

INNOVATIVE POTENTIAL OF INDUSTRIAL ENTERPRISES DEVELOPMENT IN THE CONTEXT OF MODERN INDUSTRIAL REVOLUTIONS

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The insufficient level of technical development of enterprises in Ukraine, complicated by deep economic and political crises on the threshold of the Third and Fourth Industrial Revolutions, which are gradually taking place in the world, makes the issue of finding innovative ways of economic development capable of bringing the country out of crisis and ensuring ahead economic growth in wartime conditions urgent. The article provides a retrospective analysis of economic reforms carried out in different countries of the world during periods of aggravation of crisis phenomena, which allowed to formulate the main prerequisites for the development of innovative activity of industrial enterprises of Ukraine. To implement an economic breakthrough, directions for the development of the economy of Ukraine based on venture financing are proposed. General and specific characteristics of venture activity of business entities are determined, as well as types of entrepreneurship within which venture activity can be carried out. The analysis of the activities of the most innovative companies in the world and those companies that invest the most in R&D made it possible to determine the basic principles of effective innovation in modern conditions.

Keywords: *venture capital, investment, innovation, crisis, industrial revolution.*

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Statement of the problem. In the economic development of any systems, one can trace clear periods of surges and declines, the justification of which is generally provided by the theory of economic development. Research into the nature of these phenomena proves the cause-and-effect relationships between the level of economic development and the introduction of innovations: "stagnation" occurs due to the exploitation of "outdated" ideas, and a breakthrough is simply impossible without innovations. Another pattern is that innovations are always associated not only with uncertainty and a high degree of

risk, but also with significant excess profits that can cover all the losses of unsuccessful projects. The feasibility of their implementation is undoubted and proven by the experience of many leading countries of the world and world-famous companies.

The issue of innovation development is becoming particularly relevant for Ukraine in the context of war and the onset of the Third and Fourth Industrial Revolutions in the world. The significant lag in the level of technical development of domestic enterprises from similar indicators in developed countries of the world in conditions

of limited financial resources necessitates the gradual modernization and restructuring of the country's economy based on mechanisms for financing innovation.

Analysis of recent research and publications. The history, causes and consequences of economic crises have been studied by many scientists: M. D. Kondratiev, J. Kitchin, M. Tugan-Baranovsky, J. Schumpeter and others. Their cyclical nature has been proven and can be predicted. At the same time, there is an objective need to determine the priority areas of innovation activity for Ukraine in modern crisis conditions. Increased attention is required to determine the types of entrepreneurship within which venture activities can be carried out, and to search for specific market niches for domestic producers in the context of the intensification of European integration processes on the threshold of the next industrial revolution. There is also a certain difficulty in studying the processes of development of the venture capital market, which consists in the absence of a single theoretical approach, which determines the urgency of this study.

Formulation of the objectives of the article (task statement). The purpose of the study is to identify, analyze and characterize the determinants of venture activity for Ukrainian commodity producers in modern crisis conditions.

Summary of the main research material. Economic systems of different levels of the economy may experience natural crisis shocks with different periodicity: every 3-5 years (short cycles), 7-9 and 16-20 years (medium cycles), 50-60 and 100-120 years (long cycles), including annual seasonal fluctuations, but only in the development of the agricultural sector of the economy. Therefore, the current state of the world economy is natural, as it is fully consistent with the periodization of the cyclical nature

of economic crises. History knows many examples of revolutionary transformations that led to radical changes in the politics and economy of those countries, the root cause of which was the economic crisis (Table 1).

In the 21st century, politics is primarily economics. Before the events of 2014, the share of Ukrainian goods exported to Russia, Belarus, and Kazakhstan was about 30%. The scenario did not work out in favor of domestic industrialists, and enterprises in the southeast of the country, which cooperated very closely with Russia, were especially vulnerable. But history knows many examples when even disadvantages could be turned into competitive advantages, especially since the European community supported Ukrainians in their desire for development and created a free economic zone for Ukrainian goods. Domestic industrial enterprises must definitely take advantage of this.

Ukraine has had several opportunities to embark on the path of economic reforms (1991, 2004), but has missed these opportunities. The time for frivolous hopes for resources (natural, industrial, intellectual) is over (this is proven by the experience of Russia, where they hoped for "petroleum dollars", not taking into account the fact that the era of alternative fuels and new technologies has come), and decisive action is needed, and the country, in our opinion, has the corresponding opportunities. Thus, until 1990, Ukraine had a powerful potential for the production of equipment and technology for the rocket and space, aviation, shipbuilding, radio electronics, machine building, agricultural and other industries, which needs to be restored as a matter of priority.

Traditionally, it is believed that Ukraine's main export opportunities are metallurgy, although according to statistics, the agro-industrial complex is in first place (thanks to fertile soils and climate, we can feed the

Table 1 – Scenarios of revolutionary changes in the development of individual countries [developed by authors]

Script name, year	The essence of the scenario	Examples (country)
"The Japanese Miracle", 1948	The occupying American government carried out economic reform (established a fixed exchange rate for the yen, introduced antitrust legislation, and liquidated the largest monopoly concerns), reform of the tax system (reduced the tax burden on business activity, which contributed to its revival).	Japan
"Bulldozer Revolution", 2000	Reforms to implement the strategic interests of the United States and Germany, as well as external creditors and international financial institutions, dealt a blow to the country's system of collective self-governing enterprises. Banks were replaced by "independent commercial institutions", and changes in the legal sphere, combined with the IMF's tight monetary policy towards industry and the opening of the economy to foreign competition, accelerated industrial decline.	Yugoslavia
"Shock Therapy", 1989.	With the support of the IMF and the World Bank, large-scale reforms were carried out to rapidly transform the economy from an outdated and inefficient system of centralized planning to capitalism similar to the states of Western Europe and America.	Poland
"Rose Revolution", 2003	Modernization of the country's system, elimination of corruption, implementation of radical legal and economic reforms, renewal of the judiciary and law enforcement agencies, attraction of large investors (with the support of the USA and Europe), significant development of agriculture, tourism and mining, but failures in the democratization of society	Georgia
"Economic Development Strategy", 1965.	Elimination of corruption. Creation of a preferential zone for business (fast business registration, tax exemption). Attracting foreign investors. Transformation into a financial and trade center of Southeast Asia. American TNCs laid the foundation for high-tech industry	Singapore

whole world if we learn to manage the agricultural sector correctly).

The following market segments are the defense industry, aircraft manufacturing, and the rocket and space industry. Although Ukraine almost never produced final models of weapons and military equipment, Ukrainians have mastered a number of new areas (production of light armored vehicles), achieved success in the development of systems to counter high-precision weapons, some areas of radar, training systems, modern communications equipment, and other military and dual-purpose products.

New technologies that can launch the entire production chain in many other sectors of the economy, create new jobs, and contribute to increasing foreign exchange earnings need stimulation. Due to the lack of funds, it is necessary to pay attention primarily to such projects that can contribute to the rapid development of the country's economy.

In this sense, the role of venture entrepreneurship is difficult to overestimate. It can contribute not only to increasing the scientific and technical level of production, but also to influencing the dynamism of the entire economic complex. Venture firms are generators of new ideas, on the basis of which major scientific and technical breakthroughs occur. The experience of economic development of countries confirms that the evolutionary process in the economy is carried out precisely through innovations. Вони тягнуть за собою модернізацію і структурну перебудову всієї економіки. Innovation is the main criterion for the development of society. Therefore, a country that stands aside from the "innovation competition" occupies the last place in the hierarchy of development of the world community [2].

Considering the total outflow of financial resources, capital and savings from Ukraine in 2013-2015, the war that requires additional spending on military needs, as well as the current level of economic development, we consider it necessary to urgently implement a scientifically sound program of action at the state level, which must necessarily have a theoretical and practical basis. At the current stage of development, a new economic thinking is being formed, which is based on new knowledge, technologies, new realities and types of economic activity. Venture activity is relatively new, constantly developing and has not been widely studied by scientists in terms of generalization and formalization of its specific features.

Investment, innovation and venture activity have a number of common characteristics, but in order to obtain maximum efficiency from a certain activity, a fundamental clarification of its essence and features is necessary. Let us consider the main characteristics and determinants of the development of venture activity of industrial enterprises in Ukraine. As Douglas North (1993 Nobel Prize laureate in economics for his research explaining economic and institutional changes) noted: "All that is needed for economic prosperity is investment and innovation." These two areas (finance and innovation) are combined by venture activity (from the English venture – risky), which is a progressive

type of economic activity that ensures continuous economic and scientific and technological development and meets not only current requirements, but also the needs of future (not only in terms of its implementation, but also in terms of the requirements of future generations) periods. To achieve an economic breakthrough (and in modern conditions, simply to maintain market positions), it is necessary to constantly introduce innovations [4].

If classical economic activity is aimed at the most efficient use of the available capabilities and resources of the enterprise, then venture activity involves the active implementation of various types of innovations, the search for potential opportunities and resources (including investment). Like other types of economic activity, venture activity has general (inherent in all types) and specific characteristics (Table 2).

Venture activity is a specific type of entrepreneurial activity. The introduction of innovations, research into innovative activity are not new for most countries of the world, and such statistics are constantly updated and expanded. The United States allocates the largest amount of funds for research and development. According to the Global Competitiveness Index, states spend \$405 billion on science annually (up to 2.7% of GDP). In China, the amount of funding for scientific and research activities is \$338 billion per year (2.1% of GDP at purchasing power parity). Japan allocates \$160 billion (3.67%) for this. For comparison: in terms of the total amount of investment in scientific research, our country ranks 76th in the world. Over the years of independence, the number of researchers in the field of technical sciences in Ukraine has decreased by 3.5 times. The development of new types of technology has decreased by 14.3 times, and the share of innovative industrial enterprises has decreased by five times. At the same time, the total GDP growth due to the introduction of new technologies in our country is 0.7%, while in developed countries it is 60-90% [5].

Special attention in successful companies is paid to the speed of innovation implementation, the use of technological platforms and lean practices in R&D. The use of lean approaches, which are usually associated with production, is due to the need for clear task setting and ensuring an appropriate level of control over the innovation development processes. The growth of financial results of leading companies also occurs in the areas of search and use of new ideas in related areas of business, which is clearly visible in the activities of Amazon, Apple, General Electric, Google, Procter & Gamble, etc. [3].

Ukrainian producers in the above-mentioned industries do not have competitive positions on the world market. But it is not necessary to choose the strategy of "following the leader", you can implement, for example, a "niche strategy" and occupy those niches of the world market where the advantages will be obvious. Each country chooses priority areas and areas of innovation activity for state support, taking into account its own potential. Sometimes competitive advantages become unexpected directions, caused even by lagging behind the level of

Table 2 – Characteristics of venture activities and other types of economic activities of enterprises [developed by authors]

Activity parameters	Venture activity	Other types of economic activity
Subjects	Business organizations (enterprises)	
	Legal entities	Citizens, individuals
Objects	Material, intangible, financial resources, hired labor	
	Intellectual, information resources	
Principles	Systematicity, comprehensiveness, continuity, economy, flexibility, balance, justification, multivariateness	
	Joining forces	Independence
	Selectivity	Interoperability
	Initiative	Cyclicity
	Impetuosity	Planarity
Purpose	Achieving economic and social results	
	Obtaining scientific, technical and innovative results	
Main task	Obtaining excess profit	Making a profit
Main features	Common interests	Independence
	Economic interest of the parties (at different stages)	Personal economic interest
	Innovation as a foundation	Innovation as a component
	Riskiness (shared risks)	Riskiness (own risks)
Functions	Innovative, resourceful, organizational, social, motivational	
Results of activities	Joint ownership of several participants in the activity	Property of a business entity
Role in the country's economic development	Creation of new jobs, competitive environment; development of infrastructure, investment activities	
	Impact on structural adjustment	Continuous development
	The emergence of new types of production	Increased production volumes
	Rapid update of the technical and technological base	Planned updating of the technical and technological base

economic development of the leading countries of the world (for example, Mongolia, without a developed industry, can supply other countries with environmentally friendly meat).

Considering foreign experience and financial capabilities and the specifics of the venture business in Ukraine, it is necessary to create a system of state regulation of technology transfer in both the civilian and defense sectors of the economy. The system should be specialized centers of science and high technologies, which will also provide assistance to local enterprises in solving innovative and technological problems [1].

It should be noted that the economic crisis has had a negative impact on the Ukrainian venture capital sector. Activity in the market has decreased, but domestic startups are still of considerable interest to investors. Indicative in this regard are the purchase of the Odessa company Lookery by the American Snapchat for 150 million USD, the attraction of 4 million USD by the Ukrainian startup GitLab from the Khosla Ventures fund and 1.5 million USD from the Sound Ventures fund, as well as investments by the EBRD (in the amount of 4 million USD) and TMT Investments (1 million USD) in the Ukrainian photo bank Depositphotos, etc. [3].

The direction of innovative development, such as alternative energy, continues to gain active development. According to representatives of the European Wind Energy Association EWEA [1], two areas are recognized as the most interesting and profitable in Ukraine: hydropower –

construction of hydroelectric power plants, maintenance of equipment and infrastructure, and wind power – launch of windmills in appropriate regions of the country, construction of infrastructure, supply of equipment, maintenance of systems and training of personnel. Members of EWEA (WindEurope) attract investments for projects through the association from large legal entities and funds. The only investment opportunity for individuals is investing through venture capital funds, which consolidate small amounts from many people and bring them to the capital market. In particular, the venture fund Vertex Life has announced its readiness to work on the Ukrainian market and provide individuals with investment opportunities in highly profitable, promising and innovative industries.

So, the prerequisites for venture capital activities of industrial enterprises in Ukraine include:

- evolutionary cyclical economic development, which includes crisis states, which are peculiar "provocateurs" of innovative and venture activities;
- gradual onset of the Third and Fourth industrial revolutions, which require transformation of production and management systems;
- diversity of spheres, industries and types of activities where venture activities can be implemented (in particular, industry);
- availability of effective, well-established mechanisms of venture investment in the world;
- gradual development of venture capital markets in the world;

– the presence of competitive advantages in certain specific market niches among domestic producers of industrial products;

- economic reforms in the country;
- support by the European Union for Ukrainian producers;
- the presence of innovative potential in certain producers.

Conclusions and prospects for further scientific developments. The world economy has created the prerequisites for the development of innovative activity. The experience of world-renowned leading companies proves the need to introduce innovations and implement venture projects to break into the market and maintain competitive positions. Venture activity is one of the

riskiest, but can affect the dynamism of the development of the economic complex of Ukraine.

This direction is extremely important for reducing the technological gap that has formed between the domestic economy and the economies of the world's leading countries on the threshold of the next industrial revolution. Contrary to popular belief, venture capital activities can be carried out not only in the IT sector (where it has become most widespread), but also in industry (mechanical engineering), etc. Despite the difficult economic and political situation, Ukraine has a strong potential for the production of equipment and technology for various sectors of the economy, which is attractive to foreign investors and can become the basis for attracting venture capital investments.

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ІННОВАЦІЙНИЙ ПОТЕНЦІАЛ РОЗВИТКУ ПРОМИСЛОВИХ ПІДПРИЄМСТВ В УМОВАХ СУЧАСНИХ ПРОМИСЛОВИХ РЕВОЛЮЦІЙ

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Недостатній рівень технічного розвитку підприємств в Україні, що ускладнюється глибокими економічною та політичною кризами на порозі Третньої та Четвертої промислових революцій, які поступово відбуваються у світі, актуалізує питання пошуку інноваційних шляхів розвитку економіки, здатних вивести країну з кризового стану та забезпечити випереджаюче економічне зростання в умовах війни. У статті проведено ретроспективний аналіз економічних реформ, проведених у різних країнах світу в періоди загострення кризових явищ, що дозволило сформулювати основні передумови розвитку іннова-

ційної діяльності промислових підприємств України. Для реалізації економічного прориву запропоновано напрямки розвитку економіки України на основі венчурного фінансування. Визначено загальні та специфічні характеристики венчурної діяльності суб'єктів господарювання, а також види підприємництва, в межах яких може здійснюватися венчурна діяльність. Проведений аналіз діяльності найбільш інноваційних компаній світу і тих компаній, що найбільше інвестують у НДДКР, дозволив визначити основні принципи ефективної інноваційної діяльності в сучасних умовах.

Ключові слова: венчурна діяльність, інвестиції, інновації, криза, промислова революція.

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