

Management Model of Enterprises of High-tech Business in the Globalized Knowledge Market: Regional Aspect

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Abstract In the study on the developing of a management model of enterprises of high-tech business the ratings analysis of high-tech companies on the Russian and international levels is carried out. The authors' classification of enterprises of high-tech businesses with the release of three groups of enterprises, taking into consideration the three types of economic activity: high-, middle- and low-tech is used. The main provisions of the authors' classification of enterprises of high-tech businesses are confirmed. Regional aspect of the formation of Russian (regional) rating of the leading enterprises-innovators is identified. The complex of recommendations on high-tech businesses' functioning in the global knowledge market theoretical and practical plans is proposed. The methodological base of the research are the materials of the Russian, European agencies for the period 2008-2014: Rosstat, OECD, statistical data of the National Research University "Higher School of Economics" (Moscow), in the framework of three interrelated stages of the research. The work uses the program documents: "Strategy of innovative development of the Russian Federation up to 2020". The empiric base of the research is the materials of high-tech businesses ratings according to Thomson Reuters (USA) and "TekhUspekhh" (Russia).

Keywords: *management model, high-tech businesses, globalized knowledge market*

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1. Introduction

The management company of high-tech business in the global science-intensive space involves the development of knowledge-based indicators, defined by the international ratings of the leading innovator companies. The identification of these indicators as weak (implicit) signals of strategic knowledge-based management contributes, according to the authors, the expansion of high-tech space and opportunities in the global knowledge market for regional enterprises of high-tech business [19,20,35].

The knowledge economy is characterized, on the one hand, by the development of explicit and implicit knowledge at macro-, meso-, micro-levels, and, on the other hand, by the functioning of industrial enterprises and knowledge-intensive services, using high-tech tools of knowledge-intensive management for the regulation of explicit and implicit knowledge and working in the low-, middle-, high-tech types of economic activities [15,16].

The dominance of the countries leading in the technological structure of the markets – both explicit knowledge market in the form of patents, trademarks (USA, Germany, Japan), and implicit knowledge market in the form of a modern intellectual management models in organizations, providing them with greater prosperity and longevity regardless of the type of economic activity,

technology level, regional location, position on the curve of its life cycle, transnational character, popularity of trade marks (Japan) – convincingly proves the necessity to study the topic of management of enterprises on the market of explicit and implicit knowledge from the point of view of Economics and Management disciplines with the aim of identifying the regional aspect in the management models of enterprises of high-tech business in the globalized knowledge market [3,8,9].

The topical international ratings of high-tech businesses, like Thomson Reuters (USA) and indexes of high-tech businesses, like Nasdaq (USA) [23], DAX (Germany) [24] include businesses which do not function in high- or middle-tech spheres of economy. The research of this fact will allow to reveal the notion of "enterprises of high-tech businesses".

In particular, according to the rating of the world innovative companies by Thomson Reuters in 2013, 14 companies of 100 were classified as low-tech (Table 1). Thomson Reuters is a supplier of analytical information, informational decisions and databases for businesses and professionals, with headquarters in New-York [39]. The knowledge market of the countries leading in technological patterns (USA, Japan, France) is characterized by the development of high-tech business models with high-tech businesses in all kinds of economic activity. Their dominant is managerial tools of knowledge economy [10,16,39].

Table 1. Ranking of top 100 innovators in 2013 according to the analytical company Thomson Reuters (USA)

Group 1	Group 2	Group 3	Group 4
Companies functioning in high-tech businesses	Companies functioning in middle-tech businesses (high and middle level)	Companies which can be attributed to both the 1 and 2 group	Companies functioning in low-tech businesses
Number of companies			
63	25	8	4
Name of company			
Abbott Laboratories; Advanced Micro Devices; Alcatel-Lucent; Altera; Analog Devices; Apple; AT&T; Avaya; BlackBerry; Boeing; Brother Industries; Canon; Corning; Covidien; Eaton Corporation; Emerson; Ericsson; European Aeronautic Defence and Space Company; Freescale Semiconductor; Fujitsu; FUJIFILM; Hewlett-Packard; Hitachi; Honeywell International; IBM; Infineon Technologies; Intel; Johnson & Johnson; LG Electronics ; LSI Corporation; LSIS; Marvell; Micron; Microsoft; Mitsubishi Electric; NEC; NTT; Olympus; Omron; Oracle; Panasonic; Philips; Qualcomm; Roche; Safran; Samsung Electronics; SanDisk; Seagate; Seiko Epson; Semiconductor Energy Laboratory; Sharp; Siemens; Sony; STMicroelectronics; Sumitomo Electric; Symantec; TDK; TE Connectivity; Texas Instruments; Toshiba; TSMC; Xerox; Xilinx;	3M Company; Air Products ; Arkema; Asahi Glass; Delphi; Dow Chemical Company; DuPont; Ford; General Electric; Goodyear Tire & Rubber ; Honda Motor Company; Jatco; Lockheed Martin; Michelin; Mitsubishi Heavy Industries; NGK Spark Plug Co., Ltd.; Nissan Motor Company; Nitto Denko; Procter & Gamble; Saint-Gobain; Sandvik; Shin-Etsu Chemical; Thales; Toyota Motor Corporation; Valeo	ABB; CNRS; The French National Center for Scientific Research; Commissariat a l'Energie Atomique; Fraunhofer; Google; IFP Energies Nouvelles; L'Oreal; United Technologies;	Chevron; Exxon Mobil; Nippon Steel & Sumitomo Metal; Nike
Country (number of companies originating from the country)			
USA (33), Japan (17), France (3), Switzerland (3), Germany (2), South Korea (2), Sweden (1), Taiwan (1), Netherlands (1)	USA (10); Japan (9); France (5); Sweden(1)	USA (2); Switzerland (1); France (4); Germany (1)	USA (3); Japan (1)
Type of activity (number of companies in the type of activity)			
Pharmaceutics (3); semi-conductors and electronic parts (23); telecommunication equipment (8); aerospace industry (2); computer parts (11); medical equipment (1); optics, photo equipment (2); software (3); electro-technical production (5); electro-technical equipment (1); electronic devices and high technology (1); household appliances (3)	Chemicals (7); industry (1); automobile parts (8); power industry, machine building (2); tires production (2); transport (1); heavy industry (1); consumer goods production (1); construction materials (1); transport equipment (1)	Innovative materials (1); scientific research (4); media, internet, navigation systems (1); perfumes and cosmetics (1); sports clothes and footwear (1); finance and industry (1)	Oil products (2); steel production (1);

Source: based on [39].

In addition, the program document “Strategy of innovative development of the Russian Federation up to 2020” [33], and “Methodology of calculation of indicators “Share of the production of high-tech and science-intensive sectors in the gross domestic product” and “Share of the production of high-tech and science-intensive sectors in the gross regional product of a subject of the Russian Federation” [22], in the authors’ opinion, do not contain the sufficient criteria of development of high-tech business, science-intensive enterprises and science-intensive services. Business models of high-tech businesses have limitations for high-tech business development, forming barriers both by the age of high-tech businesses and the type of its economic activity.

2. Overview of the Theory

2.1. Overview of Theoretical Sources

The authors research the regional aspect of the model of high-tech businesses management under global knowledge economy, which, according to the authors, is being formed in the context of knowledge economy formation. The latter has been researched by Russian and foreign scientists since 1945 till present: F.A. von Hayek (contribution to the topic: viewing new knowledge as a factor promoting time-saving in the production process, (1945)), A. Downson (contribution to the topic: created the first classification of knowledge, (1957)), F. Machlup (contribution to the topic: basic provisions of knowledge economics, (1966)), M. Polanyi (contribution to the topic: introduced the notions of “implicit” and “explicit”

knowledge, (1985)), P. Drucker (contribution to the topic: created the theory of knowledge management, (1975)), P. Dretske (contribution to the topic: developed the theory of knowledge management (1995 г.)), V.L. Makarova, G.B. Kleiner (contribution to the topic: social-economic aspects of knowledge economy, forming approaches to evaluating the costs of acquiring and using new knowledge (2003-2004)), B.Z. Milner (contribution to the topic: issues of knowledge management in RF (2004)), I.V. Zinovyev, L.E. Mindeli, O.A. Solomentsev, L.K. Pipiya (contribution to the topic: elaborated the system of indicators for monitoring the knowledge economy development, connected with the practice of statistical information collection in Russia (2008)). In this paper the authors used the periodization in the process of becoming a knowledge economy based on [29,30].

The following works are basic for our research: D. Acemoglu [2], M.J. Aranguren and M. Larrea[5], S. Albert and K. Bradley [3], A. Amin and P. Cohender[4], F. Betz [6], I. Giotopoulos [10], P. Romer [31], D. Teece [42], B.Z. Milner [19], B.Z. Milner, Z.P. Rumyantseva, V.G. Smirnova and A.V. Blinnikova [20], Ch. Jones [15].

In particular, the works by M. J. Aranguren and M. Larrea research the concept of constructing regional advantage, based on the necessity for the main stakeholders to interact at the regional level, though there is an opinion about the sufficiency of the innovative subjects at regional level [5]. This allows to construct the regional advantage in the sphere of high-tech businesses management, and will characterize the high-tech business at international and regional markets, thus increasing their international and regional ratings.

Milner justifies the necessity and ways of changing the target concepts, mechanisms and rules related to the formation and distribution of intellectual resources, researching the new forms of knowledge management organization [19]. The approach used by B.Z. Milner is one of the basic ones in the present work as well; it is aimed at reviewing and developing the notion of “enterprises of high-tech business”, basing on methodology of international and Russian ratings of innovative enterprises, revealing the weak (implicit) signs of strategic science-intensive management.

The most important works in foreign economic literature in the area of knowledge market building the authors used in this work are the the publications of I.K. Adizes [1], E.L. Lesser [17], T.Mandeville [18], P.M. Romer [31], D.J.Teece [41], M.D.Giudice, M. Peruta and V. Maggioni [12].

In particular, in the works by D.J.Teece knowledge management is viewed from the viewpoint of international knowledge transfer, functioning enterprises in the knowledge market, taking into account the know-how properties. According to the authors, this research is reflected in the international activity of high-tech business and characteristics of its inventions [41]. Methodology by I.K. Adizes pays much attention to the issues of organizational training at enterprises, and the issues of conflict-free introduction of innovations [1]. In the authors' opinion, I.K. Adizes's methodology implementation increases the organization's life cycle, including high-tech businesses, which is in the focus of the present work [1,14].

In the field of knowledge management at the regional level, the authors relied on the works of M.J. Aranguren, and M. Larrea [5], I. Borowik [7], S. Suleiman and K. Kassiech [35], M. Schoonmaker and E. Carayannis [36], S. Scholten and U. Scholten [37], Y. Chang, M. Chen, Y.-PoLin and Yu-Sh. Gao [8], Th. Davenport, J. Gilbert and P. Heinrich [11], S. Patton [27], K.E.Weick [43], F.R.Westley [44], B. Wooldridge and S.W. Floyd [45], S. Herstad, Ø. Pålshaugen and B. Ebersberger [13]. In particular, the work by S.Herstad, Ø. Pålshaugen and B. Ebersberger. research the issues of innovative collaboration between the capital region location and regional enterprises by the case of Norway [13]. In the authors' opinion, the present work is developing the theme of the knowledge economy analysis from the point of view of sectors determining the knowledge economy at regional level.

2.2. Overview of Methodological Materials

In the field of classification of enterprises of high-tech business, the authors used the following instructional materials: “Methodology of calculation of indicators “Share of the production of high-tech and science-intensive sectors in the gross domestic product” and “Share of the production of high-tech and science-intensive sectors in the gross regional product of a subject of the Russian Federation”, foreign classifier of enterprises and knowledge-intensive services Eurostat «Science, technology and innovation in Europe» (2008, recommended by NACE 1,1), statistical data of the National Research University “Higher School of Economics” (Moscow) [22,32,34].

In the analysis of ratings methodologies of innovation enterprises, the authors used analytical materials by Thomson Reuters (USA), “TechUspech” (Russia) [39,40]. “TekhUspekh” rating was initiated by “Russian venture company», Foundation for small businesses development, “Rosnano” Public Corporation, Russian bank for small and middle businesses support. The operator of the rating is Association of innovative regions of Russia [25,26,40].

Thus, the scientific-research objectives of our work are the following: 1. To improve the notion “the enterprises of high-tech business”; 2. To classify the enterprises of high-tech businesses; 3. To reveal regional features of the leading businesses-innovators according to the author's classification of high-tech businesses; 4. To elaborate a complex of recommendations to promote unification of the regional ratings of the leading businesses-innovators in order to include Russian enterprises into the international ratings of high-tech businesses.

3. Methodology: Stages, the Source Authoring for Research

Research work in the framework of this article, based on methodological materials of the Russian, European agencies for the period 2008-2014, is presented in three interrelated phases with the achievement of the relevant scientific results at each stage.

The first stage: Development of a model of knowledge management in organizations/ microlevel. The results of the first stage perform the following provisions: the model of knowledge management in the organization as a system is developed: (a) organization of production and knowledge management is presented as a system on macro-, meso-, microlevels; (b) the model has a universal character for the three levels of knowledge management in the organization at the macro-, meso-, microlevels; (c) as an indicator of the model is used the indicator of expenditure on technological innovation of industrial enterprises.

At the first stage used the following scientific, methodological, statistical, and empirical materials: the program documents: “Strategy of innovative development of the Russian Federation up to 2020” (2011); methodological materials of the Russian agency “Methodology of calculation of indicators “Share of the production of high-tech and science-intensive sectors in the gross domestic product” and “Share of the production of high-tech and science-intensive sectors in the gross regional product of a subject of the Russian Federation” (2014) [22,33].

The second stage: Development of methods of market analysis of explicit and implicit knowledge/ micro-, meso-, macrolevels. The results of this phase perform the following provisions: the methodology of market analysis of explicit and implicit knowledge is elaborated: (a) in the form of rough-cut algorithm as a developed procedure indicating the indices of the first, second, third level of measurements indicators on macro-, meso-, microlevels of the organization as a system. At the second stage used the following scientific, methodological, statistical, and empirical materials: statistical data of Rosstat (2014), Eurostat (2008), the National Research University “Higher School of Economics” (2014) [32,34].

The third stage: Development the classification of enterprises of high-tech business/mesolevel. The results of this phase perform the following provisions: the classification of enterprises of high-tech business with the release of three groups of companies is elaborated: (a) Developed a classification of industrial production and services based on knowledge; (b) Defined the common criteria for enterprises of high-tech business. At this stage used the following scientific, methodological, statistical, and empirical materials: Analytical materials by Thomson Reuters (USA). (2013, USA) and «TechUspech» (2013, Russia) [39,40].

To research the regional aspect of the high-tech businesses management model, one should consider in detail the research results of the authors in this field.

Under the companies of high-tech businesses in this research are understanding three groups of companies:

- the first group is engaged in high-tech and science-intensive type of economic activity. According to [22], the criteria of attributing a business to high-tech sectors is a high level of technological development, defined as the ratio of scientific research costs to the gross added value. The criteria of attributing a sector to the science-intensive ones is the share of employees with a high level of professional education in the overall number of employees.

- the second group is engaged in middle- and low-tech type of economic activity, implementing high-tech businesses management, which results in the high level of technological development of the enterprise. This is achieved by a business model (or managerial knowledge) implemented in those enterprises.

- the third group is mixed, where: (a) enterprises can have simultaneously high expenses on technological innovations, high business organization, and function in low-tech types of economic activities; (b) science-intensive businesses, whose functioning can be attributed to the 1st of 2nd group. (Depending on the sphere of research and patents in proper types of economic activity. Besides, it should be noted that this group can be divided into two subgroups.)

According to the authors', the common criteria of high-tech businesses are: (1) high market value of the company, based on the knowledge economy objects management: enterprise brand, explicit and implicit knowledge, personnel; (2) life span of the company. Thus, high-tech businesses are enterprises obtaining profit from the company cost management regardless of their type of economic activity (low-, middle- or high-technological).

The characteristic of the 1st group of enterprises is the expenses on technical innovations and scientific research not less than 5% of the enterprise turnover. The main task of development strategy for the 1st group of high-tech businesses is technological leadership. The structural elements of high-tech businesses management is management system. The main task of development strategy for the 2nd group of high-tech businesses is business indicators: market share, cost of production, profit, etc. The enterprises of the 3rd group can have simultaneously high expenses on technological innovations, high business organization, and function in low-tech types of economic activities. The examples of 3rd group of enterprises are well-known foreign fast-food companies, tobacco companies.

When elaborating the classification of high-tech businesses, based on the methodology of Russian Statistical Agency (2014) and OECD (2008, recommended by NACE 1,1), the authors have concluded that:

1. The cited documents do not state sufficient differences in coding the type of economic activity in industrial production and science-intensive services. When forming the high-tech businesses classification, we use the Russian classifier of types of economic activity [22];

2. The following two types of industrial enterprises are mentioned in the cited documents: the high-tech and middle-tech type of economic activity of high level in industrial production;

3. The analysis has not revealed any reasons for not using the classification of science-intensive services based by OECD methodology.

The authors' classification of high-tech businesses has the following advantages:

1. Inclusion of enterprises of middle-tech types of economic activity of low level (The middle-tech sectors of low level are: coke and oil production, resin and plastic goods production, other non-metal mineral products production, metallurgic production and production of metal goods.);

2. Grouping of enterprises to define the particular long-term strategic goals of development in the international and internal markets:

1st group – achieving technological leadership, development of the company's intellectual portfolio with patents, like in the Chinese Patent Office, the Japanese Patent Office (The global scale of enterprises' innovative character by Thomson Reuters (USA) is assessed by the presence of four-parties patents in the company portfolio, which include patenting in the following international agencies: the Chinese Patent Office, the European Patent Office, the Japanese Patent Office, the United States Patent & Trademark Office [39].);

2nd group – achieving high business indicators (share in the market, profit, business diversification);

3. Defining the particular development tools for each group:

The 1st – on the basis of high expenses for technical and scientific research, demanding sufficient state and other support;

2nd – on the basis of modern tools of high-tech businesses management system, demanding the development of multi-level and multi-factor management system without large state support (except socially-significant type of economic activity: 80, 85). Here are the following types of economic activity: 80 – education; 85 – health and social services [22].

4. Results

4.1. Analysis of the ratings of high-tech companies by Thomson Reuters (USA) and «TechUspech» (Russia)

This research presents the analysis of the Russian and international ratings of high-tech businesses functioning in the global science-intensive environment, using the authors' classification of high-tech businesses. The ratings analysis is based on the ratings by Thomson Reuters (USA)

and “TekhUspekhh” (Russia) in 2013 (Table 1 - Table 3) [21,23,24,25,26,39,40].

Table 2. Analysis of innovators’ rating methodology: international and Russian ratings

Methodology of rating of the top 100 global high-tech businesses according to Thomson Reuters (USA, 2013)	Methodology of rating of the most rapidly developing Russian high-tech businesses according to “TekhUspekhh” (Russia, 2013)	Authors’ comment
A	B	C
CHARACTERISTIC OF A HIGH-TECH BUSINESS COMPANY		
<p>I. VOLUME</p> <p>1. Organizations with 100 or more patent for innovations</p> <p>II. SUCCESS</p> <p>2. Officially applied patents in the recent 3 years</p>	<p>1. The company (group) income in 2012 was from 100 mln rub. to 10 bln rub.;</p> <p>2. Company’s average growth rate (CAGR) of the income is not less than 15% in the recent 3 years (2010, 2011, 2012);</p> <p>3. Share of the income from new products/service is not less than 30% on average (for machine building and electronic equipment – not less than 20%) in the recent 3 years (2010, 2011, 2012);</p> <p>4. Average expenses on research and development in the recent 3 years (2010, 2011, 2012) are not less than 5% (for machine building and electronic equipment – not less than 2%) of income;</p> <p>5. Average expenses on technological innovations in the recent 3 years (2010, 2011, 2012) are not less than 10% (for machine building and electronic equipment – not less than 4%) of income;</p> <p>7. Minimal age of the company is 4 years.</p>	<p>1. Rating by “TekhUspekhh” pays attention to: (a) financial-economic indicators of the high-tech company (The enterprise innovation measurement is crucial: costs to income or turnover of an enterprise), (b) innovative features; (c) age of the high-tech company.</p> <p>2. Rating by Thomson Reuters focuses on: (a) the high-tech company functioning in the international knowledge market; (b) patent activity of the high-tech company.</p>
CHARACTERISTIC OF INVENTIONS OF A HIGH-TECH BUSINESS COMPANY		
<p>3. Uniqueness is defined as the first publication (patent application) in a new technology, medicine, business process, etc., in DWPI. DWPI is a database of improved patent documents formed by Thomson Reuters’ experts in the following spheres: technical content, planning, business development, innovation protection within the organization. DWPI database contains more than 21.85 mln of related patents and more than 45.2 mln patent documents, comprising 47 patent agencies worldwide [16,20].</p> <p>III. GLOBALITY</p> <p>4. Assessed by the presence of four-parties patents in the company portfolio, which include patenting in the following international agencies: the Chinese Patent Office, the European Patent Office, the Japanese Patent Office, the United States Patent & Trademark Office.</p> <p>IV. IMPACT</p> <p>5. “Down the line” invention impact is defined by the number of its citing by other organizations in their inventions in the recent 5 years, excluding self-citing.</p>	<p>6. In the recent 3 years the company has launched into the Russian market at least one new or sufficiently improved product or service, based on intellectual property of the company and confirmed by protective documents.</p>	<p>3. The important rating tool of Thomson Reuters is their own patent base DWPI, which allows the Thomson Reuters experts to promote the high-tech companies’ functioning in the international knowledge markets.</p> <p>4. DWPI includes patents on business development. According to the Russian Patent Law, business processes are not subject to patenting. In detail on the possibilities of business-processes patenting see [25].</p> <p>5. Using business models (including technological platforms, open innovations) as a transfer of implicit knowledge is implied in Thomson Reuters rating as an obligatory global activity of high-tech business. According to the Russian Patent Law, business processes are not subject to patenting, including “planning, business development, protection of innovations within the organization”, which should be patented under DWPI [28, 38].</p> <p>6. Using the scientific principle of patent citing and tracing its use by other organizations in Thomson Reuters rating marks the scientific principles in explicit knowledge markets management.</p>

Text

- analysis criterion proposed by the authors; DWPI - Derwent World Patents Index

Source: based on: [21,39,40].

Note that the authors have distinguished the fourth group of companies, functioning in low-tech businesses to prove their classification of high-tech business. On the contrary, the analysis of high-tech businesses according to “TekhUspekhh” (Russia), the authors have not distinguished the companies, which can be attributed to the fourth group according to the authors’ classification of high-tech businesses.

Localization of high-tech business according to the authors’ classification by the Russian and international regions is shown in Table 1 - Table 3. It is obvious that the knowledge market of the countries leading in technological patterns (USA, Japan, France) is characterized by the developed business models with participation of high-tech business according to the

authors’ classification, i.e. all types of economic activity (in the USA presents the company of all four groups of enterprises of high-tech business according to the author’s classification). Their development dominant is reliance on managerial tools of knowledge economy [2,3,6,14]. Localization of three groups of high-tech business in Moscow and Saint Petersburg follows this pattern in 2013 (Table 3) [32].

4.2. Regional Aspect of Methodologies Ratings for the Management Model of Enterprises of High-Tech Business

A comparative analysis of the innovators’ ratings methodology according to Thomson Reuters (USA) and

“TekhUspekh” (Russia) is made in two areas: “Characteristic of a high-tech business company” and “Characteristic of inventions of a high-tech business company” (Table 1 - Table 3). Table 3 shows the result of comparative analysis of innovators’ rating methodology

according to Thomson Reuters (USA) and “TekhUspekh” (Russia). The following directions are proposed by the authors as criteria for analysis due to the research of innovators’ ratings according to Thomson Reuters (USA) and “TekhUspekh” (Russia).

Table 3. Ranking of top 50 high-tech businesses in the Russian Federation according to “TekhUspekh” (Russia) (2013)

Group 1	Group 2	Group 3
Companies functioning in high-tech businesses	Companies functioning in middle-tech businesses (high and middle level)	Companies which can be attributed to both the 1 and 2 group
Number of companies		
28	7	15
Name of company		
“IT” group; “Armada” Close Corporation; “Scientific-Research company “Electron” Close Corporation; “Prognoz” Close Corporation; “Biokad” Close Corporation; “Elar” Close Corporation; “Geropharm” group; “Medical Technologies Ltd” Close Corporation; NPP “Prima” Ltd; “NTC ELINS” Close Corporation; “Mir-Pharm” group; “Elteks” Ltd; Engineering-technological center “Skaneks” Ltd; “BARS group” Close Corporation; “Center for Speech Technologies” Ltd; “T8” Ltd; “Center for Energy-saving automatization” Ltd; “MedEng” NPP Close Corporation; “Institute for Human Stem Cells” Public Corporation; “Inkom” group; “Be Pitron” Ltd; “Open code” Ltd; “ISS” Holding; “RMT” Ltd; “Linteks” Ltd; “Avalar.ru” Ltd; NPK “Reasonable solutions” Ltd; “Scientific-implementation company “Astrapharm” Ltd	“Danafleks-Nano” Ltd; “Scientific-Production association of Special materials” Close Corporation; “Gravioniks-K” (within Unikhimtek) Close Corporation; “Scientific-Production company “Macromer” Ltd; “Tion” group; “Institute for ecologic projecting and research” Close Corporation; NPO “NIIPAV” Ltd	“Interskol” Close Corporation; “Industrial group “Metran” Close Corporation; “Diakont” Close Corporation; NPF “Mikran” Close Corporation; NPF “Paker” Ltd; “Pskovgeokacable” Ltd; “NPP “Laser systems” Ltd; “Skif-M” Ltd; “Scientific-Production center of magnetic hydrodynamics”; NPP “Resonans” Ltd; “Russian machine building corporation “Management systems” Close Corporation; “ObninskEnergotech” Close Corporation; “Scientific-Production center “Lasers and TM equipment” Ltd; “Center for Innovative Technologies-Plus” Ltd; “Semi-conductor devices” Close Corporation, “Atkus” Ltd
Region (number of companies originating from the region)		
Moscow (13); Saint Petersburg (5); Novosibirsk region (3); Samara region (2); Tatarstan Republic (1); Nizhniy Novgorod region (1); Kaluga region (1); Penza region (1); Tomsk region (1);	Tatarstan Republic (1); Saint Petersburg (1); Moscow (2); Novosibirsk region (1); Rostov region (1); Vladimir region (1)	Saint Petersburg (3); Moscow (1); Moscow region (1); Chelyabinsk region (3); Tomsk region (1); Bashkortostan Republic (1); Pskov region (1); Belgorod region (1); Kaluga region (1); Saratov region (1); Krasnoyarsk region (1)
Type of activity (number of companies in this type of activity)		
Informational and communication technologies (19); Pharmaceutical production and production of medical devices (9);	Construction and construction materials (3); chemistry and ecology(4)	Machine building and electric equipment (15)

Source: based on: [21,40].

The authors have formed comments to the innovators’ ratings methodology according to Thomson Reuters (USA) and “TekhUspekh” (Russia). These comments in six blocks serve as the basis for the following conclusions:

- the criterion “Characteristic of a high-tech business” by Thomson Reuters focuses on the high-tech business functioning in the international knowledge market; the “TekhUspekh” rating is based on the narrow interpretation of the term “high-tech business”;

- for the criterion “Characteristic of inventions of a high-tech business” Thomson Reuters uses its own patent database Derwent World Patents Index®(DWPI), based on the scientific principle of patents citing and tracing of their usage by other companies included into the Thomson Reuters rating; “TekhUspekh” rating methodology limits the high-tech business models by the parameters of the enterprise’s age and type of economic activity. These limitations create barriers for the high-tech business development in the global knowledge market (Table 2, column (c)).

5. Conclusions

The research allows to make the following scientific-practical conclusions:

1. The work differentiates the notion “a high-tech business”, distinguishing three groups of enterprises.

2. Classification of high-tech businesses is proposed, taking into account the three types of economic activity, which allows to include high-tech businesses with high market value.

3. Regional peculiarities of formation of Russian (regional) rating of the leading enterprises-innovators are identified. They are as follows: (a) the presence of a narrow understanding of the term “enterprise of high-tech business”; (b) the limitations on the business models of enterprises of high-tech business in terms of: age, type of economic activity. Identified restrictions create barriers for the developing of high-tech business in the global knowledge market.

4. For the high-tech businesses functioning in the Russia market, it is necessary to implement the complex of measures:

(a) to focus on the explicit and implicit knowledge management process. The former is patent management, the latter is business models and know-how management;

(b) to eliminate limitations on age of the high-tech company for their participation in ratings, technological platforms, etc.;

(c) to form the own patent base within “TekhUspekh”, with high-tech sphere dominating for the Russian companies. In particular, to propose creation of a unite patent base for Russia and China;

(d) to consider the possibility to patent business model as a sequence of material actions with material objects;

(e) to implement scientific principles in explicit knowledge management for high-tech businesses, namely: analysis of inventions' citing by other organizations, including foreign ones.

5. The following issues are considered to be disputable (or requiring further research): minimal market value of enterprises of the second and third groups by the authors' classification of high-tech businesses, which would allow the low- or middle-tech business to be included into the group of high-tech businesses.

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