THE DEVELOPMENT OF HIGH-TECH INDUSTRIAL ENTERPRISES IS THE PATH TO A COMPETITIVE ECONOMY

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Abstract. The competitiveness of high-tech industrial enterprises should be given special attention, since only they at the present stage can maintain world leader status not on resource-based raw materials, and on a fundamentally new, innovative basis. It is advancing the development of high-tech industrial enterprises should be regarded as a powerful source of the country's modernization, improving economic efficiency and growth of well-being of the population. Low level of competitive development of hightech industrial enterprises complicates the use of innovative wavs of economic development and implementation of technological breakthrough. Low investment with demand. associated with low investment attractiveness and low domestic consumption the same negative impact on the development of high-tech industrial enterprises. Deterrent effect of industrial enterprises has problems of institutional and infrastructural problems. High level of import dependence has also had a negative effect on the situation. All of the above problems development of high-tech industrial enterprises are observed in terms of becoming world processes "new industrialization", the purpose of which is to facilitate the transition to the new technological ways and build a competitive economy. So by 2020, the European Commission plans to bring: up to 20% of the industry; the share of gross fixed capital formation in GDP up to 23%; investment in equipment from the current 6-7% of GDP to 9% in the year 2020. In the United States 24 % of GNP is generated by value-added industry and another 25% of GNP through the services sector-related industry. The study used data from Industrial Development Report 2013-2016, data of the Federal State statistics service. In the course of the analysis of these indicators were applied as the dynamics and structure of hightech industry sector's contribution to GDP, the profitability of the high-tech industry, indicators of resource efficiency high-tech industrial sector. Quantitative analysis was supplemented by expert interviews with management of enterprises that use high technology, representatives of the academic community. The function of this interview was to determine the key factors of competitiveness and their trends changes. The study produced the following results: Were identified an evaluation of the condition and development tendencies. Model development of competitiveness of high-tech industrial enterprises taking into account the key factors of competitiveness, namely the level of technology and the level of cooperation. The obtained results are the basis for further research to develop strategies to ensure the competitiveness of high-tech industrial enterprises.

Keywords: high-tech industrial enterprises; development; competitiveness.

Introduction

A key factor in the long-term competitiveness of any level of economy is the progressiveness of its sectoral structure. Analysis of empirical material, research findings confirm that there is a correlation between the high percentage of primary commodities and the negative effects in the economy. The economies of countries with a major share of high-tech industries are resistant to inflation, as the prices of products of technology production are only at the initial stage determined by the great costs of development and pilot production. And as production volumes increase, the costs and prices of output are reduced by economies of scale. This prejudges relatively low inflation. Commodity prices are increasing objectively because of the deterioration of the commodity base, the conditions of mining and the production of high-yielding deposits. Thus, the competitiveness of commodity industries is determined by costs, and the increase in domestic costs is an objective factor in increasing the level of socio-economic development of any territory. "Hence, the competitiveness of only the low-technology industries-the developing economy." At the same time, the habit of living at the expense of commodity exports hampers innovative development.

In the report "World competition." The new reality of the US Presidential Commission is to declare, "enhancing the competitiveness of the American industry" as a national goal (Kornev, 2014). According to Gardner Research metal, US enterprises are increasing the cost of new metalworking equipment (Gardner Business Media, 2015). In Europe, improvements in productivity and the introduction of new technologies should be ensured by measures to increase investment in equipment from the current 6-7% GDP to 9% in 2020 (UNIDO, 2013b). It is industry that is making a significant contribution to the development of GDP in an economically developed country, playing the role of an indicator relative to the characteristics of its economic development. The reduction of this is an obvious "sign of the country's economic decline".

In this regard, the manufacturing sector, particularly the high-tech part of the economy, is promising in terms of achieving sustained economic growth. The status and development of the manufacturing sector determine the country's position in the world economy and its ability to influence world events. It is the development of the manufacturing industry that reflects the productive capacity of any country. Purpose of the study is to define lines of development of the competitiveness of high-tech industrial enterprises

Research methods

The aim of the research is to develop a model for ensuring the competitiveness of industrial enterprises of high-tech industries on the basis of studying the directions of development of them competitiveness.

The study was carried out in three stages:

1. To identify trends in the development of high-technology industries at the current stage.

2. Assess the current state of the high-technology industrial sector of the economy and conduct a comparative analysis in the cross-country section.

3. Identify key factors in the competitiveness of high-tech industries at the present stage.

4. Propose a model for the competitive development of high-tech industries.

The main sources of data for the study were the US president's economic Report, Industrial Development Report 2013-2016, ROSSTAT data, accounting-consulting companies, expert interviews, International Yearbook of Industrial Statistics 2016.

The analysis used indicators such as the dynamics and structure of the contribution of the high-tech industry to GDP, the share of the value added of the high-tech industrial sector, the average annual growth rate of the high-tech industry, the share of exports of the high-tech industry, and the profitability of the high-tech industry.

The quantitative analysis was supplemented by an expert interview with senior management of enterprises using high technology, held in February 2014, 2016. The function of the interview was to identify key factors of competitiveness and trends in their evolution.

The selection of candidates for the experts was based on an analytical assessment of their competence. 55 experts were interviewed in the high-tech industries of the Central Federal District of the Russian Federation. 45 per cent of the experts interviewed are employed in private companies, the rest in enterprises with public participation. A large number of experts work in enterprises operating under strong competitive pressure, primarily from foreign producers.

The study of the development of high-tech industries used comparative and structural analysis, which revealed current trends in the development of high-technology industrial enterprises. Scientific, practical and analytical publications, scientific reports were also used as a source of information on significant factors and conditions for ensuring the competitive advantages of high-tech industries.

Results of the study

The leading sector in the world economy and the economies of highly developed countries is the high-tech sector, which in general has been in the period of 2000-2014 achieved a global 90 per cent increase in the value added of all manufacturing industries. This result was the result of a number of trends.

First, there has been a gradual shift of manufacturing from the industrialized to the developing world. This has provided the latter with growth in output, which is accompanied by an increase in the share of the industry in GDP. In the developed countries, there has been a general increase in manufacturing output, with a decline in its share of GDP (Figure 1). These processes reflect an increase in the demand of national markets for manufactured goods and are due to the availability of modern production infrastructure and lower labor costs. At the same time, the low-cost labor force has recently had a less influential influence on decision-making. According to President Reshoring Initiative Moser, the average annual rate of pay increases for the Chinese worker is 15-18 %, American-3 % (Bogdanova, 2013). The productivity of the latter is higher. Moreover, cheap labor is not capable of creating high-tech and

technologically sophisticated products produced by high-tech industries. Therefore, according to Kuchukov R.: it is now competitive not to paid, but to an expensive workforce capable of solving technically complex tasks by taking on the responsibility of design, which is capable of working with modern technologies, masteringing and embedding them in productive activities (Kuchukov, 2015). According to R.Reich China, skilled labor is the only advantage of developed countries (Reich 1982).



Figure 1. Structure and dynamics of contribution of manufacturing to GDP (UNIDO, 2016b)

In the past two decades, there has been a certain loss of position by developed countries in manufacturing production. It is indicative that of the 133 countries, only 38 countries in 2011 compared to 2006 showed an increase in the share of manufacturing in world GDP, two have not lost their positions. In the list of these countries, none belongs to the economically developed. Eleven countries are territorially located in Europe.

This trend is of concern to the Governments of developed countries and their political elites. In recent years more than 250 industrial productions have been returned to the US from developing countries. Secondly, developed foreign countries are returning the "technological model of economic management", which emphasizes the development of high-tech manufacturing industries (Figure 2, Table 1, Figure 3).



Figure 2. Contribution of the high-tech industry in the GVA manufacturing sector, % (UNIDO, 2016b)

Enlarged Region	Europe	North America	Asia Middle	East and North Africa		
lead country	Germany	United States	Japan	Israel		
2006	11,57	31,44	15,94	3,72		
2011	13,25	33,20	13,74	4,89		

Table 1. Share of the high-tech industry in the lead countries of the enlargedregion (UNIDO, 2013a)



Figure 3. Structure of the high-tech industry in the aggregated regions (UNIDO, 2013a; UNIDO, 2016b)

The sum of 4 lead countries in 2006 accounted for 62.67% of the global GVA of the high-tech industry, and in 2013, it was already 65.08%.



China has the highest share of manufacturing value added to GDP (Figure 4).

Figure 4. Trends in the share of manufacturing value added in GDP, % (UNIDO, 2013a)

In some countries, such as the US, China, Russia, the growth rate of the high-tech sector compensates for the slow growth in other manufacturing industries (Table 2).

Thirdly, there is the replacement of the labor-intensive process of capital-intensive, where the priority is Labor saving, one of whose objectives is "to transform intellectual work into a mass and predominant". It is the production of a high level of intellectuality, where new technology technologies are already involved, and, as a

result, the high value added is the nucleus of hi-tech industries. And as technologybased competition among technologically advanced countries is being done at the expense of technologies, advanced countries are rapidly developing highly technological industries. To withstand this type of competition, developed and competitive engineering, which, along with pharmaceuticals, it is classified as a hightech industrial sector.

Table 2. Contribution of the high-tech industry to changing value added in terms of
country (UNIDO, 2016b)

Countries	Value a industr	added of 'y, mln. \$.	Value ad tech ind mlı	ded high lustries, n. \$.	Growth rate of value	Growth rate of value	Contributi on of replicated
	2000	2013	2000 2013		added industry, %	added watts, %	to value added growth,%
World	5646338	11073421	861874	1525948	1,96	1,77	90,28
United States	1479920	1876317	284270	416344	1,27	1,46	1,16
Germany	392551	711188	6610	8838	1,81	1,34	0,74
Japan	1034091	1169761	185145	129327	1,13	0,70	0,62
China	392778	2436588	37685	364938	6,20	9,68	1,56
Russia	44979	119799	2755	20882	2,66	7,58	2,85

The structure of the machinery is not homogeneous. First, it is different in its composition, which separates both the individual industries and the many specialized subsectors and industries. Secondly, it has both developing and depressed areas. Of the Russian mechanical engineering technologies that have been created in recent years, about 12 per cent have no counterparts in the world and are the same as those of the best foreign specimens (Borisov & Pochukaeva, 2011). Then almost one quarter of the new technology in mechanical engineering is a priori competitive. Thirdly, mechanical engineering is an industrial multinomenclature complex.

In the economically advanced countries, the products of the engineering industry account for 35-50 per cent of the value of industrial Production (Table 3) and 25-35 per cent of industrial employment are much smaller in developing countries. The state of the economy is reflected in the dynamics of the production of metal equipment and the level of development of the machine is an indicator of development of economic and productive forces. According to the findings of Steve Kline, the production of metal equipment in developed countries almost always changes at the same rate as consumption. The stable development of key sectors of the economy, such as the aviation industry, the motor vehicle, shipbuilding, electricity and many other industries that systematically restructure and modernize production, creates a high demand for precision, high-performance and highly efficient automated equipment.

Country	Share Mechanical Engineering, %	Wor equipm	d machir ent prod	uction	Place in or consur mac equipm	the world a the nption of hining nent (per)	Place in the world for the export of machining	Place in the world for the import of machining	
		2008	2013	2015	2013	2015	equipment	equipment	
Russia	19,5	21	21	17 20		8	30	5	
China	32,9	1	3	1	24	1	4	1	
Italy	26,4	4	4	4	7	6	3	6	
France	26,1	12	12 15 14		16	16	15	15	
United	29,6	14	11	11	17	17	14	16	
Kingdom									
Canada	22,5	15	12	16	9	12	20	13	
United	28,5	7	6	6	11	2	8	2	
States									
Japan	42,2	3	2	2	8	4	2	11	
Germany	42,8	2	1	3	3	3	1	3	

Table 3. Share of industrial machinery in the developed world industry(UNIDO, 2016a) (Gardner Business Media, 2016)

The statistics presented are an explanation for the fact that Russia has very modest positions among foreign countries by level of development of the high-tech industry (Table 4), after not only the developed (industrialized, technological leaders), but also some developing countries. The high-tech sector of the economy is a priori highly innovative. The technology innovation leader is a high-tech enterprise, with a share of 30.6 per cent (Figure 5). Enterprises producing radio, television and communications equipment, 33.5 per cent and aircraft manufacturing facilities, including space-33.6 percent, are very active in this sector. The manufacturing industry, classified as *srednetehnologichnym*, has a share of technological innovation in the range of 15.3-22.2%.

 Table 4. Selected indicators of the level of development of high-tech and mediumlevel activities of different countries (UNIDO, 2016b)

Country	Share of		Share of Of the country			try's	Of high-tech and			Share of industrial			Share of the country			Export share of high-		
	man	ufacturi	ng in	ma	nufactu	ring	me	dium-le	vel	exports in total			in world industrial			tech and medium		
	the co	untry's (GDP,%	sec	tor in w	orld	a	tivities	in	exports of the			exports			level activities in		
					GDP,%		man	manufacturing,%		country,%						industrial exports		
	2006	2011	2013	2006	2011	2013	2006	2011	2013	2006	2011	2013	2006	2011	2013	2006	2011	2013
United	13,7	13,5	12	22,3	20,5	19,39	48,25	51,52	50,6	86,04	75,93	75,3	8,99	7,89	8,15	72,23	62,18	61,7
States																		
China	32,6	34,2	33	10,4	16,4	17,55	41,29	40,70	44	95,09	96,19	96,6	10,36	14,60	16,83	57,94	58,96	58,3
Japan	21,8	20,5	21	12,7	10,7	11,02	53,36	53,70	54,9	92,94	91,70	91,8	6,76	6,04	5,18	82,24	78,89	78,1
Germany	21,3	19,2	21	7,69	6,70	7,02	57	56,76	59,9	90,33	88,14	87,9	11,39	10,45	10,11	71,94	72,04	72,7
Republic of	25,4	27,7	29	2,84	3,36	3,92	54,65	53,41	63,1	96,86	96,74	97,2	3,54	4,30	4,29	75,16	71,85	72,4
Korea																		
United	11,7	10,3	10	3,44	2,78	2,57	42,33	41,99	45,9	83,61	79,25	76,3	4,18	3,0	1,42	69,30	62,14	57,1
Kingdom																		
France	11,6	11,0	10	3,19	2,84	2,54	44,59	45,41	47,1	89,07	87,11	87,6	4,80	4,05	3,92	65,57	64,34	65,3
Italy	16,8	14,7	15	3,84	2,94	2,81	36,91	39,33	42,2	92,47	90,92	91,5	4,34	3,81	3,63	53,98	53,69	53,7
India	14,8	14,9	14	1,70	2,25	2,25	36,14	37,27	40,8	85,95	83,34	83,1	1,17	2,01	2,20	23,18	27,67	28,7
Canada	13,3	10,77	11	1,96	1,52	1,60	37,34	37,35	30,6	67,95	59,97	60,1	2,77	2,02	2,16	57,89	54,48	56,7
Russia	15,5	13,71	14	1,61	1,49	1,53	21,88	23,14	27,7	35,83	34,95	41,5	1,21	1,45	1,73	25,99	22,18	22,8
Spain	13,9	11,66	12	2,05	1,59	1,54	30,31	34,28	34,3	86,04	83,37	81,9	2,07	1,99	2,01	60,26	54,99	55,9
Argentina	21,5	20,60	19	0,54	0,65	0,70	25,84	25,84	26	57,53	51,38	49,2	0,30	0,35	0,30	34,19	46,33	50,6
Austria	18,4	18,4	19	0,73	0,71	0,72	23,01	23,01	45,1	86,4	86,8	88,1	1,30	1,18	1,16	60,7	59,9	62
Finland	21,9	20,52	16	0,56	0,50	0,37	42,95	45,36	37,5	92,3	90,2	90,4	0,80	0,57	0,53	55,6	46,4	44,5
Indonesia	27,2	25,30	25	1,03	1,17	1,25	31,09	37,81	37,7	63,2	55,5	60,1	0,72	0,90	0,86	56,4	53,3	30,3
Mexico	18,3	17,75	16	2,05	1,95	1,82	39,54	38,45	43,7	80,43	76,78	81,0	2,26	2,15	2,43	76,64	77,83	78,3
Netherlands	12,7	12,26	12	1,05	0,97	0,89	39,73	40,07	48,7	75,5	86,1	81,6	3,40	3,65	3,68	58,1	52,4	50,8
Turkey	17,5	18,1	18	1,14	1,27	1,29	29,81	30,04	32,7	90,1	88,6	87,8	0,87	0,96	1,05	42,7	41,2	40,6



Figure 5. Percentage of organizations carrying out technological innovations by type of activity according to 2014 (Gorodnikova & Gokhberg, 2016)

An analysis of current practices of foreign high-tech industries highlighted the determinants of competitive advantages: innovation and productive capacity, as illustrated by the contents of the table 5. These same factors also draw attention and Migranyana A.: "The performance of the most prosperous economies, high competitiveness and stable economic growth are, above all, factors that encourage the diffusion of new technologies. Taking into account the fact that modern competitive advantages are almost fully realized through the benefits of production, management, product promotion technologies, the successful achievement of the competitiveness of the economic system is possible with the integrated use of modern concepts of innovative development, incorporating the theories of the cluster mechanism." (Migranyan, 2002)

Japan	United States	China		
1. Modern technology as a result	1. Promoting innovation	1. Effective pricing		
of research and development,	through the development	policies with low quality		
R&D	of productive and	products;		
2. An effective system of	innovative capacities;	2. Import of innovative		
organization and motivation for	2. State support for	solutions and their rapid		
work as a technology for the	strategically important	introduction into		
management of human resources;	but not profitable	production;		
3. Development of productive	enterprises;	Building volumes		
capacity	3. Support for enterprises	through export		
	in external markets	orientation of production		

 Table 5. Dominant factors for the competitiveness of industrial enterprises in foreign countries

Both all above, we believe that, first, competitiveness takes into account two aspects (Vetrova, 2013): external and internal, which are built on external and domestic competitiveness factors. The external dimension focuses on the ability of an enterprise to form an effective relationship with external stakeholders. The internal characterization is the ability to effectively utilize the potential of an enterprise and, on that basis, to build sustainable competitive advantages. A map of stakeholders in the competitiveness of replicated is presented in Figure 6. Secondly, the competitiveness

of a complex concept, involving several levels of competitive superiority, replicated in the modern context. Therefore, a structured analysis of the concept of "competitiveness" includes several functional interrelated areas namely: technical (technological) competitiveness, Personnel, Social, Financial and economic, competitiveness of Management, Marketing, product competitiveness, as presented in Figure 7. One of the components of a voluminous model of replicated competitiveness is technological competitiveness, which in turn has its own structure, including scientific, technological, industrial, technological and environmental competitiveness.

The problems of continuous scientific and technological upgrading are the basis for the market viability of industrial enterprises. Innovation is sometimes the decisive factor for sustainable development.



Figure 6. Map of the stakeholder model for competitiveness



Figure 7. A multi-level model of competitiveness replicated

It is the scientific and technical status of the enterprise and its real competitiveness that determine and implement science, technology/innovation policies and their implementation. The results of the survey reveal a mixed assessment of the technological level of the domestic manufacturing industry, with a significant lag of one parameter combined with relatively high values for other indicators. For example, the high physical wear of equipment and the inadequate level of R&D costs are combined with impressive indicators of the use of information and telecommunications platforms, organizational infrastructure: scientific laboratories and R&D units, computer and information networks, quality certification systems by ISO standards.

The ability of an enterprise to withstand, fight, and Triumph in it a victory for the quality and professionalism of the workforce, capable of working using highly efficient technology and technology, is nothing less than the staff competitiveness of the enterprise.

The main ingredients of the product's competitiveness are its consumer properties and price. However, the market prospects for the goods are not only related to the quality and costs of production. As important as the productive aspects of the replicated competitiveness activities are, the returns aspects of the proposed service, image and advertisement are still one of the main roles in achieving success. As a result, enterprises cannot avoid using basic marketing functions, which ultimately characterizes their marketing competitiveness.

The link between all the functionally interlinked areas of replicated competitiveness is the management system, the competitiveness of which is the ability to design and implement a sound concept of competitive development. It is proved that the competitiveness of a modern organization depends on the use of new ideas and knowledge-intensive developments in the production of goods and services, and in the management system of the enterprise (Abdikeev, 2014).

The author's research has demonstrated the impact of managerial effects on the competitiveness of output. Thus, the author has received and nor models of the relationship between the competitiveness indicators of different groups of equipment produced by one of the machine enterprises and the criteria for the level of management of the enterprise.

Yet all the elements considered for the competitiveness of an enterprise are through the product, through its characteristics, as reflected in Figure 7. This is an objective and predetermined object of competition. In fact, as the Gelvanovsky M. rightly says, "... The competitiveness of products and firms is formed at the national cultural and historical base. Moreover, the accumulation of competitiveness takes place from macro to micro. "Products and services crown this complex process of building competitiveness" (Gelvanovsky, 2007).

Professionals and managers at different levels of industrial enterprises are involved in identifying key factors for the competitiveness of high-tech industries. The evaluated results of the evaluations made it possible to calculate the ranking of the functional areas of competitiveness of high-tech industries (table 6). Rank comparisons emphasize the increasing role of scientific and technological factors and competent personnel in the process of developing the competitiveness of high-tech industries.

			-			-						
	Period			Function	ial are:	as of ent	terprise	compet	itivenes	s		
		Scientific and technical	Manufacturing and technical	Environmental	Personnel	Economy	Financial	Marketing	Social	Advantage Products	Management competitivenes s	
Rank	2015	3	2	10	4	8	7	6	9	5	1	
of	2017	2	4	7	3	9	8	6	10	5	1	
import ance	Trends											
-	- Situation is unchanged - Improvement of situation											

Table 6. Assessing the importance of functional areas competitivenessof high-tech industries

Conclusion

Our study has led to the identification of trends in the development of the high-tech sector of the economy, among which the main ones are: - the trend towards a gradual shift of production from industrialized to industrializing countries; - the return of the "technological model of economic management" by developed foreign countries; - which emphasizes the development of high-tech manufacturing industries is the tendency to replace labor-intensive capital-intensive, where Labor saving is a priority.

There has been some slippage in the Russian high-tech industrial sector from foreign to GDP value added of manufacturing, the share of exports of hi-tech and medium higher levels of industrial exports, production and per consumption of machining equipment, export, and import of machining equipment. However, with its significant performance in a number of competitiveness factors, Russian high-tech industries have good prospects for improving their competitiveness and competitive development. A model for developing the competitiveness of high-tech industries has been built, making it possible to highlight priorities in the formation of competitiveness policies. Further research by the authors will be related to the deepening of comparative analysis of the development of high-tech industries within the framework of the trends identified with a view to creating patterns, principles, and factors for development.

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