

Innovative Program's Effectiveness of Russian Enterprises with State Ownership

Alexander Dagaev,
Dept. of Business and Management,
National Research University Higher School of Economics
(adagaev@hse.ru)

The statistical studies indicate that Russia lags many developed countries in terms of innovation activity of industrial enterprises. In order to improve the situation, the Russian government obliged in 2010-2011 the State-Owned Enterprises (SOEs) to develop the special innovative development programs (IDP). Do these programs achieve their goals? In this paper, such an assessment is carried out by comparing the growth rates of product sales and increasing the market values of SOEs with the similar indicators for private enterprises of the same industries without formally declared IDPs. The results obtained over a period of three years indicate that there are no statistically significant differences between the enterprises in question. Possible reasons for the lack of IDP effectiveness of SOEs are discussed.

Keywords: State Owned Enterprises, innovative development programs, effectiveness; Russian Federation.

Introduction.

The scientific interest to the activities of State Owned Enterprises (SOEs) follows a certain cyclical dynamic. After the rise in the 80s due to privatization in the UK, and then large-scale privatization reforms in Russia and other post socialist countries, this wave declined in the early 2000s. The new rise was due to the onset of the global financial crisis of 2007–2009. The governments increased intervention in almost all countries with a traditional market economy (often called as “liberal capitalism”). Even those who were advocates of laissez-faire capitalism, were forced to increase its presence in the economy through additional electronic printing of money (quantitative easing), budget cuts, support of problematic private banks and enterprises that faced a significant decline in market demand and financial problems.

This wave reached the peak in 2012. There have been many headlines in published articles that sounded really intriguing for western magazines, such as: “State capitalism vs free market: Which performs better” (Time, 2012), “Are State-Led Economies Better” (Reuter Magazine, 2012), “Is State Capitalism Winning” (Project Syndicate, 2012), “The Rise of Innovative State Capitalism” (Business Week, 2012), etc. A fruitful discussion about “state capitalism” as a viable alternative to “liberal capitalism”, which traditionally refers to the economy of the USA, the UK and some other industrialized countries, was organized by “The Economist” (2012).

Today, we also see a great interest in the issues of state capitalism development and transformation of SOEs, but the reasons for this interest have become somewhat different.

First, the interest in studying of SOEs is caused, in many respects, by the rapid growth of the Chinese economy, which is now second in the world and comes close to the world leader - the United States - in many important economic indicators. There are more than 51,000 SOEs in China with full or majority ownership of central government with more than 20,2 mln. peoples. Foreign companies must consider the characteristic features of the Chinese management model collaborating with such enterprises controlled by the government (OECD, 2017).

Second, SOEs play now a prominent role not only in China, but in many other countries (Bernier and Reeves, 2018). As in the 1940s – 1980s, SOEs now account for 10 percent of global GDP (Kowalski et al, 2013). According to OECD, the 8 countries with the largest share of SOEs in the economy (China, United Arab Emirate, Russia, Indonesia, Malaysia, Saudi Arabia, India and Brazil) account for 20% of world trade (OECD Trade Policy). The number of SOEs among

the largest companies in the Fortune Global 500 List increased over the period 2005-2014 from 9.8% to 22.8%. (Kwiatkowski and Augustynowicz, 2015). Particularly noticeable is the role of SOEs in network industries and financial sector including the countries whose economies are largely based on the extraction and export of mineral resources.

The views of many scientists about the goals and capabilities of the state as an economic actor today are going beyond the classical understanding of the public sector's role of in mixed market economy, expressed in the most complete form by Stiglitz (1988).

As shown by the debate in "The Economist" (2012), the analysis of the phenomenon of "state capitalism" is dominated this day by two main lines of thought. Some authors, for example Bremmer (2012), emphasize the political dimension and argue that the primary purpose of state capitalism "is not to produce wealth but to ensure that wealth creation does not threaten the ruling elite's political power" or "maximizing political control over society and the economy". Others, such as Musacchio (2012), see concrete benefits from the increased presence of the state because it allows for greater national economies stability in crisis, helps to produce global players in competition with private multinational corporations, and focus on long-term rather than short-term investing.

Anders Åslund marked that state capitalism is characterized by three main features:

- Substantial state ownership of major companies;
- Direct government intervention in these corporations;
- Basically, a capitalist system with market relations and private ownership of most enterprises.

One more feature should be added to these three items: the SOEs must demonstrate higher economic efficiency (Dagaev, 2013). If not, we say about certain regular form of general mixed economy.

SOEs as actors in national innovation systems

Classical definitions of national innovation systems assign an important role to the interaction of public and private sector institutions (Freeman, 1987; Lundvall, 1992; Nelson, 1993). SOEs could realize from this point of view very important binding functions, representing both the interests of the government and business. Due to their special position, they are the most appropriate mediators for the implementation of two reciprocal technological flows: generating demand for new applied knowledge that are being created in government research institutions and universities and transferring the ready to use solutions for commercialization in the private sector.

The Russia's experience of setting up innovative development programs for large SOEs is of particular interest in this regard.

Exploring large reserves of natural resources and being their major exporter, the Russian government nevertheless realizes that this trajectory cannot ensure the achievement of sustainable development goals in the long term. Therefore, it makes active efforts to develop and to transfer advanced industrial technologies, which will provide higher value added and increase in labor productivity to Russian enterprises. This is forced by the situation with innovation activities in most national industries.

In 2016, the cumulative level of innovation activity of Russian organizations was at the level of 8.4%. For comparison, in Brazil this figure was 72,6%, in Germany - 67%, in India – 63,7%, in Great Britain – 60,2%, in France - 56.4% (Indicators of Innovation in the Russian Federation, 2018).

This trend has been observed since the mid-1990s and has not actually changed for the last ten years. An attempt was made by government to exert directive influence on enterprises with a high share of state ownership. In order to increase the level of innovation activity, the government obliged SOEs in 2010-2011 to develop Innovative Development Programs (IDPs). By the end of 2012, near 60 such programs were adopted and implemented.

Soon, some SOEs markedly increased spending on R&D (Fig. 1). The allocated financial resources contributed to the growth of demand for innovative developments. By the end of 2017, R & D expenditures decreased slightly: Rosneft's company - to 29.9 billion rubles, the company Gazprom - to 8.2 billion rubles. But rise of R&D budgets is only one proof of the increase in innovation activity. It is interesting to understand the extent to which these programs contribute to improving the economic development of the SOEs?

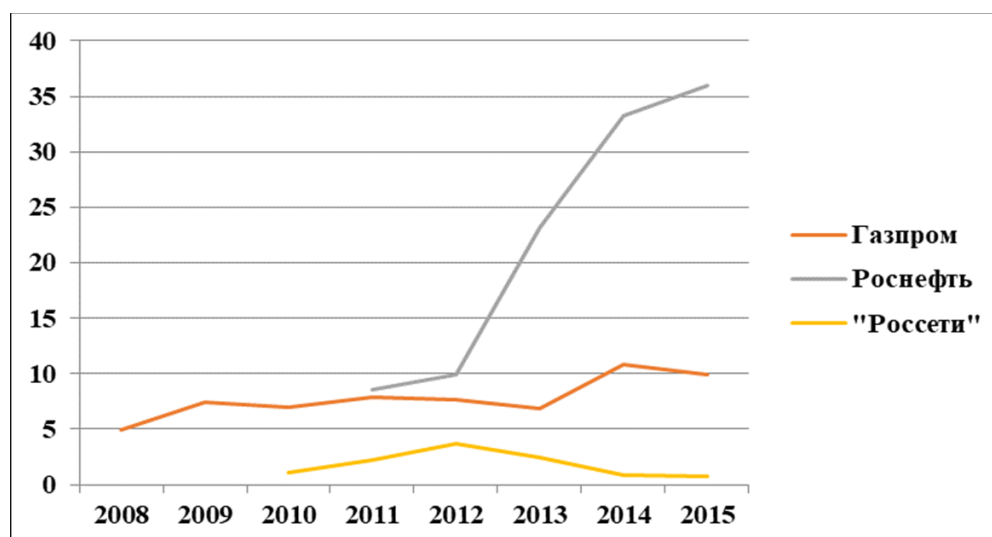


Fig.1. Dynamics of R&D expenditures of leading Russian SOEs (according to the companies' annual reports, in billions of rubles).

Whether IDPs of SOEs achieve their goals?

There are several possible approaches to get an answer to this question. Both integral indicators of the established goals achievements as a result of the IDPs realizations and individual indicators characterizing certain aspects of innovation activity can be used as performance criteria.

In the first case, a serious methodological problem is linked to the composition of the final integral indicator. In addition, it will be necessary to ensure regular receipt of a large amount of relevant data from several dozen enterprises.

In the second case, which is essentially a simplified version of the first, the increase in the output of innovative products, the R&D growth, the number of new projects, the number of applications for inventions and patents received, and others are most often used as such indicators.

Each of these indicators has limited utility taken separately. For example, there may be discrepancies in the interpretation of the concept of innovative products for different enterprises and industries. Performed R&D can fail or not find practical application. Patent claims for inventions are not necessarily completed with the issuance of a patent and received patents can be used not only to produce new original products, but also to protect against trolling.

An extremely important indicator which characterizes the level of innovation activity of enterprises, is the R & D expenditures. But there are prerequisites for obtaining ambiguous results even here. This is most clearly shown by the ratings of the most innovative companies in the world compiled by experts in comparison with their R & D budgets.

If you look at the ranking of most innovative companies for 2013, the leader -Apple Inc. - was only in 43rd place by R & D expenditures, Amazon.com corporation which ranked 4th in terms of innovativeness – was in 30th place by R & D expenditures. Quite impressive is the

example of Tesla Motors Inc and Facebook Inc corporations, which ranked the top ten in terms of innovativeness and were at 377 and 101 places, respectively, in R & D spending (Booz & Company, 2013). This means in practice that the amount of funds allocated to R&D is not so important as the ability to properly dispose of them, to obtain meaningful results of R & D and bring them to a specific practical embodiment.

Thus, the problem of evaluating the performance of the IDP does not generally have a clear solution and is of not only practical but also of definite scientific interest. It is even more difficult to determine the impact of SOE's IDPs on others private sector enterprises, which are participating in formation of national innovation system. As part of this study, this question remains open, since it requires the development and application of special research methods.

Expert assessments of IDS performance

By 2015, several thorough studies were devoted to evaluating the effectiveness of the IDP. The Report "Innovation Development Programmes of Russian State-Owned Companies: Interim Results and Priorities" (2015) prepared by a group of specialists from the Ministry of Economic Development, HSE and RVC noted that many companies use a set of key performance indicators - KPIs (for average, more than 15 KPIs per company). The authors stated a high average level of achievement of established target values of KPI, approaching 90%. A noticeable lag was found only in 96 of 834 KPIs. In 89 more cases, the goals were not achieved partially. However, the authors of the Report have concluded too that despite certain positive changes, the innovative activity of these and many other domestic enterprises still lagged the main foreign competitors.

The researches from Federal State Budgetary Institution «Financial Research Institute» (FRI) in their Report "Innovative development programs of the largest Russian companies: assessment and methodological support for the implementation of the state policy mechanism" (2015) suggested to evaluate the of IDPs effectiveness in R&D commercialization using 27 criteria expressed by the corresponding formulas.

A review of the IDPs of six companies conducted by Russian development institutions ("instituty razvitiya") in 2015 showed that the approach to implementing IDPs remains largely formal, and the lack of linking the goals and KPIs of programs to organizational development strategies and their coordination among themselves makes it impossible to assess the effect of using financial resources allocated for innovation.

An understanding of the need to expand the requirements for program content and strengthen control over their implementation was appeared. In December 2015, the IDPs began to be updated and work to create a more effective system for assessing their effectiveness with the involvement of the expert community started off (Ministry of Economic Development, 2015). An integral key performance indicator of SOEs' innovation activity was proposed, which is based on the composition and key values of indicators approved for the current year. It was used to compile the annual rating of SOEs' innovative development.

It is measured as a percentage and considers, in a certain proportion, the implementation of KPIs of innovative projects and activities (development and introduction of new products, technologies, processes, etc.), indicators of the effectiveness of organizational projects and activities (management system, infrastructure, interaction), as well as these projects and activities on time and in full. The assessment work was delegated to the expert community.

Selected final assessments of the implementation of innovation programs for SOEs, approved by the Interdepartmental Working Group on April 14, 2017, are shown in Table 1. There is also information on the State's share in these companies.

Table 1.
Integral indicator of IDPs realization (%).

Company	Integral indicator of IDPs realization (%)*	The State's share in management (%)**
Gazprom	84,32	50,0
Rosneft	94,10	50,0
Inter RAO UES	90,3	44,3
RusHydro	95,2	75,4
ALROSA	98,2	66,0
United Aircraft Corporation	97,2	96,8
Aeroflot	95,33	58,2
Rostelecom	92,07	54,9

/* Ministry of Economic Development (2017);

**Puchkarev (2018).

As follows from this table, SOEs have demonstrated fairly good results of the established goals implementation for IDS. It can be assumed that these results should be reflected in the economic performance of companies. Thus, the research question can be formulated: whether the SOEs that have been implementing IDPs since 2012 demonstrate better growth of sales and market values (capitalization) than enterprises of the same industries that do not have such formally declared IDP?

Method

The ratings of the largest 400 Russian companies in terms of product sales and 200 companies in terms of market values (capitalization) for 2016-2018 published each year by Russian "EXPERT" magazine were chosen as the statistical base for the study ("EXPERT 400", 2016, 2017, 2018). Companies that were not included in these ratings for at least one year were excluded from consideration. This applies to the companies Bashneft, Gazpromneft, FNC UES, Transneft, which also carried out innovative development programs.

The data for 12 companies that had their formal IDPs and other 21 companies from the same industries that did not have their own formal IDPs during 2012-2015 were merged in Table 2. This final list of 33 companies was considered as a general aggregate consisting of two subsamples of enterprises that had and did not have IDPs. The existence of statistical difference between these two subsamples was checked by well-known statistical methods.

Table 2.

The enterprises of different industries represented among the leaders of the Russian market in the volumes of sales and market capitalization in 2015-2017

Companies of different industries:	Existence of formal IDP (1=yes; 0=no)	Sales growth compared to previous year			Market value growth as of August 1, each year		
		2015/2014	2016/2015	2017/2015	2015/2014	2016/2015	2017/2016
ENERGY							
RusHydro	1	1,054	1,076	0,973	1,313	1,09	0,985
Inter RAO UES	1	1,087	1,078	1,056	2,32	1,42	1,113
Russian networks	1	1,009	1,179	1,053	1,851	1,236	0,875
"Unipro"	0	0,987	1,017	0,981	1,136	0,84	0,909
"Irkutskenergo"	0	1,168	1,07	1,015	2,188	1,196	0,607
"Enel Russia"	0	0,954	1,017	1,03	1,026	1,445	1,003
SC "TNS Energy"	0	1,195	1,088	1,087	1,388	0,799	0,843
TGK-2	0	1,033	1,085	1,078	1,53	1,27	1,062
"Quadra" - generating company	0	1,008	1,02	1,064	1,136	1,045	1,218
«Chelyabenergosbyt»	0	1,031	1,112	1,061	1,45	1,209	0,493
ENGINEERING							
KamAZ	1	0,881	1,37	1,179	0,98	1,484	1,286
UAK	1	1,195	1,185	1,084	1,848	1,238	1,3
AvtoVAZ	1	0,925	1,048	1,22	0,82	2,846	3,096
RKK Energy	1	1	1,012	1,272	0,972	1,848	1,298
United Carriage Company	0	2,467	1,152	1,279	1,045	1,065	0,678
«Sollers»	0	0,8	0,929	1,004	1,201	1,206	0,954
GAZ Group	0	1,01	1,239	1,096	1,005	1,227	0,938
TRANSPORT AND LOGISTICS							
Aeroflot	1	1,298	1,194	1,075	2,195	2,393	0,586
Novorossiysk sea.trade.port	0	1,472	1,086	0,905	1,968	1,731	0,854
"UTair" Airline"	0	0,918	1,072	1,005	0,839	0,929	0,999

Transcontainer	0	1,162	1,211	1,274	1,416	0,931	1,519
OIL AND GAS							
Gazprom	1	1,069	1,037	1,071	0,968	0,862	1,205
Rosneft	1	1,12	1,003	1,217	1,397	0,971	1,318
"LUKoil" Oil Company	0	1,101	0,917	1,154	1,15	0,993	1,569
«NovaTEK»	0	1,329	1,131	1,085	1,114	0,936	1,517
«Surgutneftegaz»	0	1,126	1,018	1,151	0,898	0,897	1,058
«Tatneft»	0	1,16	1,05	1,174	1,056	1,215	1,87
Kuzbass Fuel Company	0	1,123	1,076	1,439	0,729	2,242	1,406
PRECIOUS METALS							
ALROSA	1	1,084	1,412	0,868	0,965	1,198	1,129
Polymetal International PLC	0	1,353	1,208	0,998	2,279	0,753	0,796
Pole	0	1,55	1,22	0,971	2,594	0,588	1,112
TELECOMMUNICATIONS							
Rostelecom	1	0,995	1	1,027	1,029	0,761	1,094
SK «Megaphone»	0	0,995	1,009	1,18	0,857	0,856	1,044

Source of data: "EXPERT400" magazines. Special Project. (2016-2018)

The Results and Discussion

Verification of the subsamples by the Shapiro-Wilk criterion showed that only one of the six data sets has a normal distribution and can be analyzed further based on the t-criterion. In five other cases, comparison of subsamples from companies with and without IDPs was carried out according to the Mann and Whitney method (U-criterion). Calculations are presented in Table 3.

The absence of significant differences between two subsamples indicates that the IDPs of SOEs did not bring them of noticeable advantages in the context of the growth rate of sales and capitalization compared to other domestic enterprises in the same industries included in "EXPERT 400" magazine ratings. Thus, the hypothesis originally put forward in this research was not confirmed. There are two mutually exclusive to some extent explanations of this result.

First: to gain noticeable result from the IDPs, it is necessary to implement these programs over a longer period. Developing and launching of a new product or service to the market could take from several months to 10 years or more, depending on the industry in question. The innovation cycle includes not only R & D, but also patenting the new technologies, obtaining an approval from the regulation agencies (especially, in the case of pharmaceuticals), organization of mass production, conducting an advertising campaign, and creation of distribution channels. This requires a lot of extra time and financial resources.

This explanation is close to the ideas of some authors that State ownership gives to such enterprises some competitive advantages in long term perspective. For example. SOEs, especially those controlled by the central government of China, receive more patents per R & D expenditures than private companies. This is because they have greater potential for attracting talent, useful connections, and technology (Cao, et al., 2018). However, other authors support

the statement about a negative impact of the state-ownership on innovation, especially in the Northeast region of China and in mid-tech sectors of the economy. Although they admit that state control can have a neutral and even positive effect under certain circumstances (Kou and Kroll, 2017).

	Criterion	Significance level of samples difference (P-value)
Sales growth		
2015	U	P=0,231 > 0,05
2016	U	P=0,722 > 0,05
2017	t	p=0,899 > 0,05
Market value growth		
2015	U	P=0,911 > 0,05
2016	U	P=0,072 > 0,05
2017	U	P=0,203 > 0,05
Note: at p level > 0.05, differences between two subsamples are considered not statistically significant.		

Second explanation: The innovation system, with the largest SOEs the core, is not able to be effective due to a monopolistic position of such enterprises and a low level of competition in highly protected domestic markets. There are many arguments published in favor of such an assertion. They include a short planning horizon not exceeding three years, dependence of managers on political factors and personal connections, the appointment to senior positions of people who do not possess the necessary competencies, insufficiently effective measures of motivation of most employees, weak budget discipline, lack of tolerance to risk and failures, which usually accompany innovation (Zhang, 2015). These arguments largely coincide with the opinion of some European and American scientists, who believe that state control imposes myopic goals and complicates access to private capital. At the same time minority government ownership increase investments in R&D (Bortolotti, 2018).

A compromise was expressed by Belloc (2014). He believed that the orientation of SOEs managers to long-term investment strategies, reducing corruption and political interference can have a much more positive impact on technological progress in the long term than the simple privatization of companies.

Conclusion

The IDPs implemented in Russia since 2012 were aimed at increasing the innovation activity of SOEs. The programs contributed to the concentration of business efforts on innovation development and, in some cases, led to an increase in R & D expenditures. At the same time, a comparative study of companies represented in the ratings of “EXPERT” Magazine for 2016-2018 did not reveal statistically significant differences in the growth rates of sales and capitalization between SOEs, which implemented IDPs, and Privately Owned Enterprises, that did not have such programs. This may be explained a) by the longer duration of the innovation cycle from the beginning of R & D to the release of new products or services to the market or b) by imperfect management mechanisms of the implementation of such programs. The short period of time, to which the data in the study refer, is certainly the limitation of this research.

Literature

Åslund, A. (2012). The New Role of State Corporations in the Russian Economy [Electronic version]. Peterson Institute for International Economics. Kennan Institute, October 1. http://www.wilsoncenter.org/sites/default/files/KI_AslundPresentation100112.pdf.

Belloc, F. (2014). Innovation in State-Owned Enterprises: Reconsidering the Conventional Wisdom. *Journal of Economic Issues*, 48(3): 821-848.

Bremmer, I. (2012). Against the motion [Electronic version]. *The Economist*. Jan.24.

Bernier L. and Reeves E. (2018). The Continuing importance of State-Owned Enterprise in the Twenty-First Century: Challenges for Public Policy. *Annals of Public and Cooperative Economics*. 89: 3 2018. PP.453-458.

Booz & Company 2013. *Global Innovation 1000 Study*.

Bortolotti, B., and Fotak, V., and Wolfe, B. (2018). Innovation and State-Owned Enterprises (March 2018). *BAFFI CAREFIN Centre Research Paper No. 2018-72*. Available at SSRN: <https://ssrn.com/abstract=3150280>.

Business Week (2012). June 28.

Cao, X., Cumming, D. J. and Zhou, S., State Ownership and Corporate Innovation Efficiency (November 20, 2018). Available at SSRN: <https://ssrn.com/abstract=2868036> or <http://dx.doi.org/10.2139/ssrn.2868036/>

Dagaev, A. State Capitalism in the new Global Political Economy. *Conference Proceedings*. International Conference of Institute quebecois des hautes etudes international (HEI). 21-24 November, 2013. Universite Laval. Quebec City. Canada

EXPERT Magazine (in Rus.). NN 43 (1916); 43 (1917); 43 (1918).

Freeman, C. (1987), *Technology and Economic Performance: Lessons from Japan*, Pinter, London.

Indicators of Innovation in the Russian Federation: 2018 : Data Book / N. Gorodnikova, L. Gokhberg, K. Ditkovskiy et al.; National Research University Higher School of Economics. – Moscow: HSE, 2018. P.314.

Innovation Development Programmes of Russian State-Owned Companies: Interim Results and Priorities / M. Gershman, T. Zinina, M. Romanov et al.; L. Gokhberg, A. Klepach, P. Rudnik et al. (eds.); National Research University Higher School of Economics. Moscow: HSE, 2015.

Innovative development programs of the largest Russian companies: assessment and methodological support for the implementation of the state policy mechanism” (2015). I.Rikova (ed.). *Scientific Report*. Moscow: Financial Research Institute, 2015.

Kou, K, and Kroll, H. (2017). Innovation output and state ownership: Empirical evidence from China’s listed firms. *Fraunhofer ISI Discussion Papers Innovation Systems and Policy Analysis No. 55* ISSN 1612-1430 Karlsruhe, January 2017.

Kowalski, P. et al. (2013), “State-Owned Enterprises: Trade Effects and Policy Implications”, *OECD Trade Policy Papers*, No. 147, OECD Publishing, Paris. P.6. <http://dx.doi.org/10.1787/5k4869ckqk7l-en>

Kwiatkowski, G. and Augustynowicz P. (2015), State-Owned Enterprises In The Global Economy – Analysis Based On Fortune Global 500 List. MakeLearn and TIIM Joint International Conference, At Bari, Italy (2015).

Lundvall, B-Å. (ed.) (1992). National Innovation Systems: Towards a Theory of Innovation and Interactive Learning, Pinter, London.

Ministry of Economic Development of the Russian Federation (2015). Actualization of state-owned company’s innovative development programs (in Rus.). www.economy.gov.ru. July 2, 2015.

Ministry of Economic Development of the Russian Federation (2017). Information on the results of evaluation of innovative development programs of companies with state participation (in Rus). <http://economy.gov.ru/>. May 16, 2017.

Mussaccio A. (2012). Defending the motion [Electronic version]. *The Economist*. Jan.24.

Nelson, R. (ed.) (1993), National Innovation Systems. A Comparative Analysis, Oxford University Press, New York/Oxford.

OECD (2017). The Size and Sectoral Distribution of State-Owned Enterprise. *OECD Publishing*, Paris. P.8.

Project Syndicate (2012). Dec. 31.

Puchkarev, D., (2018). Companies with state participation, how many? (In Rus.)/ *BCS Express*. <https://bcs-express.ru/novosti-i-analitika/kompanii-s-gosudarstvennym-uchastiem-skolko-ikh>. [October 12, 2018](https://bcs-express.ru/novosti-i-analitika/kompanii-s-gosudarstvennym-uchastiem-skolko-ikh).

Reuter Magazine (2012). June 3.

Stiglitz J.E. (1988). Economics of Public Sector. New York, London: W.W.Norton & Company.

Time (2011). Sept., 30.

Zhang W. (2015). Why China ‘s State -Owned Companies Will Never Produce Entrepreneurs. Fragment of Lecture. *The Epoch Times*. October 5, 2015.