frame to achieve goals within the internal resources, which exist or are being created³. In the modern world, the readiness of the state to face adequately the challenges of the international market conditions means, mainly, compliance with the innovative model of the economy include: advantages in information technologies, high production efficiency, production of capital-intensive goods with a high intellectual component. It is these factors that owe much to effective investment in the innovation-oriented economic model of the state.

One of the most fundamental global trends in recent decades is the acceleration of innovations and changes. Developing countries are increasingly involved in this evolution, as changes are caused by rapid innovations on the global level, they have led to new opportunities for developing regions. Thus, the innovation strategy is the main strategy for qualitative growth of the national economy, it determines the overall goal, model and mechanisms of development, priorities, the role of different participants in the process of its implementation, as shown in Pic. 1.

The main feature of the innovation strategy is the combination of two ways of influence, the first one is aimed at the international environment and helps to increase the country's competitiveness in the world market, and the second one is to ensure internal optimization of the national economy⁴. The existence of a viable innovation strategy gives the state a number of special opportunities:

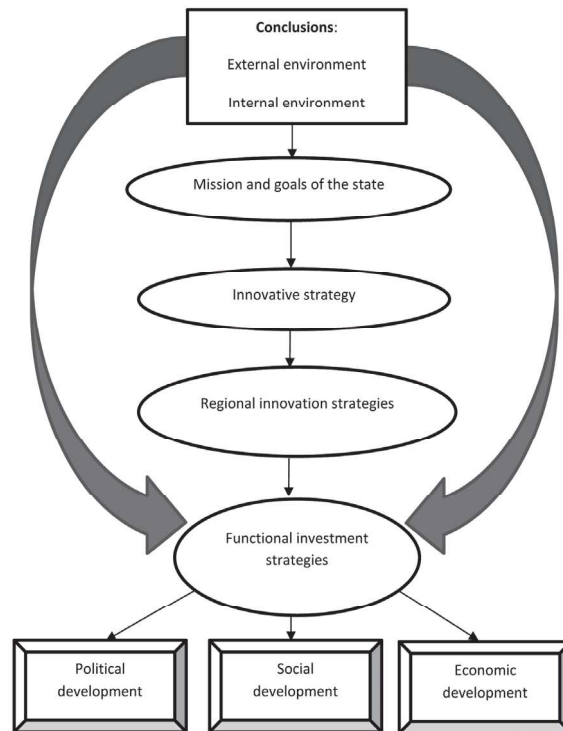
- creation of an effective innovation model of the economy;
- „second-order technology” is a key characteristic of developed countries;
- innovations embrace small businesses and core specialists;
- development of venture capital enterprises
- formation of a „technological gap” between the technologically underdeveloped countries in regard to developed countries;
- formation of „closing technologies”, the relevance of which, within a period of time is not demanded and leading to the closure of entire sectors of the economy;

² Zakharchenko V.I., Korsikova N.M., Merkulov M.M., Innovation management. Theory and practice in the conditions of economic transformation: textbook. Kyiv: Center for Educational Literature, 2012. 446 p.

³ Nevecherya D.I. Innovative component of economic development of “Asian tigers”: Taiwan. / KNEU. – Kyiv. 2020. – 74 p.

⁴ Fatkhutdinov P.A. Competitiveness: economics, strategy, management. M.: INFRA M, 2000. 312 p.

Pic. 1. The place and importance of the state's innovation strategy



Source: N.E. Teroshkina, *Innovative strategy: theory and practice of implementation in Ukraine*. Intellekt. Innovatsii. Investitsii – 2014. – N4, 124-129 p.

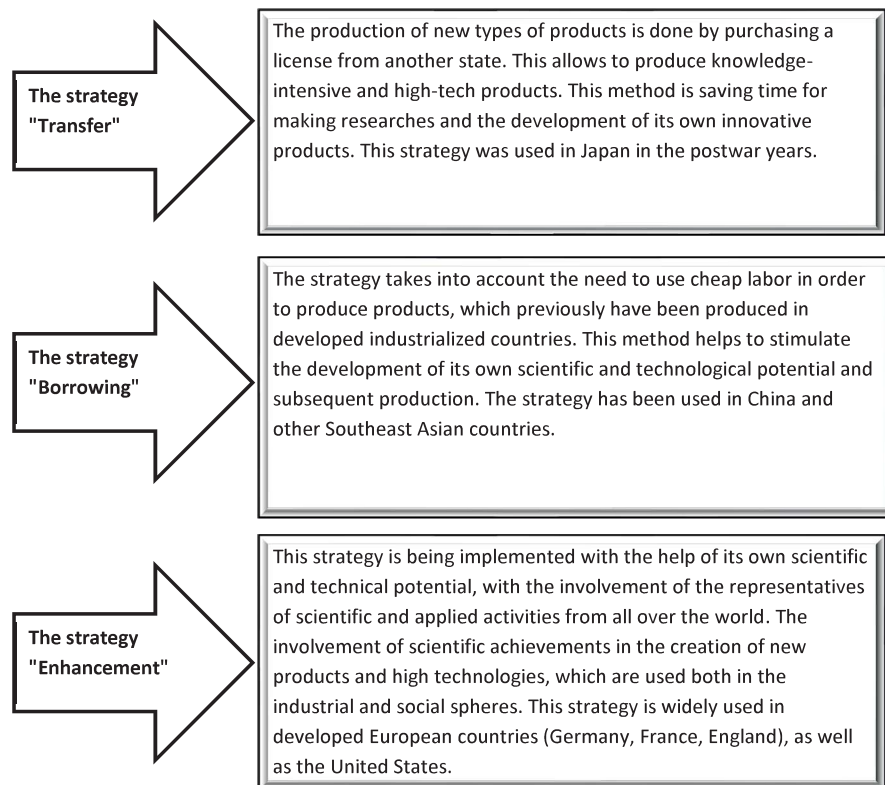
- science and modern education acquire strategic importance in the key of forming corresponding elites in politics and economy.

The choice of strategy is influenced by the achieved level of social development, financial and logistical resources of the state. From Pic. 2 we can see that there are three types of innovation strategy: “Transfer”, “Borrowing” and “Enhancement”. The common for all types of strategies is to stimulate innovation in order to achieve progress in the economy and innovative economic development⁵. Innovative economy is a type of economy based on innovation, continuous technological improvement, creation and export of high-tech goods; knowledge economy, which creates conditions to stimulate investment growth in

⁵ Nevecherya D.I. Innovative component of economic development of “Asian tigers”: Taiwan. / KNEU. – Kyiv. 2020. – 74 p.

science, technology and researches⁶. In terms of economic development over the past forty years, the Republic of China in Taiwan has no precedent in the history of the world economy. For example, over the past forty years, the average annual economic growth rate has approached 9 percent, a level which even such large economies as the United States and Japan have failed to achieve, even during periods of accelerated economic growth. Taiwan's governance policy during the first decades after 1945 followed the Japanese model of economic development as a whole.

Pic. 2. Types of innovation strategies

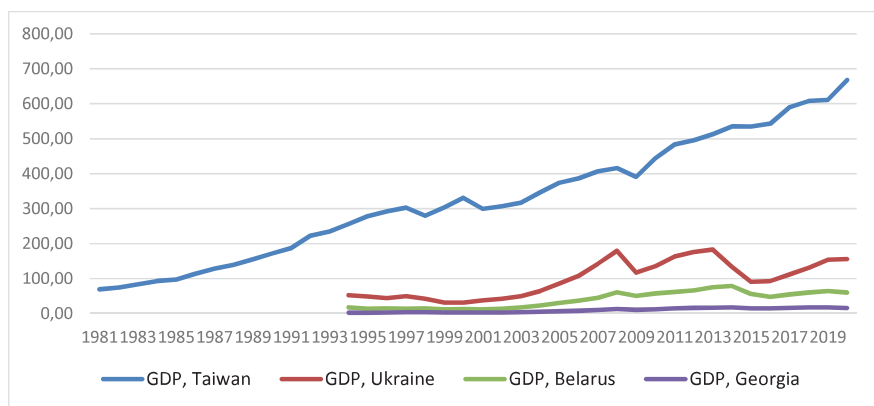


Source: *Innovative management: textbook / chief editor. acad. H.A. Oleynykova. – M.: NDIRIP-KCE. 2004. 78 p.*

⁶ Innovative management: textbook / chief editor. acad. H.A. Oleynykova. – M.: NDIRIPKCE. 2004. 78 p.

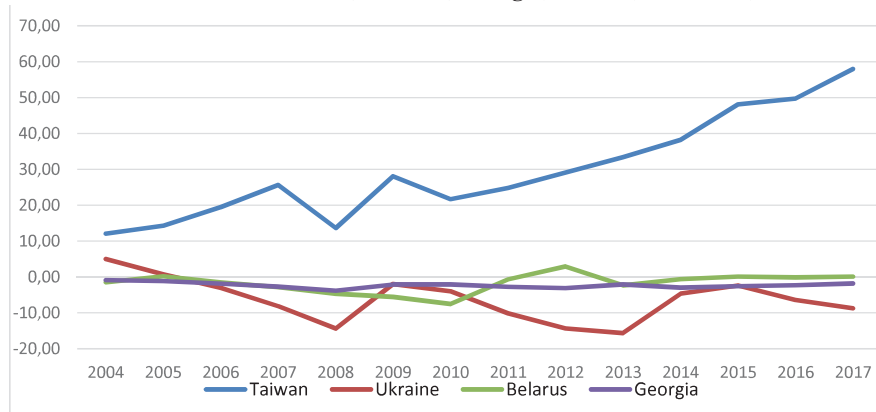
Over the past five decades, Taiwan has shown rapid and sustained economic growth (Pic 3). The gross domestic product in Taiwan in 2019 was 611 billion USA dollars. The total volume of goods and services exports increased by 3.86% in 2018 – primarily due to the growth of exports of Taiwanese information and communication technology and electronic products (Pic. 4). Taiwan's imports account for electronic equipment (27.8% of total imports), mineral fuels, including oil (15.5%) and machinery, including computers (14.8%). In terms of exports and imports, Taiwan ranks 17th place in the world⁷.

Pic.3. – Dynamics of Taiwan's nominal GDP in 1980-2019 \$ billion.



Source: <https://www.statista.com>, <https://www.statista.com>

Pic. 4. Trade Balance: Taiwan, Ukraine, Georgia, Belarus, 2004-2020, \$ billion.

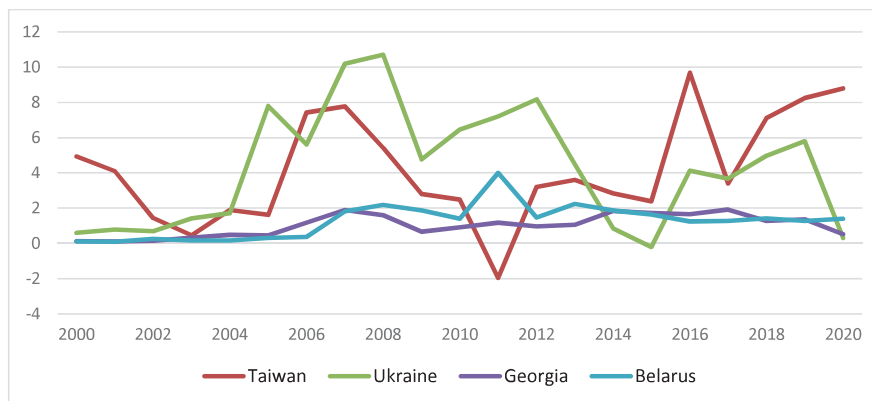


Source: <https://www.statista.com>, <http://www.worldstopexports.com/worlds-top-export-countries/>

⁷ Nevecherya D.I. Innovative component of economic development of „Asian tigers”: Taiwan. / KNEU. – Kyiv. 2020. – 74 p

An important factor in the innovative development is the indicator of direct foreign investments. As of 2018 Foreign direct investment (hereinafter referred to as FDI) in Taiwan was less than the average level in the region, since 2017 the level began to rise. Currently, Taiwan is of particular interest to foreign investors, since the state's economy puts the emphasis on the development of high-tech products. One reason for the attractiveness of Taiwan's economy is the legal framework that guarantees transparency of protecting foreign investments.

Pic. 5. – FDI inflows, Taiwan, Ukraine, Georgia, Belarus 2000-2020, \$ billion



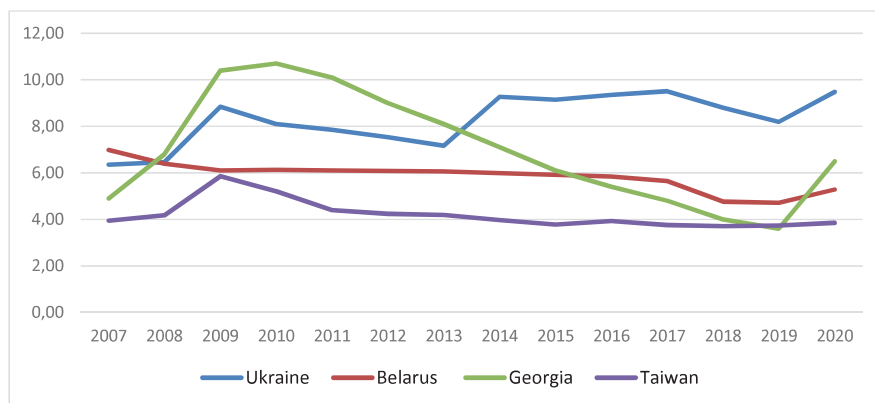
Source: <https://data.worldbank.org/>, <https://www.statista.com>, <https://unctadstat.unctad.org/countryprofile/generalprofile/en-gb/158/index.html>

Science parks are an integral part of Taiwan's economic and technological growth. However, unlike Taiwan, in countries such as Ukraine, Georgia and Belarus, the imperfection of the legislative framework does not allow the creation of fully functional science parks. Today, there are three science-industry parks (SIPs) in the Republic of China: Northern Taiwan Science Park, Southern Taiwan Science Park (Tainan) and Central Taiwan Science Park (Taichung), which not only create new developments, but annually bring to Taiwan's GDP about 2.5 trillion. Taiwan dollars (~ 81 billion US dollars), which is about 15% of Taiwan's GDP. Such indicators as foreign direct investment, within the framework of the innovative model of the economy, also affect the formation of employment⁸.

⁸ Nevecherya D.I. Innovative component of economic development of „Asian tigers”: Taiwan. / KNEU. – Kyiv. 2020. – 74 p

The unemployment rate in Taiwan in 2020 (according to data published by the statistical office of the island. Pic 6. shows the unemployment rate in Taiwan for 2007-2020, as well as Georgia, Ukraine and Belarus. In March 2020 by the age structure the highest unemployment rate was among aged group of 20 to 24, at 11.69 per cent⁹. The next group of people aged 15 to 19, with an unemployment rate of 7.71 per cent. Young people aged between 25 to 29 also continue to have difficulty finding employment (6.61%). The unemployment rate among college graduates was 4.8 percent, which was the highest among people of all levels of education:

Pic. 6. Rate of unemployment in Taiwan, Ukraine, Georgia and Belarus 2007-2020., (%)

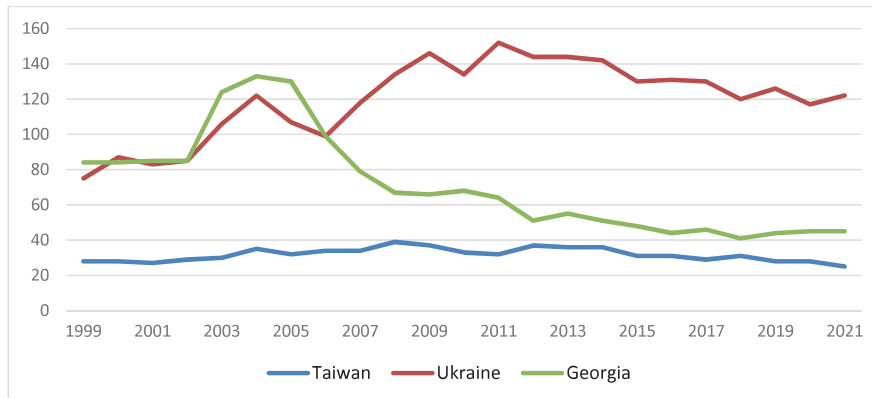


Source: <https://www.statista.com>, <https://english.ey.gov.tw/iip/B0C195AE54832FAD>

For Ukraine, as well as for Georgia and Belarus, the absence of active participation of the state in the development of innovation policy, in combination with such components of the transition economy as corruption and bureaucracy, hinders the effective organization of high-tech products production with a high share of innovation. It is known that the corruption component has the most negative impact on the effectiveness of any business-to-business project. Such area as innovation is especially vulnerable to the negative impact of corruption. The relationship between the level of corruption and the technological development of the country can be observed in the following comparative analysis of the “corruption rating” in the countries in Pic. 7:

⁹ *Ibidem*.

Pic. 7. Rating of corruption.



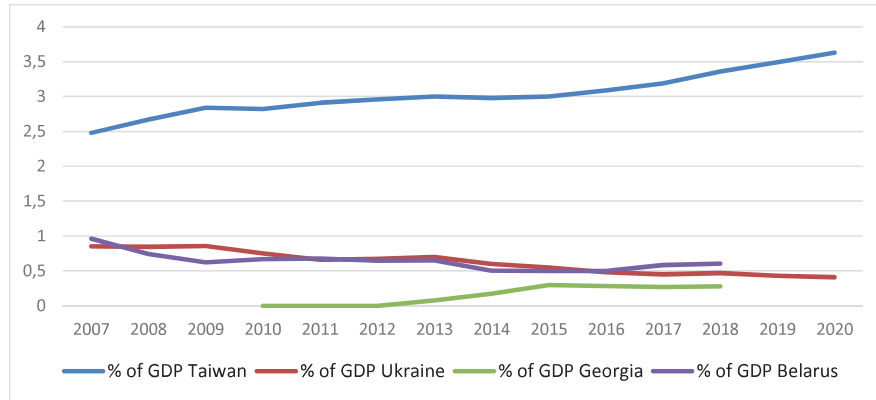
Source: <https://countryeconomy.com>

From the above graph, it is obvious that the low level of corruption in the country favors the development of an innovative climate, which directly ensures the effective development of the state economy.

China's expenditures on scientific and research works have grown significantly fast with the medium rate of 14.5% over the past decade. Korea had the second fastest growth rate: expenditures on scientific and research works rose by an average of 8.4% over the past decade, and Taiwan had the third place with a growth rate at 6.9%. The global financial crisis, which began in the fourth quarter of 2008, did not affect quickly the expenditures on scientific and research works, as global demand for goods declined except in China and France, and in 2009 all other countries which are included in this comparison had the lowest expenditures on scientific and research works. Singapore and Japan have particularly decreased their growth of expenditures on scientific and research works. After the financial crisis in 2010, Korea and the Republic of China have shown a steady double-digit growth, allowing them to grow better than other countries. The rest of the countries gradually increased their expenditures on scientific and research works after the recession. In 2017, Korea had the highest growth rate – 13.1%. The next one was Germany – 10.1%, while Singapore was experiencing negative growth¹⁰.

Gross domestic expenditures on scientific and research works in Taiwan in 2018 were 20.65 billion US dollars Pic.8.

¹⁰ Nevecherya D.I. Innovative component of economic development of "Asian tigers", *op.cit.*

Pic.8. Expenditures on scientific and research works

Sources: <https://www.taipeitimes.com/News/taiwan/archives/2021/12/31/2003770490>, <https://www.statista.com>
<https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?locations=GE>
<https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?locations=BY>
<https://wsts.most.gov.tw/stsweb/main/Main.aspx?language=E>

The growth rate in 2018 was 7.2%, which is 1.2% more than in the previous year. The expenditure on scientific and research works are calculated based on current prices, that's calculated from nominal GDP [25]. In 2018, expenditures on scientific and research works as a percentage of GDP amounted to 3.36%, which is 0.16% more than in the previous year and 0.38% more than in 2014. Expenditures on scientific and research works as a percentage of GDP has been increasing annually for the last sixty years, with the largest increase in 2018. In 1981, Taiwan's expenditures on scientific and research works was 0.55 billion USA dollars. In 60 years, from 1981 to 2018, Taiwan's expenditures on scientific and research works increased 37.5 times.

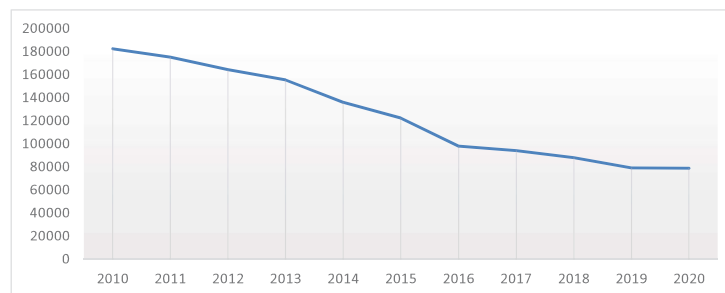
At present, Taiwan is more and more associated with the state, whose engine of the economy is the scientific and technological progress based on innovative technologies, which are constantly being introduced. Taiwan's achievements are related to the production of almost all components for portable computer and home appliances, including microcircuits, which are sold all over the world. As you know, Taiwan is a manufacturer of electronic semiconductors represented by TSMC, which provided up to 4% of the region's GDP in 2018 and supplies products to world leaders such as Apple and Huawei. Ukraine has recently ignored the problems of scientific, technological and innovative development. In Sustainable Devel-

opment Strategy “Ukraine-2020”¹¹ the innovation factor is mentioned as a factor of pride, in contrast to developed countries, where innovation is a factor of economic growth. On the one hand, the achievements of the military-industrial complex, established by experts, are due to scientific developments and relevant breakthrough technologies and exacerbated by military events, and on the other hand, problematic issues of technical and logical spheres have receded into the background due to the decline of domestic industry, which deepens the process of destructive change and requires an adequate innovation policy¹².

The scientific and technical potential of Ukraine is the foundation for the entire state development, which is influenced by both external and internal factors. Until now, the innovative potential of Ukraine does not meet competitive challenges of the modern world, because of insufficient funding for its development, as well as extremely low domestic demand for innovative technologies of domestic production, which is at the stage of its own “survival”, and the number of scientific personnel is decreasing. Pic. 9¹³.

One of the indicators of the country’s scientific potential effectiveness is the volume of research and technical work performed, and although in 2010-2013 at actual prices it increased slightly, but the share of GDP remained low, in 2018 it was 0.47%, although in 1900 it was 3.11%, and in 2004 – 1.23%. In general, the dynamics of the number of performed researches, scientific and technical works was unstable¹⁴.

Pic. 9. Ukraine - Number of employees involved in scientific research and development, persons



Source: <http://www.ukrstat.gov.ua>

¹¹ Sustainable Development Strategy „Ukraine-2020”: Decree of the President of Ukraine dated January 12, 2015 No5/2015. URL: <http://zakon4.rada.gov.ua/laws/show/5/2015>.

¹² Nevecherya D.I. Innovative component of economic development of „Asian tigers”: Taiwan. / KNEU. – Kyiv. 2020. – 74 p

¹³ *Ibidem*.

¹⁴ *Ibidem*.

Despite the efforts made, from the side of the innovation policy of Ukraine, there are no real long-term actions aimed at creating a favorable climate for the development of the scientific and technical base. The efforts being made are enough to state a very restrained development dynamics, covering some enterprises involved in the innovation sphere. These dynamics showed a decrease during the crisis of 2008-2009, although in 2012 comparing with 2011 grew slightly. The period of 2018-2019 was characterized with the downward trend in the activity of industrial enterprises, where in 2019 only three-quarters used innovations in the production. According to statistics, in 2019 the total participation of companies in innovations was about UAH 14.22 billion, where more than 60% accounted for the purchase of machinery and equipment, as well as other necessary software for carrying out their own modernization. Statistics show that the costs for researches and developments was about 17.2%, the cost of purchasing researches from other enterprises or organizations amounted to about 3.3%, the cost of acquiring new technologies amounted to about 0.3%, as well as 7.6 % were the costs of training personnel with new knowledge to improve technologies, as well as the application of innovations in the relevant field of activity.

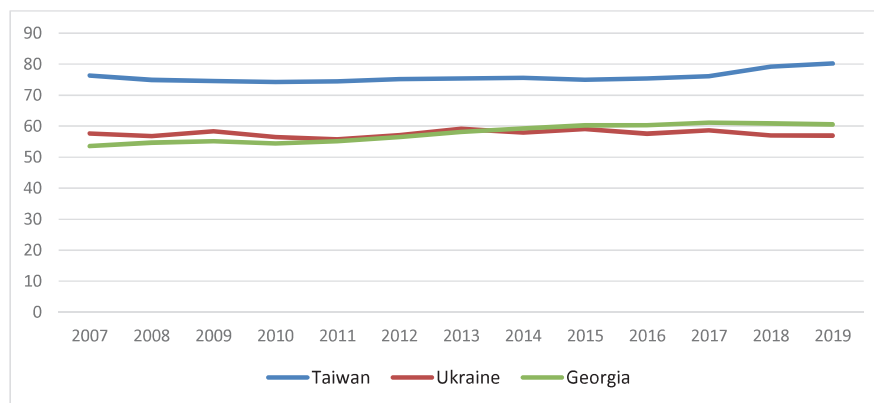
It should be noted that a particularly important condition for Ukraine is the effective organization of the entire chain of innovation: from the protection of intellectual property rights to the very structure of production technologies, taking into account the creation of jobs that will be involved in scientific development and the introduction of new technologies.

In the period between 2016-2019, there was an increase in one of the innovative development components – foreign direct investment (FDI) in the low-tech production sector, for example – 18.6% in 2016 and 19.6% in 2019, thus demonstrating the opposite trend – a decrease in high-tech industries. The reason for this was the investment in the technological base of production to ensure an acceptable level of competitiveness both in foreign markets and maintaining stability in domestic markets. It is important to note that the role and assistance of state policy in the development of innovations is the key, since it affects the entire range of its components, namely: the formation and creation of science parks, the development of methodology and regulations for the introduction of intellectual developments, the creation of a motivational base for the natural formation of the internal market and demand for domestically produced innovations and technologies.

The international researches are showing that intellectual potential of the Ukrainian nation is very high, but there is no role of the state in creating an environment for its implementation, as a key innovative factor in socio-economic development and ensuring its com-

petitiveness¹⁵. In this situation, the state cannot solve the problem of joining the cognitive society (a society where the role of constant cognitive (informational) activities of the entire economically active population is crucial for increasing human capital)¹⁶.

Pic. 10. Ukraine's position in the Global Competitiveness Index 2007-2019. Taiwan, Ukraine, Georgia.



Source: <https://countryeconomy.com>

Based on the analysis, we can certainly say about poor development in the Ukraine of innovational and technological processes. Among the influencing factors we should note:

- relatively weak interest of business entities in innovative developments in Ukraine;
- Low level of development of scientific parks and institutions for creating new developments;
- Shortage of investment and personnel potential for the innovation sphere development;
- Insufficient influence of the state activity to ensure stable development of innovation policy in Ukraine.

Conclusions

The secret of Taiwan's breakthrough in the innovation and economic development lies in the methodological approach of the country's innovation activities development, also with the development of special programs, strategies and approaches strengthening the in-

¹⁵ Nevecherya D.I. Innovative component of economic development of "Asian tigers", *op.cit.*

¹⁶ Fedulova L. Innovative development of Ukraine's economy / liubov fedulova. // state and economy. – 2015.

novative development of the state, which has a direct impact on the development of the country's economy. In this article we have given a general characteristic of economic indicators of Ukraine, as well as such countries as Belarus and Georgia in comparison with Taiwan. From the analysis obtained, it is evident that there is a huge difference in economic indicators, which characterize the state approach in creating conditions for the development of high-tech production with high added value of products. The specially studied example of Taiwan can serve as a good example, so that its approaches, methods and experience could be taken into account by Ukraine, Belarus and Georgia.

It is obvious that the economic sector can develop solely on the basis of innovative activity, the state attention to it – is a strategically important task. In the modern world, which is already divided into high-tech producing countries, it is necessary to pay attention to those opportunities, which will allow Ukraine to use its own scientific potential:

Activation of the domestic consumer market at the expense of existing and developing technologies;

- formation of regional innovation cells and investment in their development;
- intensify investments of both targeted government programs and private investment capital;
- development of new approaches and methodology of innovations' implementation and management;
- technological control and budgetary sources of financing;
- creation of the state innovation system and its scaling up to the regional levels.

To take all possible measures to ensure the introduction of modern technologies in order to ensure normal functioning of the domestic market, as well as the return of lost positions in foreign markets.

One of the main areas of innovative technologies application, based on the existing developments, as well as their improvement: aviation and space technology, weapons, mechanical engineering, as well as the sphere of biotechnology and implementation of nanotechnology projects. The indisputable fact of necessity of direct state participation in capital investments for building innovation-oriented economy. A systematic approach should take into account not only the involvement of the financial sector, but also stimulation and ensuring full functioning of science parks and specialized institutions to form human resources, which later will be involved in the real sector of the economy. This will significantly increase the competitiveness of national products, ensuring its long-term stability and development both in the domestic and international markets.

Streszczenie:

Powodzenie rozwoju gospodarczego i społecznego każdego państwa w XXI wieku zależy od wielu czynników. Jednym z głównych jest innowacyjny rozwój państwa, aktywne wprowadzanie innowacji i nowoczesnych technologii we wszystkich sektorach gospodarki i dziedzinach działalności kraju. Rząd każdego państwa, zainteresowanego innowacyjnym rozwojem, powinien w każdy możliwy sposób promować i wspierać ten kierunek. Właśnie dlatego głównym celem niniejszej publikacji jest zbadanie historii innowacyjnego rozwoju Tajwanu, analiza głównych strategii i porównanie tego kierunku z podobnym kierunkiem w Ukrainie, Gruzji i Białorusi..

Słowa kluczowe:

Innowacyjny rozwój, wprowadzanie innowacyjnych doświadczeń rozwojowych, poziom rozwoju gospodarczego, parki technologiczne

Key words:

Innovative development, introduction of innovative development experience, level of economic development, technological parks

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