Fundamentals of the economic growth of engineering enterprises in the face of challenges of the XXI century

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Abstract. The world economy is currently undergoing an irreversible transformation caused by the fourth industrial revolution, characterized by the merging of technologies and the blurring of borders between the digital, industrial and biological spheres. The main factor in creating a unique product in the face of the challenges of the 21st century, aimed at meeting future needs is the continuous growth of innovative potential associated with the development and implementation of new technologies and equipment, improving management methods. At the same time, companies need to constantly monitor the technological development of all market players and industries in order to maintain the competitiveness of existing and create new unique products that can lead a company to long-term competitive leadership.

1. Introduction
The world economy is currently undergoing an irreversible transformation caused by the fourth industrial revolution, characterized by the merging of technologies and the blurring of borders between the digital, industrial and biological spheres. Digitalization of various spheres of life is gaining more and more momentum, which will be reflected in the emergence of "smart" cities, reducing the role of intermediaries in the economy and at the same time increasing competition between digital platforms, etc. A completely new type of industrial production is being formed, based on big data analytics, full production automation, augmented reality technologies, the Internet of things, etc. Global digital transformation leads to increased competition at the geoeconomic level. At the same time, the minimum time to create a product that has a high consumer utility becomes one of the main competitive advantages. In the conditions of the development of the economy of the 21st century, with the use of new methods of the digital economy in high-tech enterprises, the constant expansion and the need to use the resources of the world information space in solving production and organizational-economic problems, many manufacturers face the urgent problem of the creation of promising products with high consumer properties, which will dominate the market and lead to economic growth of high-tech enterprises.

2. Literature review
Economic scientists started to pay close attention to the study of patterns and modeling of economic growth in the middle of the 20th century, when R. Solow proposed a growth model with the help of which he attempted to explain economic growth on the basis of indicators of the stock of labor and capital, as well as the general variable of technological changes, which was assumed to have a constant upward trend. This model showed that countries with lower capital stocks — for example,
underdeveloped or recovering from military conflicts — would grow faster in the short term than economically developed countries. But long-term progressive economic development depends on technological change.

Thus, the Solow model became the origin of a new trend in economic science related to the determination of empirically measurable factors that stimulate economic growth. Solow estimated that nearly 90% of US production was produced through technological innovation, which enabled the country to accelerate economic growth. Later, P. Romer proposed a new model of economic growth – the Learning-by-doing model, which is a model of endogenous economic growth in conditions of perfect competition, which displays the possibility of sustainable economic growth due to external effects from the total capital stock in the economy and the effect of knowledge overflow. Economic growth is manifested primarily in the growth of the diversity and quality of existing and new goods and services, created as a result of the development of technologies and radical innovations.

3. Problem statement
The processes taking place in the economies of technologically developed countries show the special relevance of studying the relationship of cyclic processes in the economy with ensuring the growth of the innovative potential of organizations and the creation of new technologies based on the use of big data from the global information space, cloud technologies, and intellectual methods of data analysis, that allows to substantiate decisions. The identification of this kind of stable and regular ties between technical, technological innovations and economic fluctuations creates the necessary grounds for developing effective mechanisms to overcome or mitigate the negative effects of cyclicity on the development of the economic life of countries by consistently making changes in the innovation sphere in terms of accelerating the pace of innovation and competencies, the use of intelligent methods and technologies in the development and production of products. The main factor in creating a unique product in the face of the challenges of the 21st century, aimed at meeting future needs is the continuous growth of innovative potential associated with the development and implementation of new technologies and equipment, improving management methods. This helps to improve the quality of products, reduce their cost, as well as produce new types of products and services. Such processes should affect all key sectors of the economy, the dynamic development of which has a greater impact on the country's economic growth, as measured by the GDP growth rate.

New unique products should be created on the basis of the development of fundamentally new technologies that allow for the transition to a new technological order. It should be noted that currently there is a tendency to reduce the period of formation and development of technological orders. Thus, while the first technological order lasted about 65 years, according to the forecasts of scientific economists the sixth one will last about 35 years, which is almost half the time.

These changes can be observed due to two main factors:
- slowdown in economic growth, since on the one hand, several macroeconomic and geopolitical factors hinder the progressive development of the country's economy at a fast pace, and on the other hand, the traditional drivers give the desired effect to ensure dynamic development of the economy with shorter period of time, therefore there is a need to find new sources of growth stimulation;
- accelerating the pace of development and adoption of new technologies lead to a reduction in the life cycle of innovations that underlie the competitiveness of manufactured and marketed goods, which in turn leads to increased competition in the sales markets and forces manufacturers to qualitatively improve or create fundamentally new products based on the development of new technologies meeting digital transformation requirements.

4. Growth slowdown of high-tech enterprises and the country's economy as an incentive for accelerated technological development
The transition from one technological order to another one ensures the economic growth of a country, since the economy and technology are inextricably linked. In this regard, the slowdown in the world
economy and some countries indicates the need for rapid development of new technologies, competencies and products that can stabilize the economic situation in the sphere of production and consumption, while increasing the pace of economic development.

Currently, the world economy is in the stage of slowing economic growth, which is confirmed by data from the International Monetary Fund, which has reduced and predicts this indicator at an average of 3% in 2020, which is the slowest pace since the global financial crisis. At the same time, economic growth is constrained by a number of trade barriers between countries and growing geopolitical tensions, including tensions in trade relations between the United States and China, and economic sanctions against certain countries due to political and military conflicts.

When considering structural factors restraining economic growth in countries traditionally divided into two large groups, we can see that in a number of countries with developing market economies such factors are low productivity growth and low investment attractiveness of business, while in countries with developed economies the limiting factor is the aging population. This problem spans economies with an aggregate share of 78% of global GDP (64% of GDP at purchasing power parity), according to data from the Morgan Stanley analytical Agency. The growth of the working-age population slows down, which leads not only to an increase in the demographic burden (the number of pensioners and children in relation to workers), but also to the aging of the labor force itself, which in turn reduces labor productivity indicators. The share of 55-64 years old workers in the world will increase from the current 13% over the next 10 years to 15%, compared to the stable 10% in the previous five decades. In the US, Europe, Japan, China and the UK – the largest economies with the crucial problem of the population aging– the share will increase from 17% to 21% in 2030.

Under these conditions, the strategic competitiveness of individual enterprises whose activities have a great influence on economic growth cannot be achieved through traditional growth drivers. In such circumstances, the strategic competitiveness of individual enterprises with a large impact on economic growth cannot be achieved at the expense of traditional growth drivers, including some individual successful R&D results or targeted management actions. A temporary increase in profitability under the influence of individual achievements will attract competitors, experience will be copied or processed, as a result of which the average rate of profit in this segment of the market will fall, and the organization will lose profit and investment attractiveness, thereby reducing its growth potential and economic stability, which in turn will negatively affect the economic growth of the industry and the economy of the country as a whole. Under these conditions, traditional sources of ensuring economic sustainability and competitiveness begin to lose their effectiveness. Organizations are faced with an urgent need not only to develop existing competencies, but also to create new ones that can provide high competitive advantages of developed products due to their uniqueness and the ability to satisfy needs that were not met before its entry to the market. Such new competencies should be the basis of R&D aimed at developing radical innovations that, on the one hand, qualitatively modernize an organization’s production and technological base and production processes, and on the other hand, change the entire production system and management of its economic activity due to changes in the principles of building such systems.

An example is modern intellectual technologies and technologies of the Internet of things (IoT) (they became possible as a result of the radical innovation - the Internet), which change the organization of labor and production in industrial companies, ensuring productivity growth as one of the factors stimulating economic development.

The fact that the number of “things” connected to the Internet, already in 2020, will exceed the number of connected computers and smartphones used by the mass consumer is of particular interest. Moreover, the technology is used both in the production segment (the construction of “smart plants”, which is already widely used in the world), and in the consumer segment (the creation of the “smart home” system). In this case, we can say that not only technologies and production principles are changing, as was previously the case, but also the ways of selling products on the market, when products sold with feedback systems allow a manufacturer to identify and predict future needs that
may arise in a particular market segment and, possibly, on the basis of these data, predict the development of completely new needs that can be created by a particular new technology.

5. Acceleration of the pace of development and adoption of new technologies as a source of economic growth of high-tech enterprises

Increased competition in global and industry markets encourages manufacturers to develop or acquire new technologies that allow them to create products that are of value to the consumer and are able to meet promising market demand. One of the factors that significantly affect the preservation and strengthening of specific positions in the market is the time it takes to bring a new product to market (the first producer to introduce a new product on the market different from existing proposals has a chance to capture a high market share at least until another player capable of creating a similar product appears). In order to build up competitive positions, including by reducing the time period for bringing a product to market, manufacturers are rapidly introducing technologies, and the advantage should be given to promising technologies of the technological order that has just begun to "emerge", or to radically new technologies that can stimulate the beginning of a future order.

Speaking about modern technologies that are the most promising for organizations, including in terms of their contribution to the creation of competitive products and the formation of the general competitiveness of a high-tech enterprise, stimulating its economic growth, the following technologies can be distinguished, presented in table 1.

Table 1. The most promising modern technologies.

| Technology                  | Impact on the competitiveness and economic growth of a high-tech enterprise and its products |
|-----------------------------|---------------------------------------------------------------------------------------------|
| Artificial intelligence     | It is implemented by creating intelligent machines capable of performing creative tasks. Enables effective decision making |
| Supercomputer               | It allows to effectively solve specialized tasks by using high-performance supercomputers that are interconnected with each other. This relationship allows to divide the task into a number of sub-tasks, each of which is solved by a separate supercomputer |
| Simulation modeling, 3D technologies | Construction and study of an auxiliary model corresponding to the characteristics of a real object. Allows to obtain data on probable changes in a real object due to a particular impact Allows to create solid three-dimensional objects based on a digital model by layering. It is fundamentally opposed to traditional methods of mechanical production |
| End-to-end technologies     | Methods of automated information processing, allowing to prepare the basis for making an effective management decision |
| Blockchain technologies     | Multifunctional information technologies that allow for objective and reliable accounting of an organization’s assets |
| Cyber-physical systems      | They consist of a number of natural objects and artificial subsystems controlled by controllers. They allow to automate the management of technological equipment of a manufacturing enterprise, taking into account changes in the external environment, continuous self-learning and adaptation of the cyber-physical system itself |
| Robotization                | The use of intelligent robots in production can significantly increase the speed of production and eliminate errors based on the human factor |
| «Brain-Computer» Technology | A neurocomputer interface that allows direct exchange of information between the human brain and an electronic device. Allows to significantly speed up the process of information exchange |
The technologies given in table 1 become the basis for the creation of competitive products at present, which contributes to the economic growth of specific high-tech enterprises in certain sectors of the economy and countries as a whole as a result of the development of industrial and consumer segments.

The constant development of high-tech enterprises, the introduction of new technologies and the creation of unique competencies form their innovative and intellectual potential, which, with appropriate resource provision, can be realized as unique products capable of occupying a leading position in the market for a long time, which will ensure a company's economic stability and economic growth.

6. Algorithm for implementing measures aimed at ensuring the economic growth of a high-tech enterprise

The formation and continuous growth of the innovative and intellectual potential of companies is becoming one of the most important tasks on the way to achieving economic growth through the creation of innovations that can provide a “leap” into a new technological order. First of all, the accelerated development of innovative potential is influenced by the dynamic implementation of modern information technology solutions in the practical activities of organizations, as shown in the table 1 and creating conditions for the development of competitive products that form the basis for further innovative development at a high rate by creating new breakthrough and development in the field of science and technology on the basis of these technological solutions.

In order to create a breakthrough innovative potential in modern conditions, companies need to implement a comprehensive approach to its development, provided by the transformation of the principles of work in all areas of activity. The scheme of formation of conditions for ensuring accelerated growth of innovative potential is presented in figure 1.

![Figure 1. The scheme of formation of conditions for ensuring accelerated growth of innovative potential.](image)

If companies implement the steps provided in the figure 1 it will provide opportunities for accelerated growth of their innovative potential, which allows developing fundamentally new technologies and products on their basis ensuring continuous updating of the product line taking into account emerging consumer expectations. This way on the one hand, companies will maintain long-term competitive leadership in market, and on the other hand, they will encourage other market players to build up the technological groundwork and create their own innovative products, which in turn will further accelerate the rapid transition of industries and economies of specific countries to a new technological order.
At the same time, companies need to constantly monitor the technological development of all market players and industries in order to maintain the competitiveness of existing and create new unique products that can lead a company to long-term competitive leadership.

Creating conditions for ensuring economic growth and global competitive leadership of a high-tech enterprise is impossible without the use of modern information technologies that can qualitatively transform existing approaches to organizing production through the use of design technologies at a given cost, building digital product doubles, modeling production processes, etc. These technologies make it possible to comprehensively solve technical and economic problems in the design and manufacture of unique products in order to ensure their high consumer characteristics at optimal cost parameters, which creates opportunities for a high-tech enterprise to achieve a dominant position in the market. High competitive advantages of manufactured products will increase their sales volumes, which will lead to profit growth. The profit, in turn, can be invested into the implementation of new projects to create a new product line in accordance with consumer expectations.

7. Results and conclusions

Long-term leadership is possible only if the superiority over competitors is constantly ensured due to advanced and continuous innovative development, given the changing needs. The goal of developing a modern high-tech enterprise is to ensure its economic growth, which is based on the challenges of the 21st century:

- formation of economic stability as a result of balanced development of innovative and intellectual potentials and their application in creating innovative, competitive, diversified products;
- creating conditions for solving the strategic tasks of improving and developing not only innovations, but the development and application of radically new technologies that qualitatively change the prospective needs of markets;
- development and production of unique products using modern intelligent technologies to create high competitive advantages and provide a manufacturer with a leading position in the market.

Implementation of the objectives of the long-term development strategy of an organization requires creation of a certain foundation, innovative potential for development, which is expressed in achieving the necessary level of development of management and planning systems, the formation of scientific, technical and technological base. In this case, accelerated creation of innovative potential and technological development can be considered as a continuous process of creating the necessary conditions which will serve a base for strategic innovative tasks of the industry and the entire economy as a whole to be solved according to the planned stages in the face of the challenges of the 21st century.

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