

Formation of the competitiveness of a manufacturing company based on technological leadership

Svetlana Karpova

Management Department

Financial University under the Government of the Russian Federation

Leningradsky prospect 49, 125993 Moscow

Russian Federation

e-mail: svkarpova@fa.ru

Tatiana Pogodina

Management Department

Financial University under the Government of the Russian Federation

Leningradsky prospect 49, 125993 Moscow

Russian Federation

e-mail: TPogodina@fa.ru

Abstract This paper studies the factors of competitiveness of national economies on the basis of the system implementation of Industry 4.0. It is noted that the majority of economically developed countries in their competitiveness are more oriented not on natural, but on acquired factors, which include technological factors. The concept of the relatively low innovation costs in connection with the active involvement of digital technologies into production, distribution, exchange and consumption has been substantiated. The advanced digital technologies that are used by manufacturing companies all over the world were identified and analyzed. It was proved that there is need for business to implement its social functions, including the production and distribution of digital goods. Production and sale of digital goods provide the formation of the moral foundations for socio-economic activity. The use of digital technology was noted by a small number of Russian companies, mainly the “second echelon”. Priorities of venture investment in Russia, which include cloud technologies, software, and cyber security are highlighted. A proposal on the need to form a digitalization strategy for production activities on the basis of technological platforms in conjunction with industrial clusters in the field of information technologies, which will enable the companies to form technological leadership, was formulated.

1 Introduction

The problems of competition and competitive factors at the macro level of individual companies are reflected in the works of leading researchers (Bass and Avolio 1994; Drucker 1998; Porter, 2000; or Doyle 2003). However, they practically did not address the dependence issues of the company's competitiveness at the level of scientific and technological potential development.

The consideration of the technological leadership factor allowed us to formulate the key issues that we need to concentrate on in the process of determining the competitiveness of an economic entity. Particularly - these are the goals of the company; internal and external parameters of the level of competitiveness; methods and means of solving problems associated with its formation and sustainable development vector. Taking into account the above-mentioned approaches, the company's competitiveness and leadership position are based on the possibility of forming a high level of development and the degree of the competitive potential usage for the most complete satisfaction of the consumers' needs in a particular market segment rather than competing companies. The purpose of the study is to identify priority areas for improving the competitiveness of manufacturing companies in the long term. In the process of achieving this goal, the following tasks were solved: to make an analysis of the competitiveness of Russian economy and individual foreign countries, to identify the role of digital technologies in shaping the competitiveness of manufacturing companies.

In the conditions of modern transformations, the competitiveness of companies should be based on the usage of technological leadership in key areas of scientific and technological progress. Digital technologies are among the most significant and advanced in the global economy.

In the course of the study, methods of statistical and dynamic analysis were used. The coefficient and structural analysis made it possible to investigate the development trends of the economy of Russia

and foreign countries. The comparative method allowed us to identify factors of competitiveness and signs of competitive industrial companies in the short and long term.

2 Analysis of competitiveness

The competitiveness of companies, industries and national economies is determined by a sufficiently large number of factors, among which the most significant are financial and economic indicators. These include indicators of production indices, the level of capacity utilization and others.

Table 1. Analysis of financial and economic indicators of business entities in Russia and some European countries in 2017

Country	Industrial Production Index, %	The level of capacity utilization in industry, %	Direct investments in the country, in millions of dollars	Share in world exports, in %
Russia	102,1	64	461710	2,1
Germany	103,0	87	1390840	8,5
Great Britain	101,0	83	1610510	2,6
Finland	104,0	82	114597	0,5
France	102,0	85	1053580	4,0
Sweden	104,0	85	390460	1,0

Source: Own results based on Rosstat (2019)

According to the results in Table 1 above, it can be seen that in terms of industrial production growth rate, Russia is inferior to many European countries, including Germany, Finland and Sweden. The level of capacity utilization in Russia is one of the lowest among European countries and amounts to only 64 % against 87 % for Germany and 85 % for France and Sweden. This indicates the lack of competitiveness of domestic industrial enterprises.

The size of attracted foreign direct investment (FDI) is a direct factor in the competitiveness of business entities. FDI in 2017 amounted to 33.2 % relative to Germany, 28.7% - to the UK, 43.8 % - to France. Accordingly, the share in world exports of Russia is significantly lower than that of the above-mentioned countries (Rosstat 2019).

In general, Russia has significant underutilized traditional resources that provide opportunities to accelerate the pace of the country's socio-economic development. At the same time, the majority of economically developed countries in their competitiveness are more focused not on natural, but on acquired factors, which include technological factors. According to the impact on competitiveness technologies can be classified on the macro-technology, breakthrough and critical. In the world there are about 50 macro-technologies. In terms of six macro-technologies, Russia's potential is higher than that of most world powers. Such macro technologies include aviation, space, nuclear energy, shipbuilding, metallurgy and power engineering. Therefore, the task of Russian industrial policy in the medium term should focus on the preservation of the achieved advantage in existing positions and the development of new macro-technologies, which will bring the national economy to the world level.

It is almost impossible for companies alone to solve this problem. Therefore, it is advisable to combine them and form organizational-economic forms of entrepreneurship. Forms of eliminating gaps in the innovation process are alliances between industrial and scientific, educational and scientific organizations. An effective form of integration for scientific research and development is an innovation cluster.

The organizational and economic forms of developing strategic directions for innovation and technological development of industries and complexes are technological platforms. Innovation organizations at the "crossroads" of industries can contribute to concerns.

Innovation and technological processes should be the object of close attention not only for federal but also for regional authorities. Therefore, at the regional level it is advisable to create a working body in the form of a non-profit organization - the Center for the Coordination of Innovations. The Innovation Coordination Center will perform the functions of building a database, monitoring the innovativeness of the region, preparing proposals for the use of opportunities for the further development of the innovation and production sphere.

In conditions of high population with low incomes, the solution of the problem of technological leadership is possible only with the social orientation of the business, providing innovative motivation of workers and the public. A key feature for the formation of the mission of social entrepreneurship is the

focus of companies on interacting with the lower part of the social pyramid, the formation of self-esteem, increasing their social status from others' point of view, introducing the understanding that cheap does not mean low-quality into the masses.

The traditional theory of innovation often justifies the higher cost of innovation by the increased costs of production and commercialization compared to traditional products (Baldwin et al. 2006). However, in our understanding, innovative products using modern advanced technologies can cost less, which increases their attractiveness for various consumer segments. In addition, the implementation of social functions provides higher business resilience in the medium and long-term business, which has a positive effect on financial and economic indicators of competitiveness (Sekerin et al. 2014).

The presented concept regarding the relatively low cost of innovations is based on the active implementation of digital technologies in production, distribution, exchange and consumption. In modern conditions of globalization and informatization of the main business processes, many products radically change their form from physical to electronic, on information carriers. The so-called digital goods that exist in digital format, become more widespread, and the broad masses of the population are able to use the achievements of world civilization in the form of video films, music, articles, textbooks, monographs, instructions, cartoons, computer games (Varian 2000; or Bhargava and Choudhary 2001).

Thus, the digitization of the economy leads to an increase in the level of the broad masses' cultural development, their socialization due to the spread and promotion of innovative goods, services and technologies. The moral foundations of social and economic activity, which are expressed in the development of business morals and communications, the spiritual life of society and spiritual production, the ethics of management and the ethical code of companies are being formed. Leadership and creative abilities are being developed to provide technological leadership in all spheres of social activity (see e.g. Thrash 2012; or Oplatka 2007).

3 Digital technologies and shaping the competitiveness

Everyone would agree that Russia needs to catch up with the leaders to ensure an intensive transition from the lower to the upper paths of technological development of the national economy. The leading role in this process belongs to the development of leadership, primarily technological (Rowold and Schlotz 2009).

Digitization of core business processes has penetrated deep into the global economy due to the positive impact on labor productivity growth rates, resource economics and reduced time spent on production and sales of products. China and the United States reached the highest results in this process. For example, in China, the share of digital economy is more than 30% in GDP, and in Russia, according to various estimations, it is about 4–5 % (Veselovsky et al. 2018).

Digital modeling, artificial intelligence, digital supply chains, digital manufacturing, robotics, intelligent machines are those mechanisms that are the most promising in developed economies of the world. The usage of digital technology in industrial companies of leading world powers was considered and the results are presented in Table 2.

Table 2. Perspective types of digital technologies and their use in the global economy

Types of digital technologies	Trait	Sphere of usage
Artificial intelligence	The ability of intelligent systems to perform creative functions	Social sphere, services, health
Robotics	The sphere related to the development of automated technical systems	Industrial production, services
Digital counterpart	Virtual reproduction of the working state of a real object, process, system	Metallurgy
Smart manufacturing	Comprehensive use of network IT-technologies at all stages of production	Electrical, car industry
Digital counterpart	Virtual reproduction of an object, process, system	Mining industry, metallurgy

Source: Own results

Unfortunately, in Russia a small number of production companies implement digital technologies of the "first echelon". Venture investment contributes to their active promotion. In the field of information technology, venture investment processes are actively carried out. In the world, their share is more than 50%, in Russia it is even higher - about 75%. Venture investors are actively investing in business solutions, cloud technologies and software. The investment attractiveness of cybersecurity and corporate accelerators

is increasing. Thus, real prerequisites for the active introduction of first-tier digital technologies in the business community have been formed.

The implementation of the task of economic digitalization is facilitated by the formation of clusters in the information technology field. For example, IT clusters are formed in the Republic of Tatarstan, the Rostov Region, the Perm Region. Their activities are focused on improving competitiveness and forming a focus of dynamic growth, becoming a full-fledged ecosystem, ensuring wide user access to high technologies and improving the skills of personnel in the region. Consequently, the organizational and economic prerequisites for the intensification of production development based on the introduction of advanced digital technologies are formed in the above-mentioned regions.

However, there are few examples of the active development of IT clusters in the Russian regions. The main reason is that most regional leaders focus on considering additional costs, while not taking into account that informatization is a tool to help save budget funds and allows you to find new sources of revenue in budget. The final stage of building an information system will be the formation of an “e-government” in the region, which will carry out indicative counter-planning, bring its basic provisions and their adjustment by regional actors and the public.

4 Conclusions

Our analysis made it possible to identify opportunities for competitiveness improvement of manufacturing companies on the basis of ensuring technological leadership. For a qualitative change in the structure of products, the transition to higher technological ways of production, it is necessary to build up the innovation potential on the basis of increasing the social orientation of business, the production of digital goods and the development of digital technologies.

Thence, according to our results and outcomes, we can state that the key areas of a strategic approach to managing a production company focused on the innovative path include:

- Development of organizational and economic forms of entrepreneurship on the basis of innovative clusters, technological platforms and concerns for the implementation of the strategic directions of technological leadership;
- The usage of strategic marketing, the formation of the corporate strategy of “selling information” indicators, that affect consumer competencies and that are recognized by a wide range of consumers, and bringing it to the developers;
- Development of digital technologies of the first echelon (robotics, artificial intelligence, “smart” production);
- Distribution and promotion of digital products that form the moral foundations of social and economic activities;
- Evaluation of corporate strategy efficiency based on deviation management, taking into account the gap between the strategic plan and the company's actual capabilities and the development of preventive measures to avoid the emergence of these gaps.

These results might be of some interest for a number of stakeholders: innovators, policymakers, state planners, as well as officials and managers responsible for the economic development, growth and competitiveness of any country.

Acknowledgements

This paper has been prepared in accordance with and based on the results obtained from the research work in the framework of the state task of the Financial University for 2019.

References

Baldwin C, Hienerth C, Von Hippel E (2006) How user innovations become commercial products: A theoretical investigation and case study. *Research policy* 35(9):1291-1313. doi: 10.1016/j.respol.2006.04.012

Bhargava HK, Choudhary V (2001) Information goods and vertical differentiation. *Journal of Management Information Systems* 18(2):89-106. doi: 10.1080/07421222.2001.11045681

- Doyle P, Marketing management and strategies, 3rd edition (translated from English. Under the editorship of Caporuscio Y, SPb.: Peter, 2003), 544 p.
- Drucker P, Effective management, 1st edn. (Moscow: fair-PRESS, 1998), 288 p.
- Bass BM, Avolio BJ, Improving Organizational Effectiveness through Transformational Leadership, 1st edn. (Thousand Oaks, CA: Sage Publications, 1994), 238 p.
- Oplatka I (2007) Foundations of educational management-Leadership and management in educational organizations, 1st edn. (Haifa: Pardess, 2007), 220 p.
- Porter ME (1987) From Competitive Advantage to Corporate Strategy. *Harvard Business Review*, May/June, 1:43–59.
- Rosstat (2019) Russia in Figures. <http://www.gks.ru>. Accessed on 28 September 2019
- Rowold J, Schlotz W (2009) Transformational and Transactional Leadership and Followers, Chronic Stress. *Leadership Review* 9:35–48
- Sekerin VD, Avramenko SA, Veselovsky MY, Aleksakhina VG (2014) B2G Market: The Essence and Statistical Analysis. *World Applied Sciences Journal* 31(6):1104–1108
- Thrash A (2012) Leadership in higher education. *International Journal of Humanities and Social Science* 2(13):1–12
- Varian HR (2000) Buying, sharing and renting information goods. *The Journal of Industrial Economics*. 4: 473–488. doi: 10.1111/1467-6451.00133
- Veselovsky MY, Pogodina TV, Lobacheva EN, Pilipenko PP, Rybina GA (2018) Organization and management of clusters in Russia in the context of import substitution. *European Research Studies Journal*. 21(4):142–150.