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Management of innovation processes of a Chinese company in order to develop business in international markets

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Abstract

Over the past two decades, we have all witnessed the ever-increasing strength of the Chinese economy. Today, China is one of the fastest growing economies in the world. Over the past decades, there has been a steady trend towards an increase in the share of high-tech products in the total output of China. With the start of economic reform, the development of modern technologies has become a priority, which has greatly contributed to economic growth over the past two decades. The development of science-intensive and high-tech industries in China is the most important factor in increasing the international competitiveness of the Chinese economy. For several decades, China has been consistently and systematically increasing resources for innovative development, improving conditions for high-tech business, increasing investment in hi-tech, already outperforming many G-20 countries in terms of innovative competitiveness, which is due many factors. Today in China there are significantly more than in Brazil, Russia and India, large successful companies that use innovation. Moreover, they grew mainly from state research structures. Under these conditions, the analysis of the state of the high-tech market in modern conditions is of particular importance, using the example of the most dynamically developing science-intensive and high-tech sectors of the Chinese economy.

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Keywords

Innovation, high-tech companies, innovation management, innovation activity, China.

Introduction

For the first time the concept of "innovation" was formulated in the work of J. Schumpeter "The Theory of Economic Development" in 1911. Schumpeter understood innovation as the result of changing and obtaining new forms of organization management, new products and consumer properties. In his work, J. Schumpeter formulated the main five typical changes in development:

– introduction of products with new properties;
– change in the organization of production and in its logistics;
– use of new equipment, technological processes or new market support for production;
– the emergence of new markets;
– use of new materials [Schumpeter, 1982].
– J. Schumpeter defined innovation as a combination of new production factors, which is motivated by an entrepreneurial spirit [ibid.].

Thanks to successful innovative activity, the company provides itself with competitive advantages. At the same time, innovation activity requires significant costs, which are subject to a high degree of risk.

Innovative activity at an enterprise includes not only the transformation of scientific knowledge into new types of products, but also the study of commodity markets, their competitive environment, consumer properties, as well as a set of managerial, technological, organizational and economic measures, which together form innovation.

In addition, the scope of innovation includes the modification of products that are in demand by the consumer, as a result of design improvements and the use of new technological processes, in order to reduce manufacturing costs, improve operational parameters, and obtain additional profit [GigaDevice, www].

The purpose of innovation management at the enterprise is the development and sale of new types of products, the introduction of advanced technologies. To achieve this, the following measures are necessary:

– organization of effective interaction between departments of the enterprise;
– search for non-standard solutions in the field of technology;
– training of highly qualified specialists.
– continue to develop new and improve existing elements of the enterprise's production infrastructure;
– to ensure interaction between the subjects of the innovation system.

Having considered domestic and foreign literature, a number of characteristic features of the essence of the innovative development of an enterprise were also identified [Tucker, 2022]:

– the source of innovative development of a high-tech enterprise is innovation and innovative activity, which, as a rule, extends to all its areas of activity;
– innovative development as an object of management requires the allocation of a separate circuit in the enterprise management system;
– innovative development is characterized by both its own parameters and indicators, and indicators that reflect the increase in the economic, technical, organizational and social efficiency of the enterprise;
– management of innovative development at a high-tech enterprise should be directed mainly to an active outstripping type of management;

– management of innovative development at an enterprise (primarily a large one) is complex and diverse in nature, it is multi-level.

The assessment of the level of innovative activity of a high-tech enterprise should be carried out on the basis of a systematic approach, which, in turn, considers the enterprise as an open system consisting of complex interacting subsystems, on the other hand, interacting subsystems form an integral mechanism [Global NOR Flash Market Forecast to 2028…, www].

One of the most important principles for assessing innovative activity is complexity, it is a comprehensive assessment that gives the result.

The assessment of the level of innovative activity of a high-tech enterprise should be carried out on the basis of a systematic approach, which, in turn, considers the enterprise as an open system consisting of complex interacting subsystems, on the other hand, interacting subsystems form an integral mechanism [SciScimago Journal & Country Rank, www].

One of the most important principles for evaluating innovative activity is complexity, it is a comprehensive assessment that gives the result of a multilateral study of a set of qualitative and quantitative indicators that reflect the activities of an enterprise.

A comprehensive assessment includes almost all the results of the enterprise's commercial activities.

A comprehensive assessment is expressed [GigaDevice Semiconductor Beijing Inc, www]:

– in multivariance, where the results are compared with several bases of comparison;

– in multidimensionality – the social, technological, economic, environmental, legal, technical aspect is assessed;

– in multi-criteria, interests and enterprises are considered, and positions of other participants in the process.

Therefore, it can be argued that a comprehensive assessment makes it possible to implement a comprehensive qualitative and quantitative characteristic of the innovative activity of an enterprise, thereby acting as a key source of information for substantiating and making managerial decisions by the top management of an enterprise.

Subsystems will help to assess the provision of the organization with resources, as well as to assess their impact on the effectiveness of the innovative activity of the enterprise [Schumpeter, 1939].

Table 1 - Subsystems of innovative activity of the enterprise [ibid.]

Subsystem	Content
Financial	Financial stability and solvency of the enterprise, investment in R&D, intangible assets, as well as sources of financing
Personnel	Share of employees working in intellectual sphere from the general the number of employees of the enterprise
Logistics	Equipment progressiveness, application information technology materials, equipment of laboratories and offices enterprises
Organizational and managerial	Organizational culture of the enterprise, forms of labor organization and management, organizational structure
Informational	All scientific and technical literature enterprises, information on innovations and innovative activities, information on inventions and patents, reports in the form of scientific and technical documentation, as well as regulations, etc.
Marketing	The presence of demand for goods or services, analysis of the level of competitiveness of the enterprise

The process of managing innovative activity in a high-tech enterprise should be continuous, within the framework of which the innovative activity of the enterprise is constantly assessed in order to monitor the level of innovative activity and form practical recommendations (the management function "Implementation" and "Control"). It should also be noted that within the framework of managing the innovative activity of a high-tech enterprise, the choice of an organization's strategy should be determined by the mission, goals, objectives and overall corporate strategy of the enterprise.

Thus, as part of the management of innovative activity, the manager must understand that this is part of the management of the economic activity of the enterprise, which, from a functional point of view, consists in the implementation of the following functions:

– analysis;
– planning;
– implementation;
– control;
– motivation.

The state plays an important role in managing the innovative activity of high-tech enterprises.

First of all, in order to improve the efficiency of innovation activity management, it is necessary to improve the system of measures for the legal regulation of relations between participants in innovation activity, as well as between public authorities.

The state should pay special attention to supporting the innovative activities of high-tech enterprises, not only by financing innovative projects, but also in solving the problems of legislative support for innovative activities at the level of federal legislation.

Also, as a result of the study, we came to the conclusion that the most important task at the enterprise, within the framework of the management of innovative activity, is the formulation of the main development tasks, as well as the identification of sources of financing. The management of the enterprise should pay special attention to:

– improvement of education and training programs for personnel;
– improvement of the industrial safety system;
– creation and development of a system for managing the innovative activity of an enterprise (formation of a subdivision dealing with the issue of innovative activity and development of an enterprise).

The level of innovative activity of an enterprise depends on the nature of strategic development, primarily on the effectiveness of management methods, considering the most important factor of innovative activity, the human capital of an enterprise, so using scientific knowledge and its transformation into innovative high technologies and technological solutions can significantly increase the level of innovative activity.

Management of innovative activity should consider all subsystems of the enterprise, in order for innovative development to be widely implemented in all subsystems of the enterprise [World Development Indicators…, www]. It is necessary to create systems for recording and monitoring innovations and innovative activity of high-tech production [Mckeown, www].

Methods

In the study, the authors used some methods such as analysis and synthesis, induction and deduction, historical and logical, abstraction and concretization.

Results

Founded in Silicon Valley in 2005, GigaDevice is a leading component supplier. The company successfully completed an IPO on the Shanghai Stock Exchange in 2016. Aiming to create a complete ecosystem with three main product lines – flash memory, microcontroller and sensor – as the main driving force, GigaDevice can provide solutions for a wide range of applications in the field of industrial, automotive, computing, consumer electronics, Internet of things, mobile communications, networks and communications.

GigaDevice is among the companies that pioneered SPI NOR flash and is currently ranked third in the world in this market segment with a total shipment of nearly 16 billion since its inception. GigaDevice GD32 MCU, a key player in the high performance 32-bit general purpose microcontroller market, has more than 2000 customers with more than 600 million units and more than 370 kinds of parts from 28 series for various applications. In addition, GigaDevice supplies touch screen controller sensor and fingerprint sensor to world-famous mobile device manufacturers around the world, with its touch screen controller sensor ranked 4th and optical fingerprint sensor ranked 3rd in the world [Company Profile, www].

Since 2007, GigaDevice has filed thousands of patent applications and issued over 700 patents.

Today, GigaDevice's management team embodies the best practices in the semiconductor industry from well-known companies in the Silicon Valley of California, Korea and Taiwan. GigaDevice is ISO9001 and ISO14001 DQS certified.

The product range of GigaDevice is shown in Figure 1.

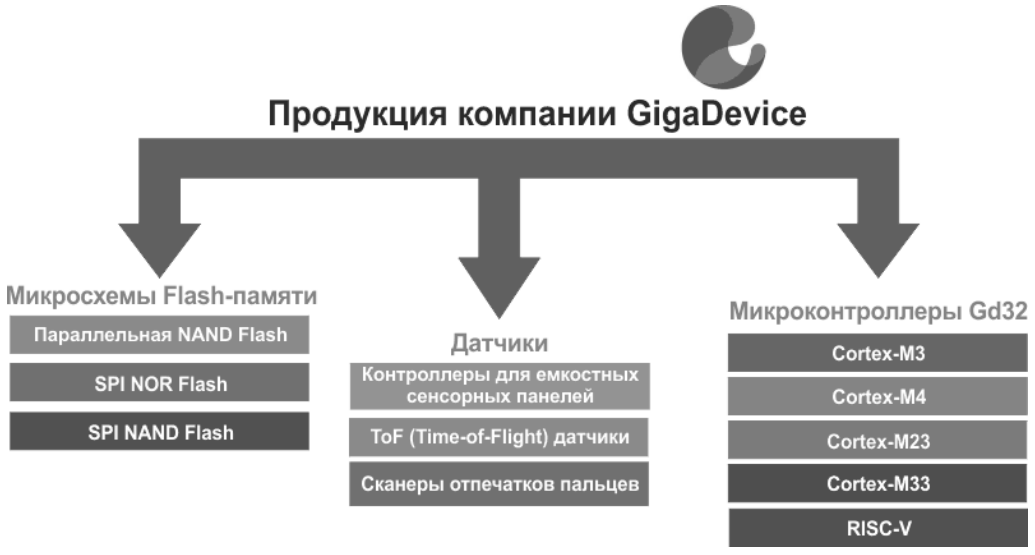

Figure 1 - GigaDevice products [ibid.]

GigaDevice uses a manufacturing model based on close relationships with foundry, assembly and testing subcontracting partners. GigaDevice believes that this well-defined, no-manufacturing model gives it a competitive advantage over traditional integrated device manufacturers, as capital expenditures on hardware to support advanced memory processing technologies exceed market returns in many market segments.

The shortage of microcontrollers that formed on the market during the pandemic led to a significant increase in the company's financial results.

The dynamics of the main financial indicators of the company over the past three years is shown in Figure 2.

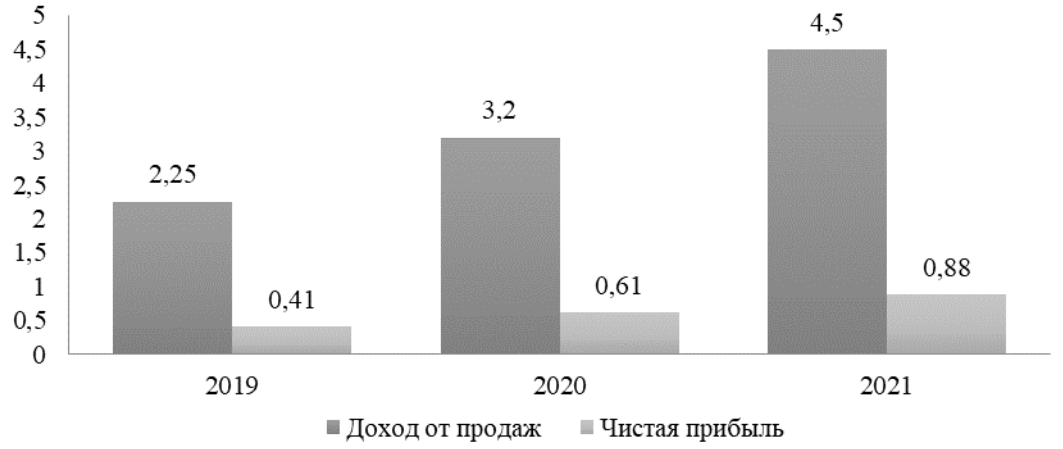

Figure 2 - Dynamics of sales revenue for 2019-2021, billion yuan [ibid.]

In the nine months ended September 30, 2021, GigaDevice's revenue increased 99% to 6.33 billion yuan. Net income increased from 672.9 million yuan to 1.65 billion yuan. Revenue reflects increased demand for the company's products and services due to favorable market conditions. Net profit rose from 6.1 million yuan to 228.8 million yuan.

Forecasts of further development of the market segments in which GigaDevice operates confirm the significant growth potential of the company itself. Thus, according to forecasts, by 2028 the NOR flash memory market will reach 6,069.5 million US dollars compared to 2,361.9 million US dollars in 2021; it is estimated that from 2021 to 2028 it will grow by an average of 14.4% [ibid.].

The rapidly growing data-driven applications of NOR flash in many industries, combined with the growing popularity of mobile devices and connected technologies, are driving global demand for NOR flash. Increasing demand from IT companies to create a computer system that provides further protection and increase its efficiency is expected to drive innovative NOR flash applications. Demand for embedded NOR chips in the automotive, industrial, medical, wireless and other sectors is expected to drive further market growth.

Thus, the growing demand for GigaDevice products creates the prerequisites for increasing production volumes and expanding the geographical boundaries of the company's presence in the near future.

The main products of the company are sensors, microcontrollers and GigaDevice microcircuits, created using the latest technologies in the field, universal for use in various fields. They are used for household, industrial, telecommunication equipment, cars, computer and computing equipment, mobile gadgets, communication systems.

GigaDevice is more than two thousand customers, six hundred million articles and three hundred and seventy products in twenty-eight application series. The company has registered over seven hundred patents. 70% of the staff are experts involved in research and development and design testing, which allows us to ensure high manufacturability of products and leave them far behind the competition. Top managers of GigaDevice are famous talents from Silicon Valley and the best companies in Korea and Taiwan.

GD is committed to building strong partnerships with semiconductor manufacturing, assembly and testing contractors. A careful approach to production and establishing contacts with manufacturers and consumers made it possible to overcome the high competition in the IC memory market.

NOR or NAND flash memory is an important non-volatile memory device that stores the configuration data of a digital device. GigaDevice has a large portfolio of flash memory products that are specifically designed to meet the various needs of various electronic applications in terms of density, performance, reliability and security, while providing the smallest size and lowest power consumption.

GigaDevice supports more than 14,000 microcontroller devices in 26 architectures, ranging from the smallest 8-bit devices to high-performance 64-bit Arm architectures. In total, this includes microcontrollers from more than 70 semiconductor manufacturers. This is more than any other embedded software tool provider on the market.

GigaDevice products are used by many of the world's largest corporations in a wide variety of industries. GigaDevice brings innovation to the automotive, industrial automation, Internet of Things (IoT), medical and consumer electronics industries.

Embedded apps are smarter, richer, and more complex than ever before. GigaDevice is here to help meet customer specific application requirements so customers can focus on innovation and get the most out of their product.

Reliable and flexible products cover all aspects of embedded software development. With powerful features, and a dedicated team passionate about embedded development, GigaDevice supports customers and their company throughout the entire development process, both now and for any projects in the future.

The company is at the stage of maturity. The main characteristics of the GigaDevice business at the maturity stage are:

– an annual growth of about 5%

– work experience of about 8 years branches or subsidiaries

This is the period of the highest level of security that the GigaDevice can feel from the very beginning. This security comes from professional day-to-day business management, stable annual profits, and relative predictability of the overall business environment.

GigaDevice's business is stable and reliable, it can protect its position in the market and expand into new verticals thanks to its exceptional brand awareness power. This, along with a strong cash position, makes GigaDevice's business attractive for acquisitions and mergers.

As a decision maker, GigaDevice has two options: reinvest in the company and its sustainability, or exit and cash out to start new ventures.

The goal of GigaDevice at the stage of maturity: to determine the future business of the company and its participation in it.

The company's task is to analyze the potential advantages and disadvantages of each option and make an informed decision.

What to pay attention to GigaDevice:

1. Business expansion. Before deciding to take this step, the company's management must decide whether the business can provide further growth. What are the market opportunities, if any, for another expansion? Can the company cover a possible failure financially? Is the company, as a market leader, prepared to deal with the challenges that the new expansion will bring?

2. Search for an exit strategy: This step will require a thorough internal and external analysis of the company's position. The management team must communicate the right information at the right time

to the right people. The company may exercise this exit through a partial or complete sale of the business. How the sale process unfolds will depend on the type of business and the decisions GigaDevice makes about moving forward.

GigaDevice's capital management objectives are to ensure the company's ability to continue as a going concern for the foreseeable future. and support the company's sustainable growth to deliver returns to shareholders and benefit other stakeholders and maintain an optimal capital structure to enhance shareholder value in the long term. Equity refers to equity and external debt (including loans and notes payable). To maintain or adjust the capital structure, a company may adjust the amount of dividends paid to shareholders, return capital to shareholders, issue new shares, buy back shares of the company, or raise/pay off debt.

Figure 3 shows the capitalization of the company.

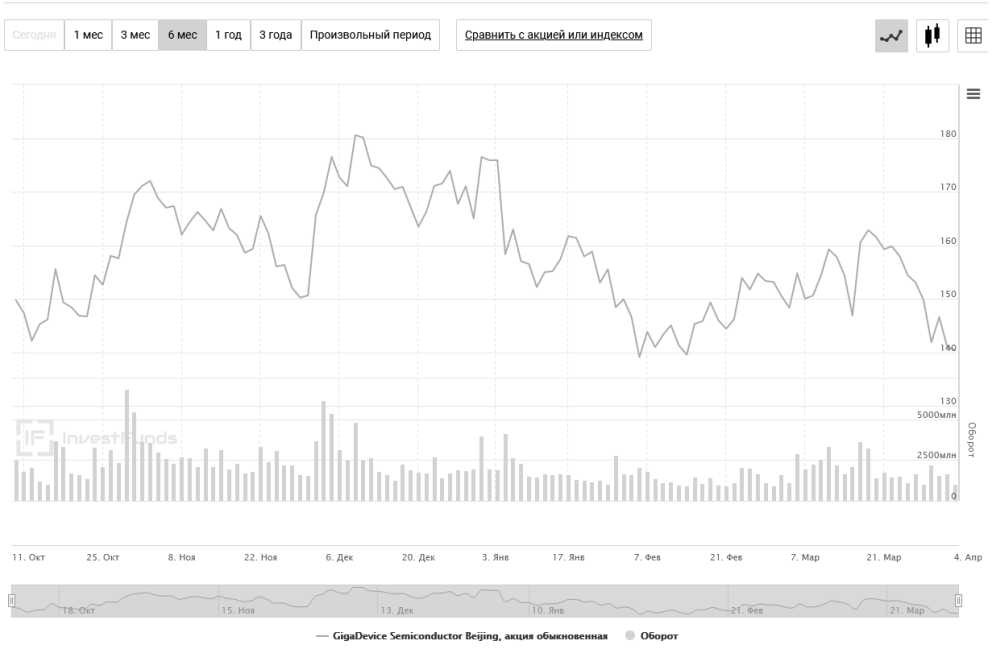

Figure 3 - Market capitalization of GigaDevice [GigaDevice, www]

As of April 2022, GigaDevice has a market capitalization of $140.3 billion. This makes GigaDevice the most expensive company in the world by market cap. Market capitalization, commonly referred to as market capitalization, is the total market value of the outstanding shares of a publicly traded company and is commonly used to value a company.

Recommendations and conclusions

In the process of implementing the first stage, the key goals for managing the innovation activity of GigaDevice were formed:

– growth of competitiveness in the world market;
– meeting the growing demands of consumers in innovative high-tech products, strengthening the position of the company, by increasing the volume of sales of innovative products;
– introduction of new projects, principles and methods of management, including the use of information technologies and corporate integrated information systems, aimed at continuous

improvement of the quality and productivity of labor.

As part of the management of the company's innovative activity, it is necessary to increase the efficiency of the enterprise's innovative activity:

– investing in the designated areas through the redistribution of investments;
– improvement of the investment policy of the enterprise;
– advanced training of employees of the enterprise;
– development of infrastructure directly involved in R&D;

The main goal of the Chinese company GigaDevice should be to increase the innovative activity of the enterprise, maintain and strengthen its position in the market, increase the competitiveness and investment attractiveness of the business through the innovative activities of the enterprise, as well as the formation of a highly profitable portfolio of orders, the implementation of research and production and personnel potential, the development of production capacities, efficient use of resources.

As part of the management of innovative activity on the GigaDevice, it is necessary to:

– creation at the enterprise of a specialized division dealing with innovative activity, as well as the organization of a unified investment policy, the formation of innovative programs, control over the development and implementation of products, and the organization of effective interaction between the enterprise's divisions to balance all aspects of the renewed production;
– search for non-standard solutions in the field of technology;
– training of highly qualified specialists.
– automation of business processes.

It is necessary to create a single information space at the enterprise, covering the main activities of the enterprise and allowing to automate existing business processes, including planning, coordination and control of their implementation. It is necessary to develop a software product for registration, approval and control of the implementation of proposals, which will automate the process of collecting and processing proposals from company employees, ensuring the involvement of a wide range of employees from various departments in the centralized process of collecting proposals.

The main conditions for the successful implementation of the proposed recommendations:

– involvement of personnel in the optimization process;
– development (training) of personnel;
– an integrated systematic approach;
– support for change by management at all levels.

GigaDevice's effectively implemented recommendations for managing innovation activity will ensure a leading position in the market. Increase competitiveness and investment attractiveness by:

– increase of innovative activity;
– formation and implementation of scientific, production and personnel potential
– development of production capacities
– efficient use of resources and cost minimization.

Thus, the proposed approach to the management of innovation activity, based on the identification of priority areas of development, is of practical importance, since it will improve the efficiency of GigaDevice management decisions.

We see that today China is making great efforts to accelerate the growth of the innovation component, striving to take a leading position in the global innovation process. Obviously, China will increase investment in science and technology, pay close attention to improving the innovation system, accelerate the transformation of scientific and technological achievements into real productivity,

strengthen the protection of intellectual property rights, and promote innovation growth.

Chinese high-tech companies are committed to promoting international science and technology exchanges and cooperation with more open thinking and measures, work together with other international companies to create an open, fair, and non-discriminatory environment for science and technology development, and encourage mutual exchange. In developing international technological and innovation cooperation, China proceeds from the premise that scientific and technological achievements should benefit all mankind, and not be a means of limiting and restraining the development of other countries. Another important task that, in our opinion, will need to be addressed by the PRC is the formation of an actively developing domestic market for innovations. Its development will be facilitated by both the growth of innovative exports and the deepening of international innovative cooperation within the framework of various initiatives.

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Управление инновационными процессами китайской компании с целью развития бизнеса на международных рынках

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Аннотация

За последние два десятилетия мы все стали свидетелями постоянно растущей силы китайской экономики. Сегодня Китай является одной из самых быстрорастущих экономик мира. На протяжении последних десятилетий наблюдается устойчивая тенденция к увеличению доли высокотехнологичной продукции в общем объеме производства Китая. С началом экономических реформ приоритетом стало развитие современных технологий, что в значительной степени способствовало экономическому росту за последние два десятилетия. Развитие наукоемких и высокотехнологичных производств в Китае является важнейшим фактором повышения международной конкурентоспособности китайской экономики. На протяжении нескольких десятилетий Китай последовательно и планомерно наращивает ресурсы для инновационного развития, улучшает условия для ведения высокотехнологичного бизнеса, наращивает инвестиции в высокие технологии, уже опережая многие страны G-20 по уровню инновационной конкурентоспособности, что обусловлено многими факторами. Сегодня в Китае значительно больше, чем в Бразилии, России и Индии, крупных успешных компаний, использующих инновации. Причем выросли они в основном из государственных исследовательских структур. В этих условиях особое значение приобретает анализ состояния рынка высоких технологий в современных условиях на примере наиболее динамично развивающихся наукоемких и высокотехнологичных секторов китайской экономики.

Для цитирования в научных исследованиях

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Ключевые слова

Инновации, высокотехнологичные компании, инновационный менеджмент, инновационная деятельность, Китай.

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