

## Innovative Forms of Industrial Enterprises' Cooperation

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### ABSTRACT

The paper is devoted to the actual topic - selection of forms for cooperation of industrial enterprises, which are enhancing the economic potential of the enterprise in the market, enable to avoid negative manifestations of the market power of huge companies. Such a phenomenon may be "co-competition" - the actual provision of innovative development at the sector and regional levels. The purpose of the paper is to explore innovative forms of industrial cooperation aimed at improving the competitiveness of products using innovative energy- and resources saving technologies, minimizing waste generation. The leading method to the study of this problem is the simulation method enabling to consider this issue as a deliberate and organized process for improving the management of industrial enterprises. The article scientifically justifies a set of recommendations on the appropriateness of the choice of innovative forms for cooperation of industrial enterprises. The study results in a better extent and more targeted enable to regulate innovative activity of industrial enterprises through the use of innovative forms of cooperation and can be used in the framework of sector programs, are of interest to the state statistics bodies, as well as ministries and departments responsible for strategic analysis and planning.

### KEYWORDS

Industrial enterprises, innovative activity, cooperation, resources saving technologies

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## Introduction

### *The relevance of research*

The economic development of the industrial sectors of the economy, based on the consolidation of production, strengthening of market power and the realization of the efficiency of scale, has limitations in the form of weakening incentives for innovation, due to, particularly, violation of market mechanisms as a result of reducing the severity

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of competition due to increased trends of market's monopolization. Despite the fact that at the federal level as the model of industrial innovative development are selected state corporations, co-financing instruments of megaprojects are actively used, attempts to form zones of small innovative enterprises at universities are made - their effectiveness has not been yet proven. The scale of their performance appears to be insufficient for the development of small and average innovative business sectors, comparable in size to huge enterprises. Consequently, the domestic theory and practice of management of industrial innovative development is experiencing difficulty: on the one hand, due to the limitation of innovative development of huge enterprises, on the other - due to lack of resources of small business for R & D sector's development in large-scale and the transfer of its results to the industry. In this regard, noteworthy the works of some researchers (Brandenburger & Nalebuff, 1996; Moore, 1996; Williamson, 1985; Silverberg & Verspagen, 1995; Shinkevich & Lubnina, 2011).

Therefore interest belongs to such organizational forms of competition, which, enhancing the economic potential of the enterprise in the market, enable to avoid negative manifestations of the market power of huge companies. Such a phenomenon, as we believe, can become "co-competition" - the actual provision of innovative development at the sector and regional levels.

In addition, the modern economy is characterized by a huge expenditure of energy, capital and labor to maintain the competitive advantages of industry at the appropriate level, i.e. escalating the pace and scale of production due to the increasing use of limited natural resources. This development not only is dangerous for the reliability of industrial production, but also can make it impossible for future generations to meet their needs. In this connection, noteworthy the works of some researchers (Shinkevich et al., 2015a; Shinkevich et al., 2015b; Reznikov et al., 2015; Malysheva et al., 2016; Kudryavtseva et al., 2015; Zaraychenko et al., 2016).

## **Methodological Framework**

### ***The theoretical base of research***

The theoretical basis of the paper are management theory, theory of innovation, neo-institutional theory, evolutionary theory of innovative changes, cyclical theory of innovative development, the theory of transaction costs, the theory of the effectiveness of economic phenomena and processes. The objectives of the study are: the development of cross-industrial models for stimulation of collaborative innovation activities of enterprises on the basis of new forms of co-competition relations.

### ***Research Methods***

To obtain scientifically justified results the following general scientific and private methods of cognition were used: the formalization method, the dialectical method, method of analogies, analysis and synthesis, methods of system, structural-functional, economic and mathematical modeling, simulation modeling, multivariate statistical analysis, comparisons, index methods, the matrix methods and forecasting methods.

### ***Stages of the study***

The study was conducted in three phases:

- At the first stage - economic essence of co-competition models was defined;
- At the second stage - the analysis of the effectiveness of the industrial enterprises of the Republic of Tatarstan was carried out;

- At the third stage - testing of innovative forms of enterprises' cooperation in industrial production was performed.

## Results

### *The economic essence of co-competition models*

Research of the category "competition" shows that organizations seeking for competitive advantage through innovation, have the best production and sales conditions of goods, which allows them to take the best position in the market. However, an organization that wants to achieve long-term success should not be limited by competition only, and the idea of cooperation takes a new form. So the authors A. Brandenburger & B. Nalebuff (1996) use a new term «co-opetition» (roughly: the co-competition), which means a simultaneous relationship of cooperation and competition of industrial enterprises at various stages of production and for the individual business processes. Developing their ideas based on the theory of value-added in supply chain, under co-competition is offered to understand the implementation of innovative projects on the basis of the emergence of competitors' incentives to co-productions (on the order of production) of an innovative product in the different phases of its life cycle. The feature of co-competition is the appearance at the sector level of a situation in which competitors are willing to waive competition to extract economic benefits of cooperation in the field of innovation. However, some companies intentionally combine their efforts to produce innovations, while others independently generate demand for innovation by developing relevant market sector. This approach enriches the theoretical basis of management technologies to stimulate innovation activity of economic systems.

In accordance with the foregoing, and by co-application of knowledge about the phases of the innovation process, life cycle of industries, the theory of the value added in the supply chain the following types of co-competition can be defined:

-direct co-competition - relationships between enterprises that purposefully combine their economic (financial, human, technological, organizational, etc..) resources in order to increase the efficiency of activities based on the collaborative development and implementation of innovation. Expected result of the jointly implemented project - process, product innovation;

-indirect co-competition occurs when companies independently generate demand for certain innovation, thereby contributing to the development of the sector of the economy, generating this innovation. The result of the joint project is the development of innovation infrastructure of industry, providing innovatively active enterprises with the necessary resources for development.

The essence of the model is to create within the industry incentives to innovative development through the operation of high-tech infrastructure sector, organized in the form of various innovations' development centers (eg., industrial districts, techno poles). Authors are actually talking about the creation of the institute at the sector level, in which there is competition between manufacturers of innovative technologies and products in the field of results' market development. As economic incentives for innovation development, in this case, serves in the framework of created Institute a compensation of the transaction costs related to the innovative process (the mechanisms of state compensation or cooperation on the pre-competitive stage), which increases the relative cost of transactions for the monopolies. As a result, for sector-forming enterprises is more profitable to carry out research and development activities by placing an order in this industry sector (outsourcing), inside of which a competition is actively carried out between small innovative enterprises.



Detailing the proposed approach it is necessary to reveal the economic content of models and characterize their organizational charts.

In order to increase efficiency of the enterprise and reduce costs, some competing companies within the industry jointly invest in the development of innovations.

This is the so-called model of "direct" co-competition. Organizational forms and database for innovations' development in this model may be sector research institutes, scientific and technological centers, higher education institutions (within the scientific research), design offices, etc. The result of co-competition is an innovative product (production technology, organizational, marketing innovations, improvement of consumer properties of the product), which is used within the industrial competition by enterprises which co-financed its development and became its owners.

Currently, the "direct" co-competition between enterprises on the territory of the Russian Federation is uncommon. Meanwhile actors of markets of economically developed countries are increasingly using this model of cooperation. In turn, it is proposed to allocate two subspecies of "direct" co-competition relying in this issue on the belonging to a particular phase of the creation of value added in the industrial supply chain: technological and market co-competition.

In the case of technological (process) co-competition its object is the cooperation of enterprises in the phase of development of technologies for the supply chain and the subsequent competition in the phase of market development of innovations. The effectiveness of this model of innovation development is that the developed innovative product is created at the beginning of the supply chain; it passes through its entire links, thereby increasing the beneficial effect on each stage. That is innovations have greater multiplier effect for regional economic system in comparison with the market co-competition.

The second type of model of direct co-competition is market (grocery) co-competition - takes place when organizations collaborate in the final phases of the supply chain - the implementation phase of the product. The result of this model of co-competition can be marketing and organizational innovations.

Turning to the second model of co-competition, it should be noted that the indirect (Infrastructure) co-competition is a set of requests for the production of an innovative product from competing companies.

Enterprises independently carry out an inquiry on the development of innovation, developing appropriate market sector in a particular area. The engine of this model is the development of a new activity in the region in which, for example, in accordance with the targeted investment programs, major industrial projects are implemented that require new competencies of employees, services, etc.

Thus, the proposed set of co-competition models suggests the universality of management technologies developed for all variants of the state of industrial conditions.

### ***Analysis of the effectiveness of innovation active enterprises in the Republic of Tatarstan***

Let's refer to co-competition of industrial enterprises. Analysis of the effectiveness of innovation active enterprises in 2010-2015 covers 100 enterprises, representing the manufacturing sector of the Republic of Tatarstan, of which 33% of businesses are large, 33% are average and 33% - small businesses.

The starting point of the analysis is the fact that co-competition should be seen on the main problem areas of production factors' use. In accordance with the theory of

production factors it is suggested to consider the following co-competition kinds in the areas of efficiency's increasing in the use of production factors: co-competition in more efficient use of labor resources; co-competition in more efficient use of technology; co-competition in more efficiency of market activity.

To improve the competitive environment it is better to divide all the performance indicators of the company into 3 groups, characterizing the efficiency of production factors' use: performance indicators of labor resources' use (enterprise profit per employee, labor productivity, the average monthly salary of an employee, the share of labor costs in value added, the ratio of production of value added and wages), indicators of efficiency of the technology's use (cost effectiveness, profitability of the enterprise), performance indicators of market activity's use (the share of shipped innovative products in the production of products, goods and services, production efficiency).

Analysis of enterprises in 2010-2015 showed that, of course, industrial production is a dynamic activity, but develops in conditions of increasing physical and obsolescence of fixed assets. The consequence of long-term operation of equipment is not only its physical deterioration that is fraught with the threat of man-made disasters, because the plants carry a large fire and environmental hazard, and only high production and highly qualified staff saves the situation, but also obsolescence, which affects the competitiveness of industrial products, both in foreign and domestic markets. As a result, in the domestic market appear imported products previously held in the category of export.

It would be logical to assume that with such a strong depreciation of fixed assets, industrial enterprises are making significant efforts to update them. That is shown by our analysis of enterprises. In addition, analysis of the enterprises of industrial production showed that the most efficient use of fixed assets was observed in medium-sized enterprises. For small and large enterprises efficient use of fixed assets is somewhat lower. The strategy for these companies, in our opinion, should be a policy aimed at scientific and technological improvement of production processes, branching, to the extent of possibility, the raw material base of production, development within the industry of innovative products and industries (polymer continuation), as well as a stimulating effect on consumers by produced products in the manufacturing process.

However, it should be borne in mind that for these enterprises there is a risk of reduction of innovation activity due to increased cost of raw materials and energy resources. It is therefore necessary to make a significant focus of the work of enterprises on cost management, including the development of raw material base, as well as more efficient use of raw materials and energy. If in the second direction to reduce costs a state program of energy saving is implemented, in the first direction it is necessary to strengthen state regulation of the process, including valuation issues, the competitive selection of suppliers (this function is transferred to the representatives of state bodies in joint stock companies), increasing productivity of enterprise employees.

The development of the industry in this direction should go the way of the formation of institutional structures, the main motive for the existence of which is to reduce the transaction costs of the innovation process for individual enterprises. This is especially true for small size companies.

In general, in enterprises fairly high values of efficient use of manpower indicators are observed. What is caused by the introduction of high-tech technology, computerization, i.e. increase of technological equipment in enterprises. In addition, the relatively high wages in these enterprises stimulates and motivates employees to a more efficient execution of their duties.



Identifying problem areas of activity of industrial enterprises and offering the main directions to improve the efficiency of their operations let's do a brief summary with the allocation of the enterprises' sectors, for which is more suitable to use co-competition.

The highest efficiency of labor resources indicators in 2015 were observed in large enterprises, as evidenced by the high values of the indicators, such as business profits per employee (994.3 thousand Rubles), the average monthly wage (37518.3 rubles per employee), high labor productivity (1764.8 thousand rubles), and so forth. In this case, better to choose as the objects of co-competition small and medium industrial enterprises, as efficient use of labor resources by these enterprises is relatively low.

In 2015, the highest share of innovative products in the production of products, goods and services in medium-sized enterprises (29.1%), as well as high production performance indicators (37.6%) enable to make conclusion that company in this sector are most effective in market activities. Market activities of large and small industrial enterprises are less efficient. One of the methods of its increase is co-competition of small and large enterprises in the industry.

Effectiveness of technology's use is highest in large enterprises, as the profitability of these enterprises amounted to 45.7% and the cost-effectiveness 0.4. Values of these indicators are lower on small and medium-sized enterprises of the sector, which means not full use of working capital. To improve the efficiency of its use co-competition is offered in this area for small and medium industrial enterprises.

### ***Proposals for the implementation of innovative forms of cooperation at the industrial enterprises of the Republic of Tatarstan***

In small and medium industrial enterprises there is a lack of development of engineering staff due to its work on the worn-out equipment with the use of outdated technologies, as well as minor investments in skills development. To improve the utilization of labor resources, for small and medium enterprises of industry it is advisable to use the model of "indirect" co-competition that will enable to implement an effective personnel policy in the industrial complex of the Republic of Tatarstan, aimed at increasing of the intellectual potential of the companies' complex, adequate to goals of innovative development. For small and medium-sized enterprises it is expedient to participate in the creation of corporate universities, as well as to organize training on the basis of specialized universities, using the technology of design and activity training for the operational use in work of the new knowledge and skills.

In turn, for a balanced innovative development of the complex it is necessary also to stimulate models of technological and indirect co-competition of small and large enterprises in the industry in the field of renewal of fixed assets, and the range of products based on the introduction of advanced high-tech resources- and environment-saving technologies that are competitive in the global and domestic markets.

While "technological" co-competition for large enterprises it is expedient to involve small businesses for generation and effective development of scientific and technological innovation (innovation). The current situation demonstrates the need to fork processes of cooperation of small and large businesses, with the aim of increasing innovation and intellectual potential of small businesses, enhancing its role and importance in the development of industrial complex and small business of the Republic of Tatarstan as a whole.

Implementation within the framework of the Institute of small innovative business of the concept of «indirect» co-competition allows equate its positions with the position of sector-forming companies, i.e. we are talking about a duopoly in the area of design

and implementation of technological innovation. On the one hand, the initiator of developments is a major, and in some cases sector-forming company in the region, on the other - the institution that brings together small producers of innovative products. However, implementation of this model of institutional changes will require the development of an industry business activity, which is a serious institutional constraints, as well as alignment of the rules of the game within the industry, preventing the monopolization of the institute created by the large enterprise.

For large and small enterprises within the framework of "indirect" co-competition it is advisable to cooperate for greening industrial development; enterprises complex's transition on resource-saving way of development; the implementation of industrial complex of the Republic of Tatarstan in the area of expansion of manufacture of advanced resource-saving materials, initiating processes of resource-saving in other sectors of the economy; the development of comprehensive cooperation of companies in the region, particularly the military-industrial complex and the engineering, construction industry, agriculture and food industry, etc.; implementation of joint large-scale investment and innovation projects; improving of control system of the complex, increasing the degree of centralized coordination of its development; continuation of the structural and institutional changes aimed at creating optimal structural proportions in the complex, taking into account the reforms.

For small and medium-sized enterprises of the industry the model of "market" co-competition will increase the scope of market activity. Reserve for development of these enterprises is, on the one hand, work with suppliers of resources, the use of so-called retraction of logistics as applied to the resource providers and consumers of products. A significant reserve of increase in the value added for this production is to optimize the distribution function, aimed at the development of its own sales network (which would require a fairly significant capital investment). It is also advisable for these companies, in our opinion, to use the product innovations being implemented in the framework of a marketing strategy.

However, isolated (local) implementation of models of co-competition can lead to a temporary success, but will not solve the problem of innovative development as a whole, so it is advisable to use complex implementation of the proposed models. Testing of theoretical proposals on the justification of co-competition model, ordering its strategies to the practice of functioning of industrial complex and other economic activities, indicate that they are reasonable, reliable and have a practical significance, enable to clarify the institutional and economic mechanisms of innovative development of industry.

## Discussions and Conclusion

Research models of innovative development of countries, regions and individual enterprises are devoted a significant number of fundamental and applied research works (Leydesdorff, 2005; Lazonick, 2006; Mensch, 1979; Perez, 1985; Silverberg & Verspagen; 1995; Krugman & Venables; 1995; Shinkevich et al., 2016; Galimulina et al., 2016; Kudryavtseva et al., 2016; Wallerstein, 1979; Kat'kalo, 2003). Some of them are based on the provisions of neo-institutional theory (Nelson & Winter, 1982; Shinkevich, 2005; Williamson, 1985). Relatively small is the number of publications devoted to the study of forms of competition and cooperation in the R & D sector (Brandenburger & Nalebuff, 1996; Moore, 1996; Shinkevich & Lubnina, 2011).

The economic content of the category "co-competition" is clarified, under which it is proposed to understand the implementation of innovative projects on the basis of the emergence of competitors' incentives to co-productions (on the order of production) of



an innovative product in the different phases of the innovation product's life cycle. The classification of types of co-competition adequate to various kinds of innovative projects is offered. A set of recommendations on the appropriateness of forms' choice of co-competition is scientifically substantiated.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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