



# Problems and Prospects of Scaling of High-tech-business as an Innovative-investment Driver of Economic Systems Development

## Problemas y perspectivas de la expansión del negocio de alta tecnología como un innovador conductor de inversión en el desarrollo de sistemas económicos

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#### ABSTRACT:

The article analyzes the best domestic and foreign practices of scaling high-tech business in modern conditions of economic systems development. The main problems and prospects for the development of the high-tech sector as an innovation- investment driver as well as their influence on the formation of innovative systems of various levels are considered and presented here. Authors offered determinations of economic definitions to "science-intensive technologies", "high-tech business", "innovation-investment driver". The factors of internal and external genesis directly influencing the prospects of scaling high-tech business are studied. The problem of attracting investments into the hi-tech sector, implementing the mechanism of public-private partnership with the aim of increasing the efficiency of operating and increasing the investment attractiveness of high-tech business was investigated. The nature of the relationship between the effectiveness of innovation and investment activities of the economic system and the possibility of forming and developing high-tech business in it as an active

#### RESUMEN:

El artículo analiza las mejores prácticas nacionales y extranjeras para escalar negocios de alta tecnología en condiciones modernas de desarrollo de sistemas económicos. Aquí se consideran y presentan los principales problemas y perspectivas para el desarrollo del sector de alta tecnología como impulsor de la innovación-inversión, así como su influencia en la formación de sistemas innovadores de diversos niveles. Los autores ofrecieron determinaciones de definiciones económicas a "tecnologías intensivas en ciencia", "negocios de alta tecnología", "impulsor de innovación-inversión". Se estudian los factores de génesis interna y externa que influyen directamente en las perspectivas de escalar negocios de alta tecnología. Se investigó el problema de atraer inversiones al sector de alta tecnología, implementando el mecanismo de asociación público-privada con el objetivo de aumentar la eficiencia operativa y aumentar el atractivo de inversión del negocio de alta tecnología. Se refleja la naturaleza de la relación entre la efectividad de la innovación y las actividades de inversión del sistema económico y la

element of the innovation system are reflected. Some measures are proposed promoting to increase the efficiency of scaling high-tech business in the context of the necessity for carrying out events to ensure its sustainable development and functioning as an innovation-investment driver for the development of economic systems.

**Keywords:** high-tech business, scaling, innovation-investment driver, economic systems

posibilidad de formar y desarrollar negocios de alta tecnología en él como un elemento activo del sistema de innovación. Se proponen algunas medidas para promover la eficiencia de escalar negocios de alta tecnología en el contexto de la necesidad de llevar a cabo eventos para asegurar su desarrollo sostenible y su funcionamiento como un impulsor de innovación e inversión para el desarrollo de sistemas económicos.

**Palabras clave:** negocio de alta tecnología, escalado, conductor de innovación-inversión, sistemas económicos

## 1. Introduction

In the current conditions of the development of the world community, special attention is paid to the search for sources of economic growth, innovative and investment development of the economy, increasing the competitiveness of economic systems and business entities in international markets, in particular knowledge-intensive ones. One of the fundamental factors is the development of a high-tech sector of the economy, an increase of the share of knowledge-intensive industries.

The study of problems and prospects for scaling high-tech business, its qualitative characteristics, potential and development specifics, gives the reason for assigning it a special status - innovation-investment driver for the development of economic systems.

Countries are interested in achieving high indicators of development of high technology, fixing innovative and technological development in international ratings. It stipulates the necessity of constant monitoring of indicators characterizing the state and level of development of science-intensive industries, correct interpretation of the results obtained and making practically meaningful conclusions. Planning and predicting the development of the high-tech sector of the economy and making adjustments to development strategies in time are of great importance.

Today, it is especially important not only to achieve stability in the functioning of the domestic economy, in particular, industry, but dynamic, progressive development, a sharp jump to a qualitatively new level of production, primarily knowledge-intensive, meeting the standards and high demands of world markets, competitiveness and investment attractiveness. Taking into account the limitation of material resources for these purposes the great attention should be paid to supporting a modern production infrastructure that facilitates the solution of the set general economic, industrial and general production problems (Doroshenko etc., 2016).

However, the process of ensuring qualitative growth in the development of industrial infrastructure at the level of the subjects of the national economy remains difficult for the domestic economy. The problems of building interaction between key subjects in the innovation sphere remain unresolved at the methodological and practical levels, namely by universities, scientific organizations, business and the state. However, the situation began to improve in connection with the application of various forms of public-private partnership. This concept encompasses many different types of cooperation, differing in the scale, structure and purpose for which they are directed. In international practice, public-private partnerships are defined by such characteristics as the presence of formal relationships between participants, common goals and a clearly expressed interest of society; Participation of the government as a partner but not a regulator; the involvement of all parties in the management and financing process (Rudnik, 2011). In economically developed countries the mechanism of public-private partnership has long been recognized as an effective tool for strengthening the links between key players in the innovation system and is actively developing.

At the same time, we note that the degree of their coordination, cooperation and coherence of actions is such a factor on which the effectiveness of the innovation system as a whole depends to the maximum. Thus, the effectiveness of the transition to a new economy based on the latest knowledge and technology depends on the effectiveness of the interaction of the above-mentioned strategic participants in economic relations. The process of formation

of given relationships is at the initial stage and still unstable. Due to lack of incentives for innovation activity, the industrial sector is not interested in participating in the implementation of strategic directions of research and development. In its turn, against the backdrop of weak innovative business activity, science is forced to rely on state order and support. This is due to a number of objective reasons, first of all, a mutual misunderstanding of the strategic interests of the parties, which can be resolved with a clear understanding by each participant of the necessity of innovative and investment development as a source of ensuring national prosperity and economic development. And one of the tools to achieve these goals is a high-tech business as an innovation-investment driver of economic development (Doroshenko etc., 2015).

The deficit of the convergent orientation of the policy of regulation of Russian high-tech industries is explained by the fact that the policy of developing the industrial infrastructure of the regions of Russia is determined according to the rates of their social and economic growth, the volumes of budget revenues, the characteristics of the competitive environment, innovation activity, as well as investment policy. The industrial complex as the basis for the emergence of high-tech business, is a component of the production industrial territorial structure of the economy of the region, being a part of the country's economy simultaneously. Thus, the industrial complex, being an interdisciplinary mesoeconomic system, has the potential not only and not so much of natural, labor, financial, information and other resources of the territory, but rather as an opportunity and ability to participate in investment and innovation processes at all stages (Simchenko, 2016).

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## 2. Methodology

The main methodological and methodical approaches used in the study of problems and prospects for the development and scaling of high-tech business were worked out in the works of foreign and domestic authors, namely P. Draker, R. Cantillon, A. Marshall, J. Schumpeter, G. Markowitz, H. Kondratieva, S.Yu. Glazyeva, V.Ya. Gorfinkel, M.A Bendikova, I.E. Frolova, A.I. Tatarkina, O.A Romanova, V.V. Akberdinoy, G.I. Latyshenko and others.

The conceptual aspects of the formation of a new industrialization as a separate type of social transformations were first described in the works of J. Galbraith and received a further reflection in the concepts of the postindustrial society of D. Bell and the super-industrial civilization of Toffler.

Regularities, problems and development prospects, the influence of the regional segment of the national innovation system on high-tech business are presented in the works of the scientists M. Miller, F. Modigliani, S. Ross, B. Terborg, V.V. Bocharova, Yu.A. Doroshenko, D.A. Endovitsky, I.V. Somina, E.N. Chizhovoy, A.G. Ivasenko, A.A. Rudycheva, P.P. Taburchak, G.I. Gumerova, E.Sh. Shaimiev and others.

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## 3. Results

In modern economic science, there are different approaches to the definition of "science-intensive technologies" and "high-tech business", which is explained, as a rule, by the peculiarities of high technology application spheres, the dynamic development of science and technics. So, according to G.I. Latyshenko, the definition of "science-intensive technologies" is based on the concept of "science-intensive" as an indicator characterizing a technology that reflects the degree of interrelation of technology with scientific research and development. Thus, according to G.I. Latyshenko knowledge-intensive technology is considered to be technology that exceeds the average value of the index of science intensity in a particular area of the economy [9]. In scientific works of other scientists, knowledge-intensive technologies are defined as technologies based on highly abstract scientific theories and using scientific knowledge about the deep properties of matter, energy and information (Latyshenko, 2009; Simchenko, 2016; Doroshenko & Malykhina, 2016).

Based on the approaches of domestic and foreign scientists to the determination of such definitions as "knowledge-intensive technologies", "high-tech business", we will give an author's definition of these concepts. Thus, high technologies are highly effective

technologies, the use of which in the production process will make it possible to make the most efficient use of all types of resources involved in the production process, ensure high quality of knowledge-intensive products and a level of competitiveness. High-tech business is a business based on advanced technologies, which differs by high risks, the necessity to use substantial investments and the possibility of getting super-profits. High-tech business can naturally be regarded as an innovation-investment driver of economic development. Innovative investment driver is a tools of innovative and investment genesis, ensuring progressive development of high technology production, strengthening of innovative and investment potentials, inflow of investments and commercialization of innovation activity results.

It is expedient to highlight the main specific features characterizing high-tech business (Zhiglyaeva, 2017; Dudin, 2015).

- High demand for such resources as knowledge, intellectual and creative potential, information;
- Progressiveness, the ability to determine the strategic direction of economic development;
- The list of knowledge-intensive technologies and industries is dynamic, that is dependent on the level of development of basic technologies most of all which affects high-tech business;
- High-tech business is closely interrelated with the development of relevant research directions;
- Development of knowledge-intensive technologies is in interrelation with the activity of high-tech business.

It is also necessary to pay attention to the characteristics of the high-tech sector of the economy, among which the most significant are the following (Zhiglyaeva, 2017; Strategy of innovative development..., 2011):

- Significant amounts of investment, mainly in research and development;
- Use of achievements of innovative activity;
- High competitiveness of products (knowledge-intensive);
- Orientation to intensive growth and development, therefore, a substantial decrease in energy intensity and material intensity of production as extensive factors;
- The rapid development in comparison with the basic industries;
- The high level of the development influences on structure of an economy as a whole and on its separate elements, promotes modernization of adjacent branches of economy;
- There is a significant impact on increasing export potential;
- There are qualitatively new working conditions.

A necessary condition for the formation of a knowledge-intensive sector of the economy is modernization and the dynamic development of production. Thanks to this, the demand for scientific and technical innovations is supported. In addition, there is a perfection of the scientific and production structure, research objects, management system in this sphere. The structure of the production apparatus of economics is also important because a large proportion of it should be experimental and experimental production.

Besides the above mentioned signs and factors, it should be noted that the process of globalization has a great influence on the development of the knowledge-intensive sector of the economy. In a globalizing world, the transfer of technology and innovation, the movements of labor, capital are of great importance. The attraction of capital to knowledge-intensive industries is connected, first, with the profitability of similar industries, which, in turn, depends on the level of sectorial labor productivity. Secondly, an increase in the number of firms in the knowledge-intensive sector creates advantages both for the firms themselves (from the point of view of employees' remuneration, the prospects for entering global markets, etc.) and for intensifying the development of the sector. In general, there is a more widespread dissemination of scientific and technological achievements due to the internationalization of production and capital as integral components of globalization; a

redistribution of resources from other sectors is carried out of the world economy (Doroshenko, & Somina, 2012).

Scaling high-tech business in the economy takes into account the economic and scientific and technical potential of the country to a large extent, serves as the basis for strategic development and national security, in particular, from the standpoint of independence, high competitiveness of domestic producers and manufactured products, as well as influence on the development of other branches of the economy.

Speaking about the growing popularity and importance of knowledge-intensive technologies, highly technological and innovative productions, it is necessary to clearly understand the basic principles, the observance of which is the key to the success of the development of national economics in these areas. To do this, it is advisable to turn to the experience of the leading countries in the development of science and technology and to identify factors that have enabled these countries to achieve high results (Vladika & Malykhina, 2013).

V.D. Markova, S.A. Kuznetsova highlight a number of features of high-tech business that determine its difference from traditional types of business and the specifics of the management system of this business. At the same time, the features of a high-tech business are highlighted that promote its use as an innovation-investment driver for the development of economic systems (Markova & Kuznetsova, 2016):

1. Increasing profitability of high-tech business and "pegging" of consumers. Well-known researcher of high-tech business V.B. Arthur formulated the law of increasing profitability of this business, complementing the classical approach of Marshall for the economy of the industrial type.
2. High risks. Activities in high-tech business involve a high level of risk, which is caused by the great uncertainty of the prospects for the development of technology, the difficulty of forecast and the development of technological foresights.
3. Competition on the principle of "the winner gets everything". The main feature of high-tech industries in terms of forming a strategy and management system is the lack of rules of the game, which entails both risks and new business opportunities. Therefore, one of the strategic tasks of high-tech business is the desire to establish new rules in the industry and its dominant design or technological standard that will promote the interoperability of various products. Owning branch standards allows you to receive income that cannot be obtained from any other type of competitive advantage. Accordingly, in many industries, there is the competition for these standards.
4. The paradigm of open innovation and platform ecosystems. During the most of the XX century in the corporate world there was a paradigm of closed innovation. Its essence was concluded in the fact that high-tech companies themselves carried out all the stages of creating and promoting new products into the market: they put forward and developed their own scientific and technical ideas, created new products based on them, went out to market with them, and then spread and supported them. Within the framework of this paradigm, internal corporate R & D was not only a strategic asset of the company, but also a barrier preventing the emergence of new competitors in the industry.
5. Orientation to the global market. Tendencies of globalization against the background of the growing role of market niches and the development of new ways of diffusion of knowledge and technology determine the orientation of high-tech firms to the opening market opportunities both in the domestic and international markets.
6. Formation of new markets and the undercuts of traditional industries. Many new products and technologies create new markets or change the rules of the game in traditional industries that become unstructured and almost undetectable. The specificity of high-tech industries, where new rules are formed in the course of the game, is manifested in the fact that the winning technology does not necessarily turn out to be the best.
7. Platform technology as a basis for the formation of an ecosystem of high-tech business. The specifics of high-tech business deserve special attention and study because it is related to the formation of platform technologies and the appropriate positioning of these companies in the market.

8. Competition as the reason for pushing high-tech companies into traditional business. It is connected with the fact that in the beginning, new technologies or solutions are unique, but then some of the unique system is standardized, it can be borrowed by traditional business companies. In addition, high-tech companies need to reduce costs for profit constantly, and for this they use elements of the model of traditional business.

In the works of G.I. Gumerova and E.Sh. Shaimieva methodological tools are developed that improve the management of enterprises of high-tech business, in particular, the classification of high-tech businesses is given here. Under the enterprises of high-tech business three groups of companies are understood (Gumerova & Shaimieva, 2015):

- The first group engaged in high-tech knowledge-intensive type of economic activity. Thus, the criterion of referring to high-tech industries is a high level of technological development, determined by the ratio of R & D costs to gross value added. The criterion of referring the industry to the number of knowledge-intensive ones is the proportion of people with a high level of vocational education in the number of employees.
  - The second group of enterprises is engaged in medium- and low-tech economic activities, implementing management of high-tech business in enterprise operation, which ultimately creates a high level of technological development of the enterprise. The latter is achieved, first of all, thanks to the business model (or managerial knowledge) implemented at these enterprises.
  - The third group is mixed, where: (a) - enterprises can have high costs for technological innovation simultaneously, high organization of business and operate in low-technology economic activities; (b) - knowledge-intensive enterprises, whose activities can be assigned to the 1 st and 2 nd groups simultaneously.
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## 4. Conclusion

In conclusion, we note that the solution of the problems which complicate the implementation of the prospects for scaling high-tech business as an innovative investment driver in the context of increasing the efficiency of attracting and using investments, intensifying innovation activity, entering the world markets of knowledge-intensive products that meet world requirements should become a priority direction. The application of successful practices in the organization and functioning of high-tech industries will help ensure the demand for knowledge-intensive products by internal forces, strengthen investment attractiveness and create effective innovative potential, a favorable investment climate.

Summarizing the main results, it should be noted:

1. High-tech business is characterized by increasing profitability and increased risks.
2. One of the strategic tasks of high-tech business is the desire to establish new rules in the industry.
3. Internal corporate R & D was not only a strategic asset of the company, but also a barrier to the emergence of new competitors in the industry.
4. The trends of globalization against the backdrop of the growing role of market niches and the development of new ways of diffusion of knowledge and technology determine the orientation of high-tech firms to the emerging market opportunities.
5. Activities in high-tech business are connected with a high level of risk.

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