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PLACE-BASED APPROACH FOR DEVELOPMENT OF RUSSIAN «RESOURCE-TYPE» REGIONS

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Abstract

At the beginning of the XXI century the success or failure of economic development of country is largely determined by the capacity for innovative development of its regions and territories. A significant differentiation in the level of socio-economic and innovative development of regions has negative impact on the internal and external competitiveness of the country. Many liberal economic concepts based on a place-neutral approach have been developed in order to explain these regional differences and to evaluate their impact on the economic growth and development of the national economy. Among them there were theory of tacit knowledge, cluster approach, concept of innovative ecosystems and others. Most of them are focused on the search for innovative development tools for the most «advanced» regions and believe that other regions will inevitably follow the leaders. However, practices showed that these models cannot always be realized.

Its implementation in «resource-type countries» to which Russia is belonged is especially problematic. In these conditions place-based approach plays particularly important role. This is a new paradigm of the regional development specializing on searching, creating and implementation the internal and external tools of development of the several countries and territories. There are at least five major fields of discussions on the place-based approach in the literature.

The **purpose** of this paper is the following:

- To reveal opportunities and limits of place-based approach for Russian «resource-type» regions development.
- To identify the elements of competitiveness of Russian «resource-type» regions according to place-based approach within the concept of value chains.

Introduction

At the beginning of the XXI century the success or failure of economic development of country is largely determined by the capacity for innovative development of its regions and territories. A significant differentiation in the level of socio-economic and innovative development of the regions has negative impact on the internal and external competitiveness of the country. Many liberal economic concepts based on place-neutral approach have been developed in order to explain these regional differences and to evaluate their impact on the economic growth and development of the national economy. Among them there were theory of tacit knowledge, cluster approach, concept of innovation ecosystems and others. Most of them are focused on the search for innovative development tools for the most «advanced» regions and believe that other regions will inevitably follow the leaders. However, practices showed that these models cannot always be realized.

Its implementation in «resource-type countries» to which Russia is belonged is especially problematic. In these conditions place-based approach plays particularly important role. This is a new paradigm of the regional development specializing on searching, creating and implementation the internal and external tools of development of the several countries and territories. There are at least five major fields of discussions on the place-based approach in the literature.

The **purpose** of this paper is the following:

- To reveal opportunities and limits of place-based approach for Russian «resource-type» regions development.
- To identify the elements of competitiveness of Russian «resource-type» regions according to place-based approach within the concept of value chains.

Research methodology of the paper is based on the following concepts. Enclave dual economy (Ross M. (2007), Stiglitz J. (1998), Polterovich V. Popov V., Tonis A. (2007)) and the problem of enclaves sustainable replication in «resource-type» regions (Levin S., Sablin K. and Kagan E. (2015)); global value chains (Gereffi G. and Fernandez-Stark K. (2011, 2016), Kaplinsky R. and Morris M. (2003), Ketels Ch. and Memedovic O., (2008), World Investment Report (2013)) and the problem of horizontal value chains formation in «resource-type» regions and the problem of positive externalities dissemination in «resource-type» regions (Nikitenko S., Goosen E. (2016, 2017).

Stable Fragility and Non-Resilience of Russian «Resource-Type» Regions

Russia is the largest producer and exporter of fossil fuel in the world market. The exaggerated role of the fuel and energy sector in Russia and its predominantly extensive development has a negative impact on the economy holding back its development.

The fuel and energy sector (FES) plays a significant role in the development of Russia with its substantial resources and able to meet the country's needs and ensure reasonable exports. According to the BP Statistical Review of World Energy (June 2016) Russia ranked second in the world's natural gas reserves, sixth in oil and seventh in coal reserves at the end of 2015. Table 1 shows Russia's share in the world's energy resources in 2015, namely 17% of gas, 6% of oil and 6% of coal (BP Statistical Review).

Table 1 – Russia's share in the world fossil fuel reserves at end of 2015

Rank in world	**Type of fossil fuel**	**Total proved reserves**		**Share of total**	**Reserves-to-production (R/P) ratio**
2	Gas	32.3 (trillion cubic metres)	1139.6 (trillion cubic feet)	17.3%	56.3
6	Oil	102.4 (thousand million barrels)	14.0 (thousand million tonnes)	6.0%	25.5
7	Coal	101.5 (anthracite and bituminous, million tonnes)	14.0 (sub-bituminous and lignite, million tones)	6.0%	89.8

Source: BP Statistical Review (2016); authors' calculations.

In 2012-2014 Russia ranked first/second in oil production (including gas condensate), sharing the place with Saudi Arabia (12.7-12.9% of world production in 2014), and was the world's second largest oil exporter. Russia was the second largest natural gas producer (19.6% in 2013, 16.7% in 2014) after the USA (21.4% of world production in 2014) but consistently the largest gas exporter. Russia ranked sixth in coal mining (4.3%) and third in coal exports (BP Statistical Review (2016)). According to the Energy Research Institute of the Russian Academy of Sciences Russia's FES accounted about 30% of the country's GDP and consolidated budget in 2015. The share of energy resources in total export proceeds to 56% in 2015. Table 2 indicates that according to the Forecast of Energy Production in Russia and the World, the FES will continue to drive the Russian economy up to 2040 (Forecast of development…(2016)).

Table 2 - Share of fuel and energy sector in Russian economy (%)

Indicators	**2015**	**2040**
Share of fuel and energy sector in gross domestic product	31	15
Share of prime energy in export (%)	56	26
Share of prime energy export in gross domestic product (%)	16	6
Share of fuel and energy sector in consolidated budget (%)	30	14

Source: Forecast of development…(2016); authors' calculations.

Russia also has a high energy saving potential reaching a third of the current energy consumption as well as possibility of significantly increasing the cost-effectiveness of energy projects with its largest resource base. However, the exaggerated role of the FES in Russia and its predominantly extensive development has a negative impact on the economy holding back its development.

The exaggeration of the FES role in Russia has resulted in the formation of "enclave economy", which is most commonly studied in the context of the "resource abundance" and "resource curse" theories. These terms were introduced by J. D. Sachs and A. M. Warner (Sachs J. D., Warner A. M. (1995)), A. Gelb and R. M. Auty (Auty R.M., Gelb A. H. (1995)) to explain the reasons for the lag in the development of countries with considerable natural resources. Later, J. Stiglitz linked the problems of "resource economies" with the presence of certain enclaves that are quite isolated from each other and use different mechanisms of reproduction (Stiglitz J. E. (1998, 2001)). Modern Russian and international studies tend to describe the Russian economy as a "resource economy" or a "dual enclave economy" with the following features:

- presence of two or more sectors (enclaves) isolated from each other;
- a high proportion of high-yielding extensively developing export-oriented industries involved in the extraction of natural resources;
- small share of manufacturing industries represented by simple process-based production mainly;
- poor development of industries in the domestic market;
- incomplete processes of market transformation manifested in the underdeveloped domestic market and infrastructure;
- strong dependence on global markets and global vertically integrated companies;
- low receptiveness of domestic innovations;
- fusion of business and authorities and their rent-seeking behaviour;
- presence of inefficient institutions (rules of the game) preserving the current situation (Levin S., Kagan E., Sablin K. (2015), Mikheeva N. (2009), Orlov V. (2007)).

The FES itself is experiencing some negative effects of the enclave economy such as deteriorated resource base due to the depletion of existing fields, reduced size and quality of new geological discoveries and increased costs of developing complex and distant provinces. Today, Russia's FES has highly depreciated production assets and outdated technologies and is too dependent on imported equipment, materials and services as well as on unstable external energy markets. These problems were exacerbated by a steadily decreasing demand for energy and its prices in the world market as well as an outbreak of geopolitical crisis in 2014 leading to the introduction of sanctions against Russia and making impossible for the country to continue development by producing natural energy resources mainly and selling them in the external market. Urgent need for seeking a new model of the FES development is arose.

However, despite the increasing "weaknesses" and non-resilience of the Russian economy the formed model of development is steadily replicated and this mechanism is very difficult to destroy. We marked this situation as «paradox of sustainable fragility and non-resilience in the Russian economy». It has the following features:

- sustainable replication of resource dependence of the Russian economy;
- the immaturity of the domestic market of the Russian economy;

- rigidity of institutions, current structure of the economy, and insensitivity to innovations «guarantee» short term stability of the Russian economy;
- replication of enclave economy in Russia.

This paradox is based on the sustainable replication of enclave economy at the macro, micro and institutional levels. The macro level of replication is linked with the absence of strict budget constraints for national economy, which connected with extensive economic growth, growth of expected incomes of resource companies and their personnel, growth of state's revenues and its participation in redistribution of rental incomes (e.g. participation in infrastructure projects and the development of social sphere), involvement of national economy in the global economy on the basis of creating short vertical value chains, simultaneous decrease of competitiveness and fragmentation of economic space. High share of extractive industries in macroeconomic indicators (share in GDP, in GRP, in export, in tax revenues etc.) is litmus test to highlight this problem. Federal Statistics of Russia showed that contribution of manufacturing and engineering industries to GDP in Russia was 65.4% in 1991, but less than 30% in 2014. The share of machinery, equipment and vehicles import was 34% in 1995 and 54% in 2014 (Official website of the Federal State Statistics Service (2017)). Answer to the question is the model of behavior of the main stakeholders in economy.

Replication of enclave economy model at the micro level is supported by extraterritorial Russian resource vertically integrated companies. It is linked with the absence of strict budget constraints for multinational corporations that operate in resource sector, which allows them to get rent and orients them to extensive extraction of resources that are exported. Global value chains are created and they are oriented to external markets. The predominance of multinational corporations blocks the appearance of national companies (resource and non-resource) whose activity orients to horizontal value chains formation and internal markets creation. There is unproductive entrepreneurship inside and outside of enclave.

The most visible indication of this situation is patents buying by vertically integrated companies including foreign ones that to restrict competitors' access to the new technologies. Data about the use of the results of intellectual activity in the largest Russian vertically integrated company operating in the oil and gas industry Gazprom is as an example. Table 3 shows data on patents held by the company (owned by Gazprom) and patents, which the company actually uses in its activities. It can be seen that Gazprom uses less than 20% of all patents that belong to it. Most of the patents are bought by the company in order to prevent competitors, especially domestic ones, from using the technology.

As a result, two poorly interlinking sectors are formed in resource-dependent economy at the national and subnational levels, i.e. the fast-growing and high-yield resource sector and stagnating and the low-income sector consisting of companies and enterprises of non-resource industries.

Table 3 - R&D activity of Gazprom

Characteristics	**2011**	**2012**	**2013**	**2014**	**2015**
Number of patents owned by Gazprom	1608	1 828	2 035	2 131	2 238
Number of patents received for the year	145	207	219	218	206
Number of using patents	214	328	350	351	345
Economic effect of the use of patents (billion rubles)	0,96	1,1	1,8	3,1	2,1
Share of using patents (%)	13	18	17	16	16

Source: Official website of Gasprom; authors' calculations.

Sustainable replication of enclave economy occurs at the institutional level. Institutions in Russia as in the most countries, which are rich in resources, differ from institutions in developed countries and, as a rule, are ineffective. New market institutions formed by the central government exist formally but with the "old content". At the same time, Russian resource regions play an important role in the sustainable replication of old institutions. There are regions with agreements on social and economic cooperation, so called "gray" schemes. It is crucial to take into account the position of regional authorities that are interested in «survival» of region as well as to lobby interests of multinational corporations that operate in resource sector. Regional authorities are beneficiary and redistributor of rent flows that received from multinational corporations. The authors of the paper believe that the key point to break the vicious replication of enclave economy is located in resource-type regions, which are distinguished by significant differentiation in Russia. To search regional mechanisms to break the vicious cycle of sustainable replication of enclave economy is the most actual manifestation of a place-based approach. Therefore, let us analyze characteristics, typology and dynamics of the development of Russian resource-type regions.

Despite the fact that the features of resource regions development largely determine the trajectory of the country as a whole, in Russia there is no universally accepted approach to the identification and classification of the “resource regions”. More often resource regions understood as the regions within the borders of a subject of the Russian Federation, which have significant deposits of natural resources and actively explore them (Decree of the President of the Russian Federation (2017)). For example, according to the classification of A. O. Polynin (Polynin A. (2010)) one of the key factors in identifying resource-type regions is the index of “the level of the region’s mineral resources potential” defined as the ratio of the regional and national average values of the mineral resource base valuation per capita (at market prices on the valuation date). According to L. Grigoriev and A. Golyashev synthetic classification of regions, all regions of Russia are divided into 9 types forming 4 groups with commodity regions identified within each group (Golyashev A., Grigoriev L. (2014)). N. Mikheeva identifies 21 commodity regions in Russia focusing on the share of mining in GRP (Mikheeva N. (2009)). The same approach was followed by V. Orlov who defines the resource region as a region “where more than 5 % of shipped products are mineral resources” (Orlov V. (2007). I. Ilyina suggests using the share of gross value added from mining in the GRP of more than 30% as the key criterion for identifying resource regions of Russia (Ilyina I. (2013). N. Mikheeva and S. Belousova suggest using the same rate but they justify the index level with cutoff at 10.5% and 10.8% (Mikheeva N. (2009), Belousova S.V. (2015)). L. Tolstolesova defines resource region as the subject of the Russian Federation (or several subjects) where mineral complex production make more than 50% in the structure of industrial production due to its geographical location and the availability of significant natural resources (Tolstolesova L. (2010)). Some authors attempt to give quality definition of resource regions (Levin S., Kagan E., Sablin K. (2015)).

In this paper the resource regions (“resource -type” regions) are understood as regions specializing in the extraction and processing of mineral complex products due to their geographical location and the availability of substantial mineral resources potential, where the largest export-oriented vertically-integrated companies determine direction and the nature of the regional economic development. To identify the Russian resource regions and suggest their classification depending on the degree of resources dependence the authors chose the time period of 2005-2014. The year 2005 was taken as a reference point. Since it was the economy recovery after the recession of the 1990-s. The periods of rapid growth of the Russian economy in 2006-2007 and the period of sharp recession during the crisis of 2008-2009 were excluded from the analysis. The latest statistical data are available for the year 2014.

To determine the lower boundary of the resource dependence of the Russian regions the authors took V. Orlov’s approach determining the “resource-type” of the Russian regions on the basis of the share of the value added in the section "resource extraction" in the GRP. (Orlov V. (2007)). Non-resource “border” regions were included into the group of the analyzed regions to account the dynamics changes in the level of resource dependence of Russia as a whole (the share of extractive industries in the GRP fluctuated in the range from 8.9% to 11.4% during this period) and its regions (some regions crossed the border several times moving into to group of resource regions and then coming out of the group again). The “border” regions were defined as non-resource regions that crossed the border of 5% at least once in the analyzed period. As a result, the number of selected regions is amounted 36 regions.

To ensure the comparability of indicators based on the share of extractive industries in the GRP the K-rate was calculated. This rate represents the ratio of the share of extractive industries in the GRP (K_{reg}) to the share of extractive industries in the Russian Federation's GDP (K_{Rus}):

$$K = \frac{K_{reg}}{K_{Rus}}$$

The results of the K-rate calculations for the selected 36 regions in 2005-2014 are provided in Table 4.

Table 4 – Dynamics of resource dependence of the regions (2005-2014).

	Region / year	**2005**	**2010**	**2011**	**2012**	**2013**	**2014**
1	Nenets Autonomous Okrug	5,80	7,56	6,60	6,73	7,03	7,01
2	Khanty-Mansiysk Autonomous Okrug - UGRA	5,85	6,06	5,98	6,06	6,07	6,31
3	Sakhalin Region	1,73	5,70	5,41	5,49	5,66	6,20
4	Tyumen Region	4,68	4,80	4,63	4,87	4,86	5,11
5	Yamalo-Nenets Autonomous Okrug	4,80	4,61	4,29	4,64	4,87	4,74
6	Republic Of Sakha (Yakutia)	3,09	3,86	3,88	3,82	3,98	4,20
7	Chukotsky Autonomous Okrug	0,59	3,67	3,71	3,38	2,90	4,05
8	Orenburg Region	2,89	3,45	3,16	3,30	3,80	3,40
9	Republic Of Komi	2,68	3,22	2,98	2,88	3,00	3,17
10	Tomsk Region	2,77	2,30	2,69	2,79	2,69	2,69
11	Udmurt Республика	2,09	2,25	2,30	2,29	2,33	2,28
12	Kemerovo Region	2,12	3,02	3,09	2,39	2,06	2,04
13	Astrakhan Region	0,21	0,34	1,56	1,74	1,97	2,03
14	Irkutsk Region	0,30	0,72	1,16	1,40	1,56	1,88
15	Republic Of Tatarstan	2,41	2,08	1,98	1,95	1,90	1,87
16	Magadan Region	2,12	1,98	2,24	1,63	1,61	1,62
17	Krasnoyarsk Krai	0,30	1,74	1,48	1,38	1,59	1,59
18	Perm Krai	1,23	1,30	1,39	1,62	1,58	1,46
19	Samara Region	0,84	1,14	1,25	1,31	1,24	1,34
20	Belgorod Region	1,70	1,62	1,87	1,43	1,40	1,17
21	Murmansk Region	0,84	1,46	1,66	1,44	1,67	1,15
22	Republic Of Karelia	1,51	1,23	1,27	1,21	1,15	1,13
23	Amur Region	0,41	0,98	1,40	1,33	1,07	1,06
24	Republic Of Khakassia	0,57	1,48	1,40	1,06	1,10	1,03
25	Kursk Region	1,41	1,16	1,33	1,13	1,09	0,88
26	Transbaikal Region	0,59	1,23	0,71	0,81	0,93	0,73
27	Tyva Republic	0,40	0,66	0,55	0,54	0,43	0,61
28	Volgograd Region	0,53	0,54	0,55	0,53	0,55	0,43
29	Khabarovsk Krai	0,37	0,43	0,49	0,58	0,53	0,42
31	Kaliningrad Region	1,15	0,57	0,51	0,43	0,40	0,33
32	The Republic Of Buryatia	0,35	0,47	0,54	0,45	0,38	0,33
33	Republic Of Bashkortostan	0,99	0,85	0,43	0,26	0,26	0,30
34	The Republic Of Ingushetia	0,80	0,18	0,17	0,17	0,19	0,16

35	Chechen Republic	0,79	0,26	0,21	0,17	0,18	0,16
36	Republic Of Kalmykia	0,51	0,33	0,26	0,27	0,27	0,13

Note: The intensity of shading reflects the degree of the region’s resource dependence.

- monoregions with maximum resource dependence (monoregions);
- resource regions with high resource dependence (high dependence regions)
- regions with medium resource dependence (medium dependence regions)
- resource regions with low resource dependence (low dependence regions)
- non-resource regions

Source: Official website of the Federal state statistics service (2017); authors’ calculations.

The table shows the presence of 5 clearly defined groups of regions that have different level of mineral resources dependence and have been respectively defined by the authors as monoregions, high dependence regions, medium dependence regions, low dependence regions and non-resource regions.

The distribution of regions into groups and according to the years is shown in Tables 4 and 5. In Table 4 the intensity of shading is reflected, while Table 5 shows the number of regions in each group and in each year.

Table 5 – Classification of regions depending on the share of the extraction industries in the GRP and the K-rate

Region type	**К-rate**	**2005**	**2010**	**2011**	**2012**	**2013**	**2014**
Monoregions (>30%)	>3	5	11	9	8	8	9
High dependence regions (20-30%)	[2-3)	7	3	4	4	4	4
Medium dependence regions (10-20%)	[1-2)	7	10	12	13	13	11
Low dependence regions (5-10%)	[0,5-1)	10	6	5	4	3	7
Resource regions, **total**:	>0,5	29	30	30	29	28	31
Non-resource regions, with the share of extracting industries within 1%-5%	[0,1-0,5)	7	6	6	7	8	5

Source: Official website of the Federal state statistics service (2017); authors’ calculations.

It is significant that the number of regions that were included in the resource regions group was quite stable. Their number was around 30 in the considered period. In general, in 2005 - 2014 there was a slight increase in the number of resource regions, i.e. from 29 to 31.

One can also note the increase in the share of monoregions from 5 in 2005 to 9 in 2014. The increase in the number of monoregions was accompanied by the increase in their resource dependence and the upper value of the K-rate increased by almost 2 times (see Table 5). The increase in the number of monoregions occurred due to the increase in the degree of the high dependence regions’ dependence (Orenburg Region and Republic of Komi) and the conversion of medium dependence regions (Sakhalin Region) and previously non-resource regions (Chukotsky Autonomous Okrug) into monoregions. This was due to the rising price of hydrocarbons at the world markets and the overall growth of the resource dependence of the Russian economy.

The high dependence group was reduced due to the processes of polarization. Two regions increased their dependence and became monoregions, while two regions contrarily reduced their resource dependence and went to the less resource-dependent groups. One monoregion (Kemerovo Region) moved to the high dependence group (see Tables 4 and 5).

The biggest changes occurred in the largest group of medium dependence regions. Over the period of 2005 - 2014 the total number of regions increased from 7 to 11. It is particularly noticeable in the change of intensity of shading of the regions of this group in Table 5. In addition, the regions constituting this group were constantly changing. Only 2 regions constantly belonged to the group of medium dependence regions: Perm Region and Republic of Karelia. The rest regions moved from high dependence regions (Republic of Tatarstan and Magadan Region), low dependence regions (Samara and Murmansk Regions) and non-resource regions (Tuva Republic and Amur Region).

The impact of the dominant mineral resources on the status of regions is also significant. Table 6 shows that the most resource-rich regions possessing large deposits of hydrocarbons (oil and gas) tended to increase their resource dependence with the exception of Republic of Tatarstan, Tomsk Region and Republic of Bashkartostan. This reduction of resource dependence reflects a positive trend in the structure of the GRP of all regions, the gradual growth of the share of processing industries and high-tech production. However, these positive trends do not yet have a significant impact on the other resource regions.

Table 6 – Classification of Russian resource regions and the dynamics of groups' transition.

№	**Region**	**Dominant mineral resources**	**Resource dependence dynamics**	**Transition from group if compared to 2005**
Resource monoregions К>3				
1	Nenets Autonomous Okrug	oil and gas	↑	-
2	Khanty-Mansiysk Autonomous Okrug - UGRA	oil and gas	↗	-
3	Sakhalin Region	oil and gas	↑↑	from medium dependence group
4	Tyumen Region	oil and gas	↗	-
5	Yamalo-Nenets Autonomous Okrug	oil and gas	↘	-
6	Republic of Sakha (Yakutia)	oil and gas	↗	-
7	Chukotsky Autonomous Okrug	oil and gas	↑↑	from low dependence group
8	Orenburg Region	oil and gas	↑	from high dependence group
9	Republic of Komi	oil and gas	↑	from high dependence group
High dependence regions К=2-2,99				
10	Tomsk Region	oil and gas	↘	-
11	Udmurt Republic	oil and gas	↗	-
12	Kemerovo Region	coal	↓	from monoregions
13	Astrakhan Region	oil and gas	↑↑	from non-resource regions
Medium dependence regions К =1-1,99				
14	Irkutsk Region	oil and gas	↑↑	from non-resource regions
15	Republic of Tatarstan	oil and gas	↓	from high dependence group
16	Magadan Region	oil and gas	↓	from high dependence group
17	Krasnoyarsk Region	oil and gas	↑↑	from non-resource regions
18	Perm Region	oil and gas	↗	-
19	Samara Region	oil and gas	↑	from low dependence group
20	Belgorod Region	oil and gas	↓	-
21	Murmansk Region	other mineral resources	↑	from low dependence group

№	Region	Dominant mineral resources	Resource dependence dynamics	Transition from group if compared to 2005
22	Republic of Karelia	other mineral resources	↘	-
23	Amur Region	coal and other mineral resources	↑↑	from non-resource regions
24	Republic of Khakassia	oil and gas	↑	from low dependence group
Low dependence regions K=0,5-0,99				
25	Kursk Region	other mineral resources	↓	from medium dependence group
26	Transbaikal Region	coal	↗	-
27	Tyva Republic	coal	↑	from non-resource regions
Non-resource regions K=0,1-0,49				
28	Volgograd Region	oil and gas	↓	from low dependence group
29	Khabarovsk Region	coal and other mineral resources	↗	-
31	Kaliningrad Region	other mineral resources	↓↓	from medium dependence group
32	Republic of Buryatia	coal	↘	-
33	Republic of Bashkortostan	oil and gas	↓	from low dependence group
34	Republic of Ingushetia	oil and gas	↓	from low dependence group
35	Chechen Republic	oil and gas	↓	from low dependence group
36	Republic of Kalmykia	oil and gas	↓	from low dependence group

Source: Official website of the Federal state statistics service (2017); authors' calculations.

The data of Table 6 also indicate that the regions rich in coal and other mineral resources (iron ore, nonferrous metal ores, etc.) reduced the level of their resource dependence during the analyzed period. However, these changes did not reflect the positive changes in the sectoral structure of the GRP (growth of the manufacturing industries and knowledge-intensive production), but the decrease in the overall decline of the GRP under the impact of lower raw materials prices in the world markets. Most likely, the real level of resource dependence in these regions remains at a high level. The exception is Republic of Tyva. It has seen an increase in resource dependence reflecting the development of new coal deposits.

The analysis showed that despite the fact that Russia is resource economy, only 27 of the 85 Russian regions can be identified as resource-dependent, they have a decisive impact on the character and trajectory of the Russian economy's development. An important indicator of the region's resource dependence may be the share of the mining sector in the GRP structure.

There is a significant differentiation in the level of resource dependence of Russian regions. This allows suggesting a classification of resource regions and distinguishing among them four sustainable groups: monoregions, high dependence regions, medium dependence regions, and low dependence regions. The boundary of the resource dependence of the Russian regions is movable thus it makes sense to include “border” regions (shifting from resource to non-resource regions). And it is important to understand the reason for their “border” position.

Resource regions is not uniform, which is manifested in the major differences in the degree of dependence of the regional economy on the industries engaged in the extraction of resources, trends and mechanisms for the development and implementation of the regions’ resource dependence. However, only a small part of the regions demonstrates the dynamics of decreasing resource dependence. In many ways, this fact is determined by the vertically integrated companies operating in the regions and the value chains, which are result of their activities. The analysis shows that overcoming the resource-dependency of Russian regions may be distinguished from the breakup of old value chains and the construction of new ones that form the localization of the processing industry and build value chains for the domestic market around it.

Global Value Chains and the Search for New Ways to Develop Russian Resource-Type Regions

The theory of value chains (VC) or rather the theory of global value chains (GVC) emerged in the late 1960s – early 1970s (National Accounts Statistics: Main Aggregates and detailed Tables 2013 (2014)). It attempted to answer the question why some countries managed to provide a high rate of growth and development through innovation and participation in the global division of labor while others lag behind. For that the degree and nature of countries’ and regions’ involvement in the process of value creation along the entire process chain from resource extraction to selling the final products (services) on the market were analyzed (Kondrat’ev V. (2015, 2016)).

Unlike other approaches involved in studying countries’ and regions’ innovative development, the GVC theory allows addressing the following issues:

- showing the effect of VCs at the local level of particular regions, sectors and clusters;
- explaining the mechanisms of the major global vertically-integrated companies influencing the country’s (region’s) choice of specialization;
- identifying the explicit and implicit (actual and potential) opportunities and risks of companies’ and countries’ (regions’) integration in the modern markets at the global, national and sectoral levels and showing possible alternative scenarios of the change of specialization (Sturgeon T.J. (2001)).

The latter is extremely important for the countries and regions with raw material specialization.

M. Porter is believed to be the author of the GVC theory. In his work “Competitive advantage. How to achieve high results and ensure its sustainability” M. Porter described the vertical value added chain at the level of individual companies (corporate VC). He argued that each company can be represented as a set of different activities aimed at the development, production, marketing, delivery and maintenance of their products, and all those activities are combined in the value chain (Porter M. (2005)). T. Sturgeon suggested the most general definition of the GVC as a mechanism of adding value in the process of “taking the product to the market”, which involves different stages of the development, production, design, and sales of finished products (Sturgeon T.J. (2001)). In the OECD report (2013) the GVC is defined as “the full range of activities that firms engage in to bring a product to the market, from conception to final use”.

In Russia, GVCs are studied by V. Kondratiev (Kondratiev V. (2015, 2016)), Meshkova T. and Moiseichev E. (Meshkova T., Moiseichev E. (2016). They argue that the GVC is “a sequence of primary business functions of... design, production, marketing, distribution and after-sales customer service” (Meshkova T. A., Moiseichev E. (2016)). They also point out that the GVC “is a sustainable mechanism of charging the cost in the process of creating the final product including various technological stages of production as well as design and sales” Meshkova T., Moiseichev E. (2016)). In this paper, the authors stick to T. Sturgeon’s definition.

Within a chain two types of linkages can be distinguished:

- forward linkages;

• backward linkages (Sturgeon T. (2001)).

Forward linkages are usually formed in the export-oriented model of countries' and regions' development. Country (region) produces and exports raw materials and services with low added value, which later are imported back into the country in the form of finished products with high added value. Forward linkages are often formed around process manufacturing industries such as chemical industry, oil and coal mining and metallurgical industry. Forward linkage VC are characterized by low localization of the industries engaged in processing raw materials, repairing equipment and providing service in the region. Therefore, countries where forward linkages dominate in the VC are exporters of raw materials, manufacturers of parts and components for complex products with high added value (Morrison A., Pietrobelli C., Rabellotti R. (2008)).

Backward linkage VC are formed around the production and export of high-tech and innovative goods and services, while raw material and services are exported by those countries (regions). The centers of backward linkage formation are major universities, research institutions, modern development and engineering centers. In contrast to forward linkage VC development of backwards linkage value chains is accompanied by a high localization of the industries engaged in processing raw materials, repairing equipment and providing services in the country (region) (Gereffi G., Humphrey J., Sturgeon T. (2005), Kaplinsky R. (2013)).

The emergence and rapid development of the GVC is primarily due to globalization and activities of multinational companies. That is why GVC (global value change) theories are used in studying the effect of globalization on the level and nature of countries' development.

Five types of value chains are distinguished (Fig.1).

Type I is market value chains (Markets). Within this model players have equal market power. The control system of such a VC is decentralized and is based on market interaction. Such VCs are formed spontaneously. Most often they emerge in the spot market with a generic product (service). They are characterized by fragmentation and variability associated with the ease of changing partner. The most effective mechanism for creating such VC in commodity markets is establishing exchanges.

Type II is Modular value chains. The central element of such chain is the supplier. It delivers goods and provides modular services (modules) at the request of the counterparties. The products (services) are of the same in general but need some adjustment according to the specific requirements of the customer. Classic example of such modular centers is specialized company and engineering centers. Such VC are an effective mechanism for the formation of predominantly backward linkage VC. They also contribute to the development of domestic market of the country and region.

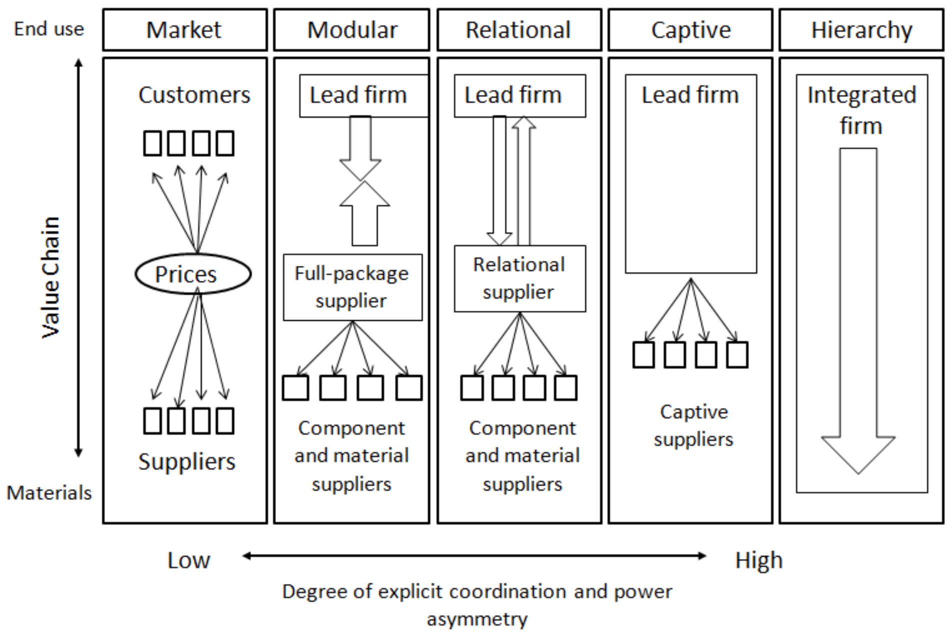

Figure 1. Models of value chains management (Gooch M., Felfel A. (2009)).

In the value chains of Type III, the relations between counterparties are very similar to the relationship between cluster members. The relations are based on niche specialization and trust. Thus, Type III is relational value chains. They are characterized by long often informal (including family) relations between two companies. This system of relations is dominated by ethical and reputational motives. An important factor in the formation of such chains is geographic proximity, participants' membership in professional organizations, etc. Such VC are widely used as a mechanism for the formation of territorial clusters.

Types IV and V are based on large firms' dictates. In captive values chains a major firm (the buyer) performs strict monitoring of small vendors who totally depend on them thus forming some kind of a close enclave. The presence of such enclave in the territory of the country and the region typically has a serious negative impact on their development. Firms included in the enclave in cooperation with the major firm are privileged to absorb the best resources, which leads to rising prices. The negative effects from the VC are most evident where forward linkages dominate in the VC.

The most rigid control by the major firms is observed in Type V (hierarchy), which represents a case of vertical integration and direct control of subordinate units by the 'parent'. The most striking example of such VC is the vertically integrated mineral companies (OECD (2013)).

Russia is significantly involved in the GVC (Fig.2). According to OECD in 2013 Russia's index of participation in the GVC was 51.8% and it ranked 25th out of 57 countries. The nature of Russia's involvement in GVC remains mainly extractive. This means that Russia mostly participates in forward linkage GVC (86%), as it exports raw materials and purchases finished products. A large number of VC has a strong hierarchical structure. The latter means that a large share of forward linkage VC into which Russia is involved is controlled by Russian vertically integrated mineral companies. Forward linkage prevails in mining, chemical industry and metallurgy, wholesale and retail trade, transport and telecommunications sectors (Official Website of the Ministry for Economic Development of the Russian (2013)).

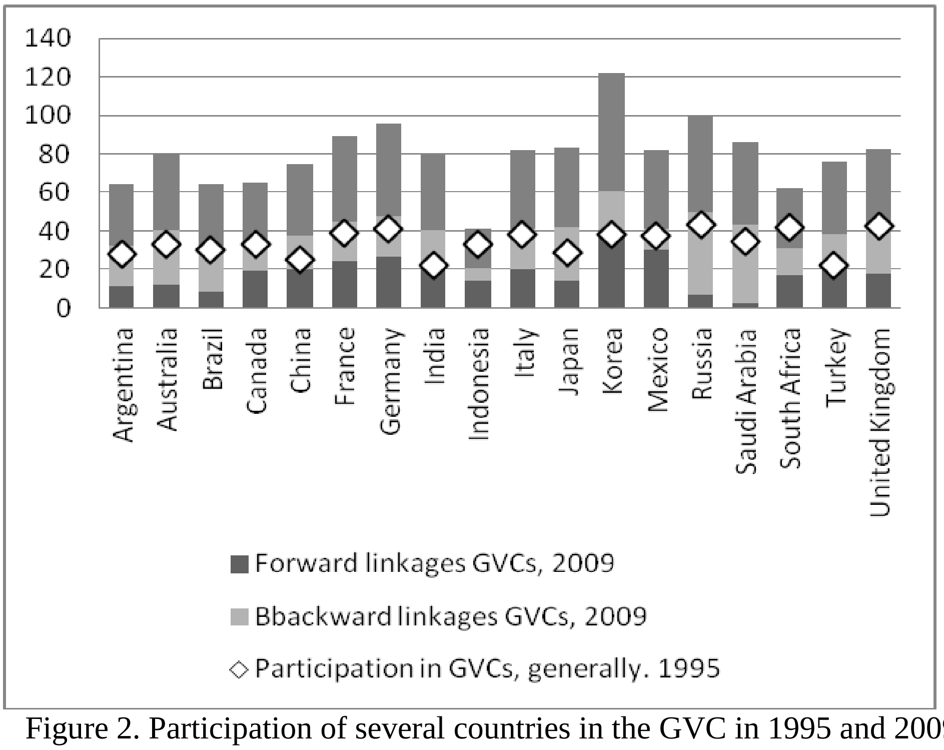

Figure 2. Participation of several countries in the GVC in 1995 and 2009 (%)
Source: Official Website of Ministry for Economic Development of Russian (2013).

The level of Russia's participation in backward linkage value chains is much smaller. According to OECD estimates the index of Russia's participation in backward linkage GVC in 2015 amounted 13.7%, which is the sixth result from the bottom of the table with such countries as Indonesia, Brazil, Colombia, Brunei and Saudi Arabia left behind. It is important that most of these GVC are formed with the involvement of large foreign TNCs acting as the leading contractors and intermediaries forming vertical type value chains.

Such specialization leads to the fact that the share of added value in the country is not very big. Conversely, the mineral resources exported by Russian vertically integrated mineral companies return to the country in the form of finished foreign goods with significant added value (OECD (2015)). The predominance of vertical VC leads to block the development of high-tech industries, prevents the development of internal market and establishes resource specialization of regions. In the Russian coal industry dominated by large vertically integrated mining and metallurgical holding companies this situation is the most evident. The authors argue that it is reasonable to develop both backward and forward linkage VC, which should complement each other in the coal industry of Kemerovo region (also known as Kuzbass that is short form from "Kuznetsk coal basin"; thus, the second name of the region reflects its main specialization). The world famous technologies allow producing more than five thousand kinds of products with high added value from coal.

Currently, four "branches" of coal processing forming forward linkage VC have industrial applications in the world.

1. Pyrolysis (coking) of coal is producing coke, semi-coke, coal tar pitches, humic acids, naphthalene, anthracene, phenanthrene, benzene, coal-tar oils, ammonia, phenol, cresol, pyridine bases and coke oven gas. About 680 million tons of metallurgical coke and approximately 25 million tons of coal tar are produced with pyrolysis and only 50% is further processed into marketable products. Another area of coal chemistry based on metallurgical coke is the chain of "coal – calcium carbide – acetylene – vinyl chloride", which refers to "traditional" coal chemistry, and is widely applied in China.

2. Gasification of coal is producing and cleaning the synthesis gas and its derivatives. Technological leadership in the field of gasification belongs to the world's leading engineering companies – General Electric, Shell and Lurgi. However, the rapid development of the domestic market has led to the emergence of private industrial technologies in China (ECUST, MCSG, SEDIN), which in the medium term can have a significant impact on competition in the segment of industrial gasifiers.

3. Indirect hydrogenation of coal is producing liquid products (gasoline, diesel fuel, lubricating oils, paraffins, phenols) of the tar obtained during gasification or pyrolysis of coal. In Russia there is domestic cost-efficient technology, which differs from the German industrial technology of the 1930s – 1940s and the relevant researches carried out in the USA, Japan, Germany, Britain, and other countries in recent years. The technology involves a number of processes that have been improved using the latest achievements of Russian and foreign research and practice in recent years.

4. Direct hydrogenation of coal is direct destructive hydrogenation under pressure with the production of motor fuels and raw materials for organic synthesis. At present the cost of hydrocarbons obtained in this way exceeds that of the hydrocarbons produced from petroleum.

The promising forward linkage VC can be based on Kuzbass companies' complex development of the Russian and the Siberian regional coal market including the development of "small-scale power generation" in the housing complex. Today many large and small coal companies are already striving to reach the ultimate consumer of the coal by selling their products even in the retail market. Innovative development of the coal industry and the formation of promising VC are impossible without technological upgrading of the related and supporting industries, which include mechanical engineering and railway infrastructure primarily.

Regrettably that mining technologies used these days in the coal industry and in Kemerovo region are those which determine the extensive way of deposits development and shortened forward linkage VC. Only coal whose extraction with the existing equipment is cost-effective is being produced. The “cost-ineffective” coal (from the technological point of view) is simply left “for later time”. As a result, on average Kuzbass “loses” 500-600 million tons of reserves every year. The mining companies’ using innovative extraction technologies could help the industry to shift to intensive development of deposits thereby reducing the “technological” loss of coal and have a positive impact on the economy of coal enterprises (Nikitenko S., Goosen E. (2017)).

The existing traditional technology with the use of panel method of coal extraction from steep and steeply inclined strata has low productivity, low completeness of coal excavation from the formation and an increased risk due to the use of drilling and blasting method of softening coal. Due to the low efficiency and high risk of methane explosion in the mine (not corresponding to the modern requirements of the Federal norms and rules on methane), this technology is almost never used.

Scientists from Federal Research Centre of Coal and Coal Chemistry of the Siberian Branch of the Russian Academy of Sciences see the effective solution to this problem in extracting such coal beds with the controlled release technology as well as in improving mechanization based on the use of unmanned technologies (robotic systems) to ensure the completeness of coal excavation and a significant increase in the level of security (Nikitenko S., Goosen E. (2017)).

The novelty of the proposed technology lies in ensuring the excavation of minerals from the underlay or the interlayer thickness based on the physical effect of the destruction of the strata under rock pressure power. This effect allows giving the robotic systems additional functions related to the extraction of minerals, located above the support or collapsing behind it. New technology in combination with robotic systems can be successfully used for underground development of large layer mineral deposits, placer deposits of diamonds and precious metals with the managed production of mineral resources from the sub roof strata. With the implementation of this technology we can talk about the revival of the Prokopyevsk and Kiselevsk coal mining complex and other sealed off mines with ready-made technological infrastructure. The presented technology opens the possibility for the formation of new backward-linkage VC on the basis of machine-building enterprises. It is important that these chains do not exclude the former forward-linkage VC, but complement them allowing significantly extend their segments belonging to the Russian market.

The performed analysis shows that the natural resources exported by Russian vertically integrated mineral companies return back to the country in the form of finished foreign goods with significant added value. The predominance of vertical VC leads to blocking the development of high-tech industries, prevents the development of the internal market and establishes resource specialization of regions. The authors prove that the theory of value chains can be used for the analysis of development prospects of Russian resource regions. The use of innovative technologies in the practice of coal companies for the extraction, transportation, beneficiation and deep processing of coal can help the industry to shift to the intensive development of deposits, thereby reducing significantly the “technological” loss of mineral resources and having a positive impact on the economy of enterprises, and also open the possibility for the formation of a new backward linkage VC on the basis of machine-building industry. It is also important that these chains do not exclude the former forwards linkage VC, but complement them allowing extend significantly their segments belonging to the Russian market. Public-private partnerships can be an effective tool for building new global value chains. It must play key role in the building resilient regions in Russia. Search and selection of that form of participation could be a crucial part of the place-based approach to create resilient regions and regional innovation system based on the partnership between stakeholders.

Public-Private Partnerships (PPP) as Key Tool to Overcome Stable Fragility and Create Resilient Regions in Russia

The way to build resilient regions in Russia is to find subjects that can create domestic markets and cohesion between «business to business», «businesses to local authorities», «businesses to local communities». We believe that a variety of professional non-profit organizations can become full-fledged regional development institutions but a key role in this should be played by PPP.

PPPs are still quite rare in the Russian FES, although the country's leadership and the Energy Strategy of Russia for the Period until 2035 (2016) emphasise the plans to use PPPs as an effective tool for import substitution and cross-sectoral cooperation that should help to attract investment and "form a domestic scientific, technological and industrial base for designing and producing high-quality power equipment and providing services in the key technological areas to ensure the FES sustainable operation and development". There are three main reasons for that, namely: (1) Russia does not have a clear conceptual approach to PPPs, (2) national PPP model is still in its infancy in Russia, with no clear PPP laws, standards and project models, and (3) Russian legislation has a number of serious limitations on using PPP projects in the energy sector.

Among the most influential studies of PPPs are those by Delmon J. (2009), Osborne S. and Steven P. (2000), Klijn E. H. and Teisman G. R. (2000), Yescombe E. (2015), Gerrard M. (2001). A few conceptual approaches can be found in the foreign and Russian theoretical studies differing in their understanding of the PPP role and the place in the modern market economy. The first approach takes a broad view of PPP defining it as any form of cooperation between business and authorities including joint ventures, corporate social responsibility, charity and even government subsidies as well as financial and organizational support for business. This broad approach can show the role of PPPs in the public sector as well as offer possible directions for joint participation of business and authorities in the FES development. However, it seems unable to identify PPP features, mechanisms and forms or their benefits and risks. The main drawback of this approach lies in its inability to define clearly priorities and boundaries for the use of PPPs in the fuel and energy sector.

The second approach is based on the concept of “New Public Management” Savas E. (2000), Delmon D. (2010), Varnavskiy V. (2011), Deryabina M. (2008), Kholodnaya N. D. (2009). This approach defines PPP as a way of introducing the instruments of commercial project management into the traditional branches of the public sector (medicine, healthcare, protection of public order, public utilities) and of strengthening public property management in the infrastructure sectors for example in transport. In other words, PPP is conceptualized as an instrument of state regulation and an alternative to privatization. This approach focuses on adopting foreign organizational schemes and ways of financing projects used in developed countries. Its main advantage is in a detailed analysis of PPPs as a form of interaction between business and authorities, while its main drawback is its focus on the experience of developed countries only. Most followers of this approach do not analyse country-specific PPP models nor do they consider possibility of using PPPs in the fuel and energy sector. With some reservations we can say that this approach is most prevalent in the Russian and foreign literature.

The third approach most suited for a possibility of using PPPs in the fuel and energy sector defines PPP projects as an instrument of national, international, regional and municipal economic and social development and as a way of overcoming the economic crisis in some countries and sectors (Brinkerhoff D. and Brinkerhoff J. (2004), Agere S. (2000), Goosen E., Nikitenko S. and Pakhomova E. (2015)).

It defines clearly such PPP features as a project form (PPP is a long-term project with a clearly defined timeframe), a voluntary and mutually beneficial co-operation between partners, formal nature of this co-operation based on contracts and agreements with a clear structure of interaction and division of risks and benefits, and joint participation of business and authorities in the financing, management and/or implementation of the project (Nikitenko S., Goosen E., Sablin K. (2016)). At the same time, this approach admits possibility of PPPs taking the form of a project but not possessing all the PPP features described above. The term “quasi-PPP” (“almost” PPP) has been offered to distinguish such projects from the “classic” PPPs (Goosen E., Nikitenko S. and Pakhomova E. O. (2015)). We believe that is the third approach that can identify potentially productive areas and specific features of PPP development in the Russian fuel and energy sector.

Let us take a closer look at the Russian experience of PPP development. The Russian market of PPP projects began to develop formally following the Federal Law N 115-FZ "On Concession Agreements" of 21.07.2005. The period of 2005-2015 saw a rapid increase in the number of projects and investment volumes. By the middle of 2016, 1339 projects had been approved for implementation of which 873 are already underway according to Unified Information System of Public-Private Partnerships in the Russian Federation (PPP-info). Table 7 shows a tenfold increase in the number of projects in 2014-2016. It is noteworthy that Siberian and Far Eastern Federal Districts, where the main resource companies are based, were among those which saw the greatest growth in the number of projects.

Table 7 - The quantity of PPP projects in Russia according to the PPP Information Portal, 2013-2015.

District	**Number of PPP projects by year**			**Growth from 2014 to 2015 (times)**
	2013	2014	2015	
Central Federal District	59	21	292	14
North-western Federal District	46	23	114	5
Volga Federal District	36	34	342	10
Southern Federal District	14	10	61	6
North Caucasian Federal District	9	4	28	7
Ural Federal District	25	11	49	4.5
Siberian Federal District	103	24	256	11
Far Eastern Federal District	19	4	143	36
Russian Federation (total)	311	131	1285	9.8

Source: Unified Information System of PPP in the Russian Federation http://www.pppi.ru; authors' calculations

The sectoral analysis shows that the most Russian PPPs are based on concession agreements in the infrastructure and social sectors with very few PPPs set up in the energy sector. In 2015, for example, only five PPP projects out of 1285 belonged to the area of subsoil use according to the PPP-info database.

All FES-related PPP projects can be divided into three groups. The first group is made up of projects aimed at creating sector-specific mineral productions on the basis of concession agreements and production sharing agreements. Examples of this type of Russian PPPs include development projects in the Elga coal deposit (Republic of Sakha, Neryungri district) and oil and gas fields of Evenkia (Yurubcheno-Tokhomskoye, Kuyumbinskoye, Nizhneangarsk group, and Sobinsko-Teterinskaya group). With some reservations this group can also include a number of raw hydrocarbons development projects with a share of foreign investment based on production sharing agreements, namely: Sakhalin-2 project, including the Piltun-Astokhskoye oil and gas condensate field and Lunskoye gas condensate field; Sakhalin-1 project including Chayvo, Odoptu and Arkutun-Dagi oil and gas fields; Khariyaga project; and the development of Samotlor oil and gas field. It is noteworthy that such PPPs do not really change the paradigm of subsoil use retaining the predominantly extensive nature of the FES development and reinforcing the dependency of "host regions" on the extraction of resources and the dual enclave development. However, abandoning such projects at this stage would be unreasonable as they attract foreign investment and can mitigate the effects of the economic crisis supporting the current state of the FES (The Industrial Ural - Polar Ural investment project (2006)).

The second group of PPP projects focuses on the development of industrial and social infrastructure in the resource extraction regions creating conditions for a sustainable use of natural resources, deep processing and beneficiation of the extracted minerals.

Good example of such projects is the construction of complex of refineries and petrochemical plants in Nizhnekamsk initiated by the Government of Tatarstan and Tatneft, the main private partner, investor and project coordinator. The project aimed to set up facilities for processing Tatarstan oil near the site of its production; replace oil exports with the realization of high-quality oil products on the domestic and foreign markets, which is in line with Russia's strategic objective; improve the environment by producing environmentally friendly fuels and complying with stringent emission requirements at the design stage; and apply the advanced world technologies. This integration of refineries and petrochemical plants in a single production facility will give impetus to intra- and interregional integration of companies in the region. The first stage of this PPP project has already created over 3,000 new jobs, with new housing, kindergarten and sanatorium built for its workers (Nikitenko S., Goosen E. (2017)).

The distribution of "duties" between the partners is also noteworthy. As a private partner Tatneft contributed its own funds to the construction of production facilities, while the Government of Tatarstan used the Investment Fund (Investfond) to upgrade the external infrastructure such as access tracks, an oil pipeline with a pumping station and a pipeline for the finished products. About 16.5 billion roubles of budget investments were allocated for this project from the Investment Fund, its total cost amounting to over 200 billion roubles. The construction started in 2006 and is now in its final stage (Nikitenko S., Goosen E.V. (2017)). The PPPs of the second type generally have a significant social component. They involve large-scale upgrades in the transport, energy and social infrastructure and aim to improve the social and economic environment by raising employment, living standards, etc. And although they do not produce any fundamental changes in the paradigm of subsoil use, they are much more oriented towards its shift than the first group.

The second PPP group also includes those projects which are components of such mega-projects as Ural Industrial-Ural Polar, Comprehensive Development of Lower Angara Area, Comprehensive Development of South Yakutia, etc. These are long-term multisectoral projects aimed at a large-scale development of new territories. Their implementation involves development institutions and major vertically-integrated companies operating in the energy and mineral resources sectors. All these projects were thoroughly assessed and approved by the Russian Government. Trans Urals accounted for 62% of total investment in the mega-projects exceeding 150 billion USD, i.e. over 10% of Russia's GDP. They focus on sustainable, balanced and competitive development of problem areas. Table 8 shows some examples of such projects (Nikitenko S., Goosen E. (2017b)).

Table 8 - Russian PPP projects in the fuel and energy sector.

№	**Project name**	**Duration**	**Industry classification**	**Project status**
1	Elaboration of project documentation for the investment project ‘The Comprehensive Development of South Yakutia”	2008-2013	coal mining, enrichment, energy	federal
2	Building the transport infrastructure for the development of mineral resources in the southeast of Trans-Baikal Territory	2007-2016	enrichment, transportation	federal
3	Complex of refineries and petrochemical plants in Nizhnekamsk	2006-2012	petroleum refining	federal
4	Ural Industrial-Ural Polar	2005-2015	extraction of natural resources, transportation, energy	federal
5	Comprehensive Development of Lower Angara Region	2006-2015	transportation, energy, nonferrous metallurgy	regional

6	A complex for processing Northern Caspian gas into ethylene, polyethylene and polypropylene (step I)	2011-2015	gas processing, energy and transport infrastructure	regional
7	Construction of Kyzyl-Kuragino railway line for the development of mineral resources in the Republic of Tyva	2008-2016	transportation	regional

Source: Reference Materials on the Projects Implemented with Involvement of the Russian Federation Investment Fund (2015); authors' calculations.

Comprehensive Development of South Yakutia project was approved in 2007 under the Scheme for Comprehensive Development of Production, Transport and Energy in Republic of Sakha (Yakutia) until 2020. This PPP project aimed to create a new large industrial zone in the Far East of Russia based on the region's hydropower and mineral resources such as natural gas, apatite, coal, iron and uranium ores, etc. It was planned that 25% of its total cost would come from the public funds (Investment Fund) and 75% from private investors. The project intended to design and build the following facilities: Kankunskaya hydropower plant, Elkon mining and metallurgical combine, South Yakutia mining and metallurgical association, Inaglinsky coal complex and Yakutia gas production centre as well as build roads (Tommot-Elkon, Maly Nimnyr–Kankunskaya), railways, Chulbass-Inaglinsky coal complex, Kosarevsky-Seligdarsky mining and chemical complex, and an electrical grid infrastructure.

The project was to remove infrastructure constraints and facilitate the socio-economic development of the region; ensure high rates of economic growth; contribute to an increase in the economically active population in Yakutia as one of the least populated regions in Russia; provide income growth and improved living standards; increase revenues in the budgets of all levels. It also intended to create conditions for development of new deep processing facilities diversify Russian exports, etc. The project had a federal status and, apart from the federal and regional funds, involved such private investors as the Almazredmetzoloto uranium holding, RusHydro, ALROSA, EVRAZ, Gazprom, UK Kolmar and other large national vertically-integrated companies. A total of 24.8 billion roubles, including over 7.4 billion roubles from the Investment Fund, were spent on Comprehensive Development of South Yakutia mainly on the design works.

However, despite the enormous investments, the project has not been implemented in full for various reasons including international economic sanctions, changes on the world markets of raw materials leading to a sharp drop in the prices for uranium, coal and oil, etc. Yet, the problem seems to lie much more deeper. This PPP model is a large investment project involving big companies and development institutions that has been unable to break the inertia of Russia's mineral resource base focused on the extensive use of natural resources. Its experience showed that both businesses and public authorities were most willing to get involved in those parts of the project which were related to the development of new deposits. The private companies built the Inaglinsky coal complex whereas the authorities developed its infrastructure.

On the whole, the Government contributed 3.2 billion roubles to Comprehensive Development of South Yakutia invested in the construction of Chulbass-Inagli railway line, transmission line. By 2016, Eastern Siberia-Pacific Ocean oil pipeline had been laid across the south of republic and e Berkakit-Aldan-Tommot railway had been built. The ongoing projects include the construction of Power of Siberia gas pipeline and the renovation of Lena Highway. Among the completed facilities are new power lines and connection to the power grid of the Far East. Much less 'lucky' were energy, deep processing and social infrastructure facilities. The issue of expanding the reproduction of the region's resources was also left unaddressed (Nikitenko S., Goosen E. (2017b)).

Even less successful was Ural Industrial-Ural Polar project launched in 2005. This project was supposed to be able to solve such problems as inadequate investment in the engineering sector, power shortages, underdeveloped energy and transport infrastructure, and the dependence on imported raw materials. A significant part of the investments was assumed to come from the commodity sector through active government policies. The total investment in the project amounted 543.8 billion roubles in 2006 prices, namely 105 billion roubles from the Investment Fund, 79.1 billion roubles from Ural Federal District, and 359.7 billion roubles from private investors.

The project was supposed to create a unique industrial and infrastructural complex based on the integrated development of natural resources in the Subpolar and Polar Urals, and to construct the key components of the basic transport and energy infrastructure. Its aims were to radically improve the industrial raw materials base, upgrade the transport and energy infrastructure in Russia and the Urals in particular, accelerate the development of regional economies through their large-scale innovative diversification, develop social infrastructure in the new industrial areas and raise the standard of living and the quality of life for people in the Ural Federal District. Ural Industrial-Ural Polar project was planned as a model for a new integrated approach to developing mineral resources and territories. It contained three main components. There were transport, energy, and natural resources. In the core of the transport component was a project to build a Polunochnoye-Obskaya railway line along the eastern slope of the Urals which, together with the Obskaya-Bovanenkovo and Obskaya-Salekhard-Nadym lines and the Salekhard-Agirish-Urai-Tyumen road, was to provide the shortest link between the industrial Urals and the mineral deposits in the Polar Urals and the oil and gas area, ensuring access to the Northern Sea Route to Norilsk. Its objective was to provide reliable power supplies for the existing and future customers in the new economic zone. The natural resources component envisaged opening 18 to 60 mining, processing and woodworking enterprises. The area under development exceeded 390 thousand sq. km. The project implementation involved over 100 companies and a specially set up management company, OAO Urals Industrial-Urals Polar Corporation, later renamed to AO Development Corporation. The company's shareholders were such regions in the Ural Federal District as Khanty-Mansiysk Autonomous Okrug - Yugra, Yamalo-Nenets Autonomous Okrug, Tyumen Oblast, Chelyabinsk Oblast, Sverdlovsk Oblast, and the German company DB International GMBH. AO Development Corporation prioritized cost-effective investment projects based on PPP principles and capable of increasing the competitiveness of the regional economies, encouraging their diversification and investment activities, removing infrastructure constraints and cultivating new points of economic growth in the Ural Federal District. Its Board of Trustees, consisting of the RF President's plenipotentiary to the Ural Federal District and the governors of Khanty-Mansiysk Autonomous Okrug - Yugra, Yamalo-Nenets Autonomous Okrug and Tyumen Oblast, is responsible for the development strategy of both the corporation and the project (Nikitenko S., Goosen E. (2017b)).

However just as the mega-project described above, Ural Industrial-Ural Polar has not been implemented in full. Experts believe the reasons for the failure of both mega-projects include their long duration, high risks and complexity, overestimated mineral resources, design flaws in assessing the demand for the transport infrastructure, the economic crisis, sanctions and others. But even if all these negative factors had not come into play and the mega-projects had been fully implemented, they would have been unable to overcome the "resource curse" of Russia and its constituent resource extraction regions (Nikitenko S., Goosen E. (2017b)).

The transition to an integrated PPP-based subsoil development is only possible if these PPPs aim to set up new production facilities creating innovative development centres, innovative markets and clusters. There are still very few projects like that in the world. According to IPP Journal there are 168 innovative PPP projects in the world in 2016, including 45 in the USA, 10 in Indonesia, and 7 in Bangladesh. Most of the projects are being implemented in the energy sector, constructing modern power plants, with fewer in the oil and coal chemistry. It is noteworthy that private investment for these projects comes from major engineering companies which, together with research organizations and public authorities, establish innovative development centres, technological platforms, etc. (Official website IPP Journal).

The third group of PPP projects in the Russian FES can be exemplified by three technological platforms involved in the extraction of natural resources and the processing of oil and gas. These three platforms (No. 22, No. 23 and No. 24) were selected from the list of 28 platforms and approved by the Government Commission on High Technology and Innovation in 2011. Platform No. 22 focuses on deep processing of solid minerals and upgrading domestic processing facilities with high technologies. Platform No. 23 aims to develop and implement new technologies for hydrocarbon production, preparation, processing and transportation, including well drilling, etc. Platform No. 24 deals with deep processing of hydrocarbon resources and intends to create conditions for upgrading technologies and increasing the competitiveness of oil and gas processing and petrochemical and organic synthesis, using foresight procedures. The primary goal of these technological platforms is to select fundamental research ideas, do prospecting works and research, and develop innovative business concepts. (Plyaskina N., Kharitonov V. (2010)).

The main difference from the first two groups is that the recipients of investments in the third group of PPPs are not producing or processing companies, but those companies which work for the fuel and energy sector, creating internal and external markets, and developing its mineral and human resources, its industrial and scientific base. This limits the possibility for large, vertically integrated energy companies to accumulate all the resources and leads to a synergistic effect, i.e. a large number of highly specialized and competitive small and medium-sized innovative companies setting up around the core PPP project and encouraging the development of scientific and social infrastructure. This ultimately creates conditions for a transition of the FES companies to a rational model of subsoil use, for changing the vector of resource regions development and breaking the vicious circle of the "resource curse."

Our analysis shows that the PPP projects in the Russian fuel and energy sector are still developing very slowly. However, PPPs focusing on the innovative model for integrated development of natural resources have potentially great prospects. It is this kind of PPPs that can fundamentally solve the problems of the FES and resource extraction regions through a transition to a new paradigm of subsoil use based on the ideas of integrated use of natural resources and sustainable socio-economic development by adopting new technologies and developing the domestic market.

Conclusions

Summing up we can say that the use of place-based approach in Russia has its own specifics. Firstly, it is relevant for researching resource regions whose development determines the trajectory of the development of the whole country. Secondly, it is crucial to take into account regional differences and choice of available tools taking into account established practices.

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