ISSN 1997-1370 (Print)
ISSN 2313-6014 (Online)

Журнал Сибирского федерального университета

Гуманитарные науки

Journal of Siberian Federal University

Humanities & Social Sciences

2020 13 (4)

ISSN 1997-1370 (Print)
ISSN 2313-6014 (Online)

ЖУРНАЛ СИБИРСКОГО ФЕДЕРАЛЬНОГО УНИВЕРСИТЕТА
Гуманитарные науки

2020 13(4)

JOURNAL OF SIBERIAN FEDERAL UNIVERSITY
Humanities & Social Sciences

Издание индексируется Scopus (Elsevier), Российским индексом научного цитирования (НЭБ), представлено в международных и российских информационных базах: Ulrich's periodicals directiory, EBSCO (США), Google Scholar, Index Copernicus, Erihplus, КиберЛенинке.

Включено в список Высшей аттестационной комиссии «Рецензируемые научные издания, входящие в международные реферативные базы данных и системы цитирования».

Все статьи находятся в открытом доступе (open access).

Журнал Сибирского федерального университета. Гуманитарные науки.
Journal of Siberian Federal University. Humanities & Social Sciences.

Учредитель: Федеральное государственное автономное образовательное учреждение высшего образования «Сибирский федеральный университет» (СФУ)

Главный редактор Н.П. Копцева. Редактор С.В. Хазаржан. Корректор И.А. Вейсиг
Компьютерная верстка И.В. Гревцовой

№ 4. 30.04.2020. Индекс: 42326. Тираж: 1000 экз.

Свободная цена

Адрес редакции и издательства: 660041 г. Красноярск, пр. Свободный, 79, оф. 32-03

Отпечатано в типографии Издательства БИК СФУ
660041 г. Красноярск, пр. Свободный, 82а.

http://journal.sfu-kras.ru

Подписано в печать 24.04.2020. Формат 84x108/16. Усл. печ. л. 13,6.
Уч.-изд. л. 13,1. Бумага тип. Печать офсетная. Тираж 1000 экз. Заказ № 11313.

Возрастная маркировка в соответствии с Федеральным законом № 436-ФЗ: 16+

CONTENTS

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 442–452

DOI: 10.17516/1997-1370-0580
УДК 332.1; 338.2

Institutional Innovations for the Development of the East of Russia: Effects of Implementation in the Resource Region

Natalia E. Antonova and Natalia V. Lomakina*
Economic Research Institute of FEB RAS
Khabarovsk, Russian Federation

Received 15.11.2019, received in revised form 10.03.2020, accepted 10.04.2020

Abstract. The authors examined the responses of economic agents to implantation in 2013–2020 of institutional instruments of a "new model" for the development of the Far Eastern macro-region. The trend of the predominance of investments in resource projects in the total volume of investments in fixed assets in the macro-region has been confirmed. The study contains new results confirming the influence of the predominantly raw character of the region's economy on the transformation of institutions, expressed through: modification of institutional instruments for the development of the region and the formation of a multiplicity of preferential regimes in the interests of large resource-based companies; the emergence of negative institutional externalities for the regional economy in the implementation of selected institutional instruments in the resource-based industries. We ranged the Far Eastern and several Siberian regions according to the degree of resource dependence with the estimation of the selected indicators for the natural resource sector as a whole (including the extraction of mineral, forest and water-biological resources), which corresponds to the economic specialization of the macro-region. We have revealed that the result of the implementation of the "new model" of development was an increase in resource dependence in the economy of the Far Eastern macro-region in the studied period. The obtained estimates demonstrate the contradiction between the goals, institutional instruments and the first results of the implementation of the "new model" of development of the Far East. The study allows to gain new knowledge at the intersection of certain theoretical and applied scientific directions: assessing the effectiveness of state regional policy; the role of natural resources in economic development; institutional design.

Keywords: state regional policy, preferential regimes, resource region, resource dependence, natural resource sector, Far Eastern macro-region.

Research area: economics.

* Corresponding author E-mail address: antonova@ecrin.ru, lomakina@ecrin.ru
ORCID: 0000-0003-0317-0817 (Antonova); 0000-0003-3490-5775 (Lomakina)

Citation: Antonova, N.E., Lomakina, N.V. (2020). Institutional innovations for the development of the East of Russia: effects of implementation in the resource region. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 442-452. DOI: 10.17516/1997-1370-0580.

Introduction

The state's attention (in various forms of its manifestation) to the Far Eastern macro-region, as well as the predominantly resource-based nature of the region's economy and its dependence on the external economic situation, are fundamental factors in its development (Minakir, 2006).

The novelty of the situation is now determined by the following factors:

1) the state program documents declared the creation of conditions to ensure the sustainable development of the Far Eastern Federal District (FEFD) at the expense of *the modernized structure of the economy*;

2) to achieve this goal, new institutions for the development of the economy of the Far Eastern macro-region have been introduced, which include a number of legislative, organizational, and infrastructural tools to create an appropriate institutional environment;

3) significantly expanded the boundaries of the FEED due to the inclusion of two Siberian regions – the Trans-Baikal Territory and the Republic of Buryatia. If in previous periods these territories were considered in different ways in the Far Eastern development programs, now the situation is legitimized at the highest managerial level.

This situation makes a number of research questions relevant:

In which sectors and complexes preferences are mainly accumulated?

Is the role of resource sectors in the Far Eastern macro-region's economy decreasing?

Are there opportunities for weakening the predominantly raw nature of the development of the macro-region in the foreseeable future?

Finding answers to these questions is the purpose of this article.

Statement of the problem

Studies on the sustainable, balanced development of territorial systems of various hierarchical levels (from the state to the municipality (Kryukov, 2014)) with mainly raw material specialization of the economy, state regulation and its consequences for such territories are devoted to a large number of works (Libman, 2013; Alexeev, Chernyavskiy, 2014; Cust, Poelhekke, 2015; Pyzhev et al., 2015; Popodko, Nagaeva, 2019). Despite the fact that the scope of research on the problems of resource regions is quite wide, discussions on the issues of identification and selection criteria for this type of territory have not been completed. In the scientific literature, the concepts of "resource regions" (Resursnye regiony, 2017), "resource areas" (Kryukov, 2014), "resource type regions" (Kurbatova et al., 2019) and others are discussed. Despite the presence of certain differences in definitions, it is common for research to recognize in the economy of such territories the crucial importance of the extraction and primary processing of natural resource industries for the formation of GRP and regional revenues, as well as for the employment of the population.

An important turn in the study of resource territories, in our opinion, is a detailed description of approaches to their development based on the use of the concepts of "resource abundance" and "resource dependence". At the same time, resource abundance is an exogenous factor (determined by natural-industry characteristics), and "resource dependence is endogenous, is formed not only under the influence of resource abundance, but also under the influence of the institutional environment and economic policy" (Kurbatova et al., 2019: 93). Of particular importance is the thesis that "resource dependence" forms the orientation of prospective development towards resource sectors as sources of economic growth, which reduces the competitiveness of other centers of competence in such territories.

For the Far Eastern macro-region, the forms and several results of the manifestation of state participation in its development both at various historical stages (Minakir,

Prokapalo, 2017) and within the framework of the modern "new" management model (Antonova, Lomakina, 2018) have been analyzed in sufficient detail, and a conclusion has been drawn about the ambiguity of the consequences of the instruments used for the macro-region (Izotov, 2017; Minakir, Prokapalo, 2017). Nevertheless, the question remains whether the institutional instruments of the "new economic policy" of the state in the FEFD are capable of affecting the diversification of the macro-region's economy towards a decrease in the share of extractive industries and, accordingly, an increase in the share of manufacturing industries. Or is the specificity of the economy of the regions of the resource type such that it does not respond to these instruments and, under the influence of institutional innovations, the same raw material structure of the economy is reproduced?

The object of consideration in this article is the natural resource sector (NRS) of the Far Eastern macro-region as part of the mineral resources, fisheries and forest complexes. The industries of the NRS in the macro-region became "stabilizers" in times of crisis and "drivers" during periods of economic recovery. Different industries of this sector often had multidirectional dynamics of economic processes, however, the role of the NRS in the Far Eastern economy definitely increased, and, above all, the mining complex (Rossiiskii Dal'nii Vostok…, 2017). Evaluation of the first results of the implementation of certain instruments of the "new model" for the development of the macro-region in its natural resource sector (Antonova, Lomakina, 2018), monitoring of investment activity in the NRS (Lomakina, 2018) also confirmed its increasing importance.

As part of the solution of the research problem, in the first part of the article we examined the responses of economic agents to the implantation of the basic instruments of the "new model" of development of the Far Eastern Federal District. The main emphasis is placed on the analysis of investment activity in the extraction and primary processing of the basic natural resources of the FEFD. In the second part of the work, the regions of the FEFD were ranked according to the levels of resource dependence using the methodological approach proposed in the article (Kurbatova et al., 2019). At the same time, the object of assessment has been expanded in comparison with the authors proposed. The estimation of indicators for ranking the Far Eastern and individual Siberian regions by the degree of resource dependence was carried out for the natural resource sector as a whole (extraction of mineral, forest and water-biological resources), which corresponds to the economic specialization of the macro-region and makes this assessment more adequate.

We study the period from 2013 to 2020, reflecting the first results of the federal center's implementation of the "new model" of the development of the FEFD. As the information base, official statistical data, regulatory documents of the federal and regional levels, analytical and expert estimates were used.

Discussion

1. Structural priorities of preferential regimes: the role of resource industries

Such instruments of state support as the formation of *territories with special economic regimes* turned out to be quite demanded among investors in the FEFD. According to the federal law "On Territories of Advancement of Socio-Economic Development in the Russian Federation" (dated December 29, 2014 No. 473-ФЗ), residents of the territory of advancement of socio-economic development (ASEZ) are granted a number of preferences, including priority connection to infrastructure facilities created at the expense of state budget funds; preferential taxation of residents of the ASEZ; preferential amount of insurance contributions for the wage fund; reduction in administrative burden; application of the procedures of the free customs zone; expedited procedures for obtaining a building permit, etc. The main condition is the localization of preferences within the framework of the ASEZ for the activities of its residents. In terms of content and pursued goals, the ASEZs are identical to special economic zones (Special Economic Zones…, 2011).

At the beginning of 2020, 20 ASEZ were created in ten regions of the FEFD.

When considering projects for the inclusion of ASEZ, priority was to be given to full-cycle industries in the following areas: manufacturing sector based on primary resources; petrochemical complex; production of construction materials; agro-industrial complex; production of high-tech services; other high-tech industries producing high value-added, export-oriented products.

We conducted an analysis of the number of declared and implemented projects in the ASEZs in the territories of the FEFD with the identification of projects related to the natural resource sector (Table 1).

In the macro-region as a whole, the activity of investors from NRS does not look as high in the share of declared projects as one might expect, taking into account the natural resource specialization of the FEFD. The analysis by regions shows that in the northern regions of the FEFD, where the economy is predominantly resource-based (Chukotka Autonomous Okrug, the Republic of Sakha (Yakutia), Kamchatka Territory) there is a higher share of NRS projects (mainly in mining and fishery) compared to the regions of the southern zone of the FEFD with a more diversified economy (Khabarovsk and Primorsky Territories, Amur Region). Nevertheless, in the ASEZ of the southern regions there are a lot of projects both in mining and fishery, and in the forest industry. It should be noted the high degree of implementation of NRS projects in almost all regions (except for the ASEZs in the Trans-Baikal Territory and the Republic of Buryatia, which are just being created).

Much more realistically, the situation is reflected not in the share of projects, but in the structure of investment in projects, showing the investment activity of the residents of the ASEZ. Figure 1 shows the share of investments in NRS projects in the total number of projects implemented under the ASEZ.

In most regions of the FEFD, the share of investments in NRS projects is dominant, including in the four regions the natural resource sector accounts for almost all of the investments in the ASEZs. Investors prefer to invest in projects that guarantee the highest commercial efficiency from capital. Taking into account the natural resource specialization of the economy of the FEFD, such projects have always referred, first of all, to the mining, fisheries and the forest industry, and these types of

Table 1. NRS projects in investment projects in the ASEZ, 2015-2019

Regions	The number of projects in the ASEZ, units		The share of NRS projects from the total number of ASEZ projects, %		The ratio of the number of implemented and declared NRS projects, %
	declared	implemented	declared	implemented	
Republic of Buryatia	2	0	0,0	0,0	0,0
Republic of (Sakha) Yakutia	41	29	29,3	41,4	100,0
Trans-Baikal Territory	9	0	66,7	0,0	0,0
Kamchatka Territory	103	85	25,2	24,7	80,8
Primorye Territory	113	80	13,3	15,0	80,0
Khabarovsk Territory	84	63	22,6	28,6	94,7
Amur Region	29	16	20,7	25,0	66,7
Sakhalin Region	38	31	10,5	9,7	75,0
Jewish Autonomus Region	4	3	50,0	66,7	100,0
Chukotka AO	50	41	44,0	41,5	77,3
Total FEED	473	348	24,0	25,6	79,0

Source: calculated according to the data from the website of the Far East Development Corporation. Available at: https://erdc.ru

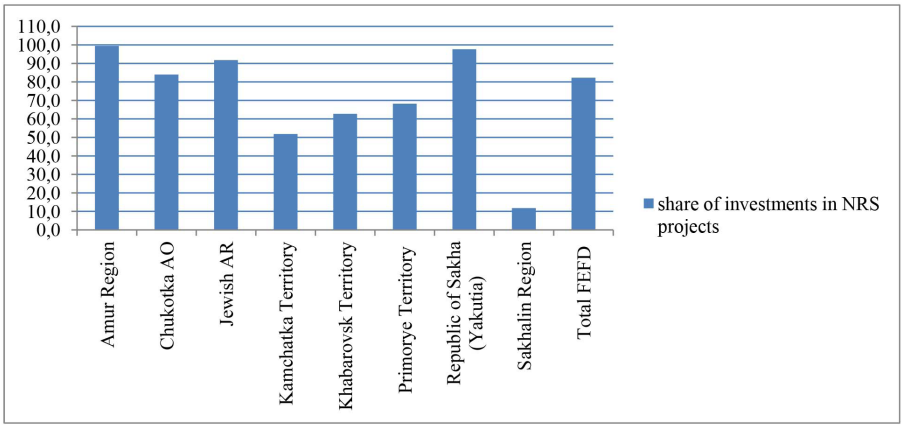

Fig. 1. The share of investments in NRS projects implemented in the ASEZ, located in the regions of the FEED

Source: calculated according to the data of the Far East Development Corporation. Available at: https://erdc.ru

activities accounted for the bulk of investment in the ASEZs.

The above analysis shows the preservation and consolidation of the trend of the predominance of investments in resource projects in the total volume of investments in fixed assets in the FEFD (Lomakina, 2018).

Moreover, in our opinion, in the institutional field of the "new model" for the development of the FEFD, a new trend is also emerging – the modification of the instruments of state support for regional development under the objective influence of the predominantly raw nature of the region's economy.

One example illustrating such processes can be the formation of the ASEZ "Komsomolsk" in the Khabarovsk Territory, which, when created in 2015, had three sites. The key activities of this ASEZ at that time were declared metal and wood processing, food industry, mechanical engineering, mechanical processing, tourism. By 2018, another 4 new sites were added to this ASEZ, on three of which (located quite far from the original ASEZ border) resource projects are being implemented: a timber processing complex (investment volume 1.1 billion rubles) and two projects for the extraction and enrichment of tin (total investment of 10.5 billion rubles.). At the beginning of 2020, at the proposal of the regional authorities, the expansion of the boundaries of this ASEZ was again discussed by joining four land plots for mineral resource projects (development of the Malmyzh gold-copper deposit, processing of tailings at the Solnechnyi mining plant).

Such processes, firstly, violate the principle of the formation of the ASEZ – the provision of preferences in localized territories, and, secondly, demonstrate the intensification of the provision of benefits to mainly resource based companies. The authorities are encouraged by the existing system for evaluating their activities: one of the key indicators of creating conditions for the accelerated development of the FEFD is the number of created ASEZs and the accumulated amount of residents' investments. Based on the volume of investments implemented in the ASEZ projects, NRS projects are the most attractive in these respects.

The instrument for obtaining tax preferences outside special territories – obtaining the status of a *"regional investment project" (RIP)* – was also in demand in the resource sector of the Far East. The key preferences in the framework of this instrument are income tax benefits and mineral extraction tax, so mineral companies have become the main applicants for them. The RIP regime has passed several stages in its development. For the initial period of launching this instrument (2014-2016), there were quite strict legal requirements for

applicants of benefits, the formation of a special RIP Register and inclusion of projects into it by decision of regional government bodies. The result of this period was the registration as a RIP of a small number of mineral projects in selected Far Eastern regions. In 2016, under the pressure of resource based companies, at the federal level significant amendments were made to the RIP formation procedure: liberalization of the financial barrier (by volume of investments), change in the validity period of preferences (for investments made since January 1, 2013), introduction of a notification procedure for receiving benefits (without coordination with regional authorities and inclusion in the register) (Lomakina, 2018). The unexpected loss of control over these processes at the regional level, the threat of the growth of uncontrolled shortfalls in regional budgets led to active actions by the governing bodies of several regions to refuse these preferences.

For example, in the Chukotka Autonomous Okrug, currently only three large gold mining companies form more than half of the region's own revenues. According to experts, the annual falling-out incomes of the regional budget only due to preferences under the RIP can amount to more than 1 billion rubles (from 50% to 70% of all mineral extraction tax). Therefore, in 2018, a legislative initiative was launched in the Chukotka Autonomous Okrug to exclude it from the regions, in the territory of which, when implementing the RIP, it is not necessary to include the organization in the register of participants and, accordingly, to coordinate with the regional authorities. In the Khabarovsk Territory, in the structure of the economy of which the resource sectors are not dominant, at the beginning of 2020, logging, coal mining and processing, mining of metallurgical ores and other minerals, as well as production of precious metals were excluded from the list of activities covered by the RIP regime.

Thus, the liberalization of the RIP regime in the interests of resource based companies has led to the emergence of negative "institutional externalities" for the regions, which, in our opinion, is also a confirmation of the emerging modification of state support tools for regional development under the objective influence of the predominantly raw materials nature of the economy of the Far East.

An equally important mechanism of the "new model" for the development of the macroregion is *government support for investment projects*, the practical implementation of which can give a significant effect for the Far East. To date, this procedure has not only been worked out normatively, but the results have already been obtained. In 2015-2018 several stages of the selection of investment projects for direct state support in the form of subsidies for the creation and reconstruction of infrastructure in the framework of investment projects were carried out. During the selection process, more than fifty projects in various sectors were considered and 13 investment projects were selected for state support, 8 of which were in mining and 1 in the forest industry. Subsidies from the federal budget in 2015-2020 were planned at 32.5 billion rubles, with more than 90% of these funds being allocated to support mineral projects. At the beginning of 2020, the Government of the Russian Federation decided to supplement the list with two more mineral resources projects – development of the Pravourmiysky tin ore deposit (Khabarovsk Territory) and the Nasedkino gold deposit (Trans-Baikal Territory). State support for these projects will amount to more than 1.6 billion rubles.

The mechanism of direct state support of investment projects for solving infrastructure problems is of a general nature. However, in fact, resource projects are still recognized as being in line with the strategic goals of the region's development and creating the maximum social and economic effect in the region, competitive both for private investors and the state.

It should be noted the positive importance of the state support instrument for expanding the raw material base. Firstly, new deposits that did not have such prospects before could be involved in the development, and secondly, this expands the development opportunities for "junior" companies in the Far East. But all together, this is still aimed at the growth of the mineral sector in the structure of the economy of the macro-region.

2. Dynamics of resource dependence of the regions of the FEFD during the implementation of the "new model" of development

One of the objectives of our study is to find out whether the role of resource industries in the macro-region's economy is reduced in terms of contribution to GRP. To find the answer to this question, we analyzed the structure of the economy of the regions of the FEFD using the approach described in the article (Kurbatova et al., 2019). This paper presents a classification of resource-type regions based on the following criteria: the share of the extractive sector in GRP and the ratio of the share of extractive and manufacturing sectors in GRP. The authors ranked and distributed among the selected groups the regions of the Russian Federation.

Using this approach, but with the inclusion of all natural resource sectors in the assessment, we obtained a ranked characteristic of the resource dependence of the regions of the FEFD (Table 2).

The study showed that all regions of the Far Eastern Federal District belong to resource-type regions, but of varying degrees of dependence. This was reflected in their distribution into 3 groups: with very high, high and middle levels of resource dependence. It should be noted that the regions of the FEFD that were not included in the group of resource-dependent in the classification in the article (Kurbatova et al., 2019), with more complete consideration of natural resource sectors, fell into regions with a middle level of resource dependence. Moreover, the consideration of indicators in dynamics shows an increase in the resource dependence of the regions. For example, if the Jewish Autonomous Region at the beginning of the period could be characterized as a region with a middle level of resource dependence, then by 2017 its characteristic is a region with a high level of resource dependence. This reflects the real situation in this region: at present, the main macroeconomic indicators of the economy in the region are determined by the launch of a

Table 2. Dynamics of the distribution of regions of the Far Eastern FD by levels of resource dependence, %

	2013	2014	2015	2016	2017
regions with very high level of resource dependence					
Republic of (Sakha) Yakutia	45,3/26,6	46,4/29,0	50,8/33,9	52,8/52,8	50,0/45,5
Chukotka Autonomous Okrug	36,3/181,5	44,1/220,5	49,1/70,1	50,3/125,8	46,5/93,0
Magadan Region	21,7/9,0	21,6/10,8	34,6/20,4	47,0/26,1	45,4/26,7
Sakhalin Region	64,8/17,5	68,7/32,7	63,9/30,4	59/21,1	64,0/20,6
regions with high level of resource dependence					
Amur Region	16,9/3,8	19,2/5,1	24,8/5,9	20,9/6,1	18,4/3,6
Kamchatka Territory	19/1,9	20,4/2,3	25,4/2,6	29,3/2,9	26,3/2,5
Trans-Baikal Territory	15,0/4,9	13,0/3,2	17,0/3,5	19,5/3,8	18,8/3,3
regions with an middle level of resource dependence					
Republic of Buryatia	9,1/0,6	9,2/0,5	10,2/0,6	10,4/0,8	9,2/0,9
Primorye Territory	9,5/1,1	10,8/1,1	11,0/1,3	10,6/1,2	9,3/0,9
Khabarovsk Territory	11,4/1,5	10,1/1,1	12,5/1,1	12,3/1,1	12,6/1,2
Jewish Autonomus Region	7,7/1,3	11,6/2,0	12,8/2,5	12,1/2,2	16,9/2,1

Note: in the numerator – share of the natural resource sector in the GRP, %; in the denominator – ratio of the shares of the natural resource /manufacturing sector in the GRP, %.

Source: calculated according to the classification in (Kurbatova et al., 2019) and data of Regiony Rossii (Regions of Russia)) (2017, 2019).

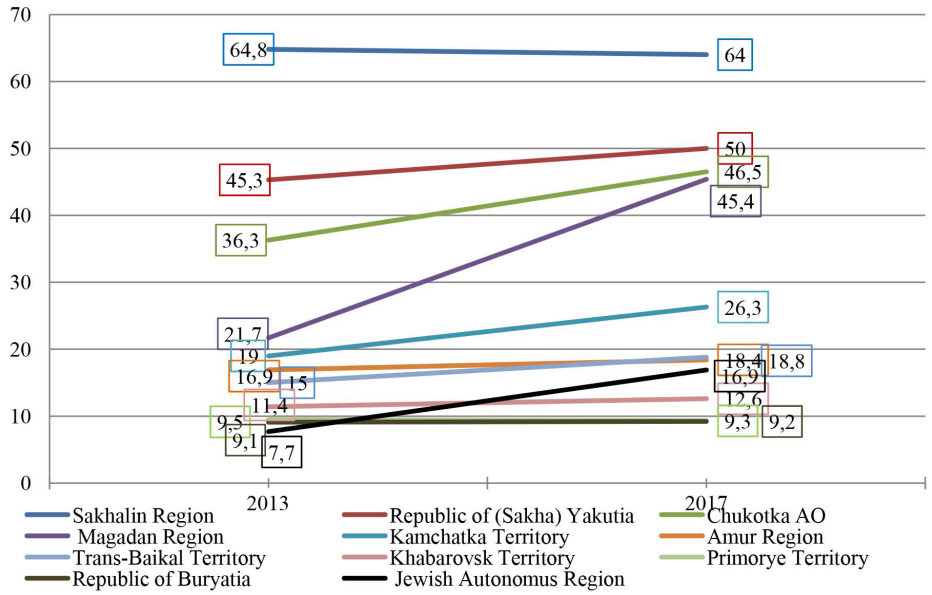

Fig. 2. Share of the natural resource sector in the GRP of the FEED' regions, 2013 and 2017, %

Source: calculated according to data of Regiony Rossii (Regions of Russia)) (2017, 2019)

large-scale resource project (Kimkano-Sutarsky mining plant).

Figure 2 shows the change in the share of GRP in the natural resource industries at two time points (2013 and 2017), reflecting the period of introduction and operation of the institutional instruments of the "new model" for the development of the FEFD. During this time the share of GRP in most regions either increased or remained virtually unchanged.

It can be concluded that the "new model" of the development of the FEFD during the last five years is aimed at consolidating and even increasing resource dependence in the macro-region's economy. Under the influence of institutional innovations its same raw material structure is reproduced. The practice of implementing institutional innovations in the FEFD indicates that not only the institutional organization determines the level and dynamics of resource dependence, but also the objective specificity (resource abundance of the region) modifies these instruments.

Conclusion

The study of state stimulation of the development of a resource-type regions by the example of assessing the effects of certain institutional mechanisms of the "new" model for the Far Eastern macro-region confirms the thesis that "the institutional organization of resource-type economies is largely determined by their resource-industry characteristics, but not directly, and indirectly, through the actions of dominant political and economic actors. They are the subjects of institutional design, creating a demand for certain rules of the game and actively participating in the processes of their development and implementation" (Kurbatova et al., 2019: 95).

For the Far Eastern and Siberian regions, the concrete results of such an institutional design in the period under review were:

1) a further increase in the importance of resource sectors in their economies;

2) modification of institutional instruments for the development of the region in the interests of large resource-based companies (for example, the "erosion" of territories of special preferential regimes);

3) negative institutional externalities for the regional economy from liberalization of the RIP regime in natural resource sectors;

4) the formation of "multidimensional benefit packages" (ASEZ regime preferences plus direct subsidies from the federal budget) for individual large resource-based companies that exhibit rent-oriented behavior (for example, PJSC Rusolovo, RFP Group timber industry holding).

In addition, the growth of resource dependence of the regions of the East of Russia is also manifested in their assessment of strategic prospects. As the analysis showed (Lomakina, 2019), to the "depth" of 10-15 years, significant structural changes in their economies are not expected. In most areas of the macro-region, extractive industries remain the key areas of development and the main drivers of their economic growth.

The task of overcoming negative impacts and turning them into positive effects requires taking into account and evaluating the institutional environment, and searching for possible instruments for managing it in the desired direction. What is needed is preventive work with institutional design: calculating not only the economic efficiency of projects, but also the expected effectiveness of institutional measures and preferential regimes.

References

Alexeev, M., Chernyavskiy, A. (2014). *Natural Resources and Economic Growth in Russia's Regions*. Working papers. Series: Economics. WP BRP 55/ec/2014. Available at: https://publications.hse.ru/en/preprints/125385100

Antonova, N.E., Lomakina, N.V. (2018). Prirodno-resursnye otrasli Dal'nego Vostoka: novye factory razvitiya [Natural Resource-based Industries of the Far East: New Drivers of Development]. In *Ekonomicheskie i social'nye peremeny: fakty, tendentsii, prognoz* [*Economic and Social Changes: Facts, Trends, Forecast*], 11(1), 43-56. DOI: 10.15838/esc/2018.1.55.3

Cust, J., Poelhekke, S. (2015). The Local Economic Impacts of Natural Resource Extraction. The Ox-Carre Working Paper No. 156. Oxford Centre for the Analysis of Resource Rich Economies. Available at: https://www.economics.ox.ac.uk/materials/working_papers/4732/oxcarrerp2015156.pdf

Izotov, D.A. (2017). Dal'nii Vostok: novatsii v gosudarstvennoi politike [Far East: Innovations in Public Policy]. In *EKO* [*ECO*], 4, 27-44.

Kryukov, V.A. (2014). Syr'evye territorii v novoi institutsional'noi real'nosti [Resource Areas in the New Institutional Environment]. In *Prostranstvennaya Ekonomika* [*Spatial Economics*], 4, 26-60. DOI: 10.14530/se.2014.4.026-060

Kurbatova, M.V., Levin, S.N., Kagan, E.S., Kislitsyn, D.V. (2019). Regiony resursnogo tipa v Rossii: opredelenie i klassifikatsiia [Resource-type Regions in Russia: Definition and Classification]. In *Terra Economicus*, 17(3), 89–106. DOI: 10.23683/2073-6606-2019-17-3-89-106

Libman, A. (2013). Natural Resources and Sub-national Economic Performance: Does Sub-national Democracy Matter? In *Energy Economics*, 37, 82–99. DOI: 10.1016/j.eneco.2013.02.003

Lomakina, N.V. (2018). Gosudarstvennoe stimulirovanie investitsii v mineral'no-syr'evye proekty: dal'nevostochnyi variant [Government Promotion of Investment in Mineral and Raw Materials Projects: Far Eastern Case]. In *Regionalistika* [*Regionalistics*], 5(4), 14-23. DOI: 10.14530/reg.2018.4.14. Available at: http://regionalistica.org/archive/19-2018/2018-4/113-reg-2018-4-2-eng

Lomakina, N.V. (2019). Strategicheskie prioritety ekonomicheskogo razvitiya i "resursnaya ekonomika" Dal'nevostochnogo makroregiona [Strategic Priorities of Economic Development and "Resource Economy" of the Far East Macroregion]. In *EKO* [*ECO*], 7, 35-53. DOI: 10.30680/ECO0131-7652-2019-7-35-53

Minakir, P.A. (2006). *Ekonomika Regionov. Dalniy Vostok* [*Regions' Economics. Russian Far East*]. Moscow. Economica. 848 p.

Minakir, P.A., Prokapalo, O.M. (2017). Rossiiskii Dal'nii Vostok: ekonomicheskie fobii i geopoliticheskie ambitsii [Russian Far East: Economic Phobias and Geopolitical Ambitions]. In *EKO* [*ECO*], 4, 5-26

Popodko, G.I., Nagaeva, O.S. (2019). "Triple Helix" Model for Recourse-Based Regions. In *Journal of Siberian Federal University. Humanities & Social Sciences*, 12 (12), 2309–2325. DOI: 10.17516/1997–1370–0524

Pyzhev, A.I, Syrtsova, E.A., Pyzheva, Yu.I., Zander, E.V. (2015). Sustainable Development of Krasnoyarsk Krai: New Estimates. In *Journal of Siberian Federal University. Humanities & Social Sciences*, 8 (11), 2590-2595. DOI: 10.17516/1997-1370-2015-8-11-2590-2595

Resursnye regiony v novoi real'nosti [*Resource Regions of Russia in the "New Reality"*] (2017). Novosibirsk. IEOPP SO RAN. 308 p.

Rossiiskii Dal'nii Vostok: na puti v budushchee [*The Russian Far East: on the Way to Future*] (2017). Khabarovsk. ERI FEB RAS. 395 p.

Special Economic Zones. Progress, Emerging Challenges, and Future Directions (2011). The International Bank for Reconstruction and Development / The World Bank. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/2341/638440PUB0Exto00Box0361527B0PUBLIC0.pdf

Институциональные новации для развития Востока России: эффекты реализации в ресурсном регионе

Н.Е. Антонова, Н.В. Ломакина
Институт экономических исследований ДВО РАН
Российская Федерация, Хабаровск

Аннотация. Исследованы отклики экономических агентов на имплантацию в 2013-2020 гг. институциональных инструментов «новой модели» развития Дальневосточного макрорегиона. Подтверждено закрепление тенденции преобладания инвестиций в ресурсные проекты в общем объеме инвестиций в основной капитал в макрорегионе. Получены новые результаты, подтверждающие влияние преимущественно сырьевого характера экономики региона на трансформацию институтов, выраженную через: модификацию институциональных инструментов развития региона и формирование множественности преференциальных режимов в интересах крупных сырьевых компаний; появление отрицательных институциональных экстерналий для региональной экономики при реализации отдельных институциональных инструментов в сырьевых отраслях. Проведено ранжирование дальневосточных и отдельных сибирских регионов по степени ресурсной зависимости с расчетом выбранных индикаторов для ресурсного сектора в целом (добыча полезных ископаемых, лесных и водно-биологических ресурсов), что соответствует экономической специализации макрорегиона и делает такую оценку более адекватной. Показано, что результатом реализации «новой модели» развития в исследуемом периоде стал рост ресурсной зависимости в экономике Дальневосточного макрорегиона. Полученные оценки демонстрируют противоречие между целевыми задачами, институциональными инструментами и первыми результатами реализации «новой модели» развития Дальнего Востока. Проведенное исследование позволяет получить новые знания на стыке отдельных теоретических и прикладных научных направлений: оценки эффективности государственной региональной политики; роли природных ресурсов в экономическом развитии; институционального проектирования.

Ключевые слова: государственная региональная политика, преференциальные режимы, ресурсный регион, ресурсная зависимость, природно-ресурсный сектор, Дальневосточный макрорегион.

Научная специальность: 08.00.00 – экономические науки.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 453–463

DOI: 10.17516/1997-1370-0582
УДК 330.3

Cultural Heterogeneity and Economic Development in Russia

Anna N. Bufetova*, Alina A. Khrzhanovskaya and Evgeniya A. Kolomak
Institute of Economics and Industrial Engineering of the SB RAS
Novosibirsk, Russian Federation
Novosibirsk National Research State University
Novosibirsk, Russian Federation

Received 11.11.2019, received in revised form 10.03.2020, accepted 10.04.2020

Abstract. The paper studies change in the national and religious structure of the population and assesses the impact of cultural heterogeneity on the economic development of Russian regions. Sources of information on the national structure of the population are 2002 and 2010 censuses. The analysis of heterogeneity in the religious structure is carried out for 2012 and 2015 and sources of the data are Atlas of Religions and Nationalities of Russia and the Federal Agency for Nationality Affairs. Fractionalisation and polarisation indices are used to assess the level of cultural heterogeneity. The study of these characteristics showed that despite the intensification of migration processes in contemporary Russia, there were no major changes in the cultural structure of the population of the regions. At the same time, there is a wide variety of national and religious structures in the regions. The impact of cultural heterogeneity on economic development is estimated using regression analysis. The panel regression of gross regional product on labor, capital, controlling variables and indices of cultural heterogeneity is estimated. The results have shown: 1) the positive impact of ethnic and cultural fractionalisation on economic development; 2) the absence of a statistically significant relationship between the level of national polarisation and development; 3) the negative impact of religious polarisation on regional productivity. The results suggest that it is necessary to consider cultural heterogeneity of the society and the possibility of contradictions due to the cultural differences in the regional policy and in the decisions on the public finance.

Keywords: cultural heterogeneity, Russian regions, nationality, religion, empirical analysis, fractionalisation, polarisation, regression.

The authors are grateful to the Russian Foundation for Basic Research for the financial support of the research (Grant No. 19-310-90010).

Research area: economics.

* Corresponding author E-mail address: bufetova@gmail.com, AlinKhrzh57@mail.ru, ekolomak@academ.org
ORCID: 0000-0003-4253-7079 (Bufetova); 0000-0003-2374-0098 (Khrzhanovskaya); 0000-0002-2230-852X (Kolomak)

Citation: Bufetova, A.N., Khrzhanovskaya, A.A., Kolomak, E.A. (2020). Cultural heterogeneity and economic development in Russia. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 453-463. DOI: 10.17516/1997-1370-0582.

Introduction

Economic theory recognises that informal institutions and culture, in particular, can have a significant impact on economic performance. Culture is involved in shaping preferences, restrictions, attitudes to other institutions, and behaviour patterns. Culture determines the effectiveness of formal rules, influences the choice of political and organisational structure, the success of reforms and, ultimately, the level of development of a society. Most countries and regions have a heterogeneous population in terms of cultural characteristics. Cultural diversity creates both positive and negative effects. The former ones are explained by the combination of advantages of different cultures, by their complementarity in production, by a variety of skills, experience and ideas. The negative consequences are associated with possible costs due to mismatch of values, coordination problems because of different behaviour, potential political and social conflicts, barriers and disagreements on policy priorities. Active migration processes and the growth of labor mobility on a global scale bring changes in the ethnic, religious and national structures of the population, which raises questions about the socio-economic consequences of these phenomena and effective political reactions.

Cultural diversity is one of the aspects of the problem of social heterogeneity, and several theoretical studies (Esteban, Ray, 1994; Esteban, Ray, 1999; Nehring, Puppe, 2002) are devoted to this issue. It is proposed to separate two characteristics of the diversity: fractionalisation and polarisation, which are associated with different levels of risk of negative consequences for a society.

The study of the effects of ethnic heterogeneity was initiated by Perotti's work (Perotti, 1996), which shows that political instability has a negative impact on growth through mechanisms for distributing economic benefits, but ethnic fractionalisation does not have a statistically significant impact on it. The paper of Alesina and Perotti (Alesina, Perotti, 1996) analysed the channel of influence through investment, and the authors came to the similar conclusion.

A special contribution to the debate was made by the article of Easterly and Levin (Easterly, Levine, 1997), which analysed the effects on long-term economic growth in Africa in 1960-1990 and found a statistically significant negative impact of ethnic diversity on development. Channels of the influence were public goods, financial repression, and policies in favour of the elites. Polarisation of different ethnic groups leads to rent-oriented behaviour and disagreements regarding the distribution of public goods (Horowitz, 1985).

In (Sokoloff, Engerman, 2000), the authors analysed migration to America, comparing the development of different American countries, and concluded that in a number of countries, elite groups created institutions in their favour, infringing on the rest of the population, which negatively affected economic development. In this case, the behaviour of influential elites was important, they excluded a part of the population from the distribution of economic benefits. This idea was developed in (Keefer, Knack, 2002), which shows a statistically significant negative impact of polarisation on economic growth due to increased risks to property rights.

Exploring the effects of ethnic diversity on economic growth, Putnam (Putnam, 1995), as well as Alesina and La Ferrera (Alesina, La Ferrara, 2000; Alesina, La Ferrara, 2001) emphasise the role of trust, showing that members of different racial groups are less likely to participate in common social activities and trust their neighbours less. Consent for the redistribution of goods is worse in racially diverse communities, this case is also applied to the provision of public goods (Alesina, Baqir, Easterly, 1999). In (Esteban, Mayoral, Ray, 2012) authors investigate conflicts related to the distribution of public goods and conclude that the

polarisation index positively correlates with the occurrence of conflicts over public goods.

In (Collier, 2001; Easterly, 2001; Papyrakis, Mo, 2014) it is shown that the negative impact of ethnic heterogeneity is less if there are democratic institutions that act as mediators in national conflicts. The studies by Bluedorn (Bluedorn, 2001) and later by Alesina and coauthors (Alesina et al., 2003) show that the negative impact of the diversity on economic growth is stronger in less democratic countries. With a high level of ethnic diversity, weak institutions have a more adverse effect on growth and policy. In countries with relatively developed institutions, ethnic diversity does not constrain growth or impair economic policies, the democratic institutions reduce the risk of conflict and genocide. Fearon and Laitin (Fearon, Laitin, 2003) add that ethnic diversity is not a sufficient explanation for the beginning of civil conflicts and a measure of polarisation should be used.

The difference in the impact of ethnic diversity on economic growth depends on a study object. Thus, at the country level, the relationship between ethnic diversity and economic growth is negative, but at the regional and urban levels, the authors found that there is a positive relationship between them. Alesina and La Ferrara (Alesina, La Ferrara, 2005) compare effects of the ethnic diversity at the regional level in developed countries; comparing the American states, they found out the negative impact of ethnic diversity only in the poor states.

Most studies for the city level have found that heterogeneity has a positive effect on such indicators as wages and productivity. In (Ottaviano, Peri, 2006) the authors found that on average, cultural diversity has a net positive effect on American productivity. In (Sparber, 2010) a positive relationship was found between racial heterogeneity and wages in the United States. Lee (Lee, 2011) used employee career data for 53 English cities between 1981 and 2001 and showed that cities with more diverse populations experienced faster economic growth.

The third level of the analysis presented in the literature is companies. In (Lee, 2015) the author compared the effect of diversity for firms and cities and found a positive effect of diversity in companies on innovation. Assuming that immigrants bring different ideas and abilities, and are important factors in the technological progress, Alesina, Harnos and Rappoport (Alesina, Harnoss, Rapoport, 2013) analysed the relationship between the diversity of immigrants and the level of economic development and concluded that it had a positive impact. Many papers support the suggestion that diversity leads to increased productivity when skills are complementary (Lazear, 1999; Hamilton, Nickerson, Owan, 2003; Parotta, Dario, Mariola, 2010).

The conclusion about the negative impact of diversity on economic development or its absence is often made when a high level of aggregation is used, but a positive relationship is revealed in the analysis at the level of cities and enterprises. A more detailed approach is increasingly used in the study of ethnicity and institutions (Michalopoulos, Papaioannou, 2013; Michalopoulos, Papaioannou, 2014), ethnicity and inequality (Alesina, Michalopoulos, Papaioannou, 2015).

There are few papers that study the relationship between ethnic and cultural diversity and economic development in contemporary Russia (Limonov, Nesena, 2015; Nesena, Razumovsky, 2016; Bufetova, Kolomak, 2017; Bufetova, Kolomak, Khrzhanovskya, 2018). Empirical analysis did not reveal stable relationships and patterns. This paper attempts to present a more detailed study by separating the effects of polarisation and fractionalisation of both national and religious heterogeneity.

Theoretical framework

The paper is based on the conclusions of the theories of economic growth and institutional economics, which consider culture as an important informal institution that forms preferences, restrictions, and models of interaction and behaviour of people.

The results of empirical studies on the socio-economic and political consequences of the cultural diversity are ambiguous and depend on the objects studied and on the estimated impact directions. This can be explained by the fact that the influence of the cultural heterogeneity

on economic development is not direct, it is mediated by the system of formal institutions, by the structured social relations, and by the traditions of interpersonal relations. The channels of influence of the cultural heterogeneity on the results of economic activity are trust, transfer of experience, preferences for public goods and public choice procedures. In this regard, the degree and direction of influence of the cultural heterogeneity on the socio-economic processes are determined by the technological progress, diversity of production, costs of coordinating the preference for public goods, the role of powerful elites representing ethnic or religious groups in government policy, restrictions on rent-seeking elites, the development of democratic institutions, social cohesion and capacity for collective action.

Empirical studies on the impact of cultural diversity on economic development are based on models of economic growth. The specification of the model, along with the fundamental factors of production, which are labor and capital, includes characteristics of cultural diversity, while controlling the features of the institutional environment that can directly or indirectly affect the results of the interaction.

Cultural heterogeneity is measured using several indicators, including the fractionalisation index and polarisation index. The potential positive effects of the heterogeneous structure reflect rather the first indicator – the fractionalisation index. And the probability of social conflicts, which may be based on cultural heterogeneity, is estimated using the polarisation index. The risk of social tensions depends not on the number of ethnic or religious groups as on the distribution of the population among them, and not so much on the level of heterogeneity, but on its structure. Inequality does not always cause open conflict, social protest is a collective action and requires concentration of interests and political forces, i.e. polarisation of the society is necessary. We can talk about the polarisation if the following conditions are met: firstly, there is a high degree of homogeneity within each group and, secondly, there is a high degree of heterogeneity between groups. Polarisation involves analysis of distribution, while fractionalisation does not allow us to identify the details of the heterogeneity structure, to determine the presence of dominant groups.

The analysis of the impact of the cultural heterogeneity in Russian regions on the economic development uses the fact that the country is a multinational state with a large ethnic and religious diversity and, at the same time, there are large differences in the level and dynamics of regional development. National, ethnic, and religious groups are distributed very unevenly across the territory of Russia: from the concentration in some regions to a small representation in others. However, the macroeconomic and institutional environment within a country is more uniform compared to the level of differences between countries and estimates for regions remove the problem of extremely different conditions and specificity of different countries.

Statement of the problem

The problem of national and ethnic conflicts has become one of the most discussed topics in the media in the recent years. Increased migration due to economic problems, rising unemployment, crises and wars are changing the population structure. Rapid changes in the national structure and the growing heterogeneity of the population, where different ethnic or religious groups have different interests and norms of behaviour, cause tension in the society.

It is known that informal rules grow out of traditions and culture, and diversity in the institutional environment is often determined by national characteristics, which also influence the nature of development. The factor of national heterogeneity and ethnic diversity has impact on economic dynamics, and its direction remains unclear. A number of papers prove the positive impact of ethnic heterogeneity of the population on economic growth and labour productivity. The explanation is that diversity makes it possible to optimally combine the advantages of different cultures and traditional skills. The positive effect of national diversity is mainly characteristic of countries with a high level of development and political stability. But many studies also reveal a negative relationship between ethnic and religious heterogeneity of

the population with indicators of development and economic efficiency. A whole range of arguments are given as reasons for this dependence. First, in ethnically heterogeneous societies, there is a greater likelihood of conflicts between population groups and related political instability, including armed clashes and civil wars, which negatively affects investment activity and, as a result, the rate of economic growth. Second, in ethnically heterogeneous societies, it is more difficult to reach consensus on the distribution of public goods, so the efficiency of providing budget services is lower. Third, because of the mismatch of interests, groups seek channels of influence on political decisions, wasting development resources in an unproductive way. As a result, in heterogeneous societies the level of corruption is higher, and the participation of citizens in public life is lower due to distrust to the authorities. Finally, ethnic heterogeneity can slow down the diffusion of ideas and technological innovations as a result of cross-cultural and language barriers.

Despite the fact that the Russian Federation is a multi-ethnic state with a great cultural diversity, and as a result of active migration and immigration in recent years, it is possible to assume noticeable changes in the national and religious composition of the population. This work complements the study of the processes of changing the national structure of the population, conducting a detailed analysis of the characteristics of ethnic and religious heterogeneity for the post-Soviet Russia using a set of empirical indicators and techniques.

Cultural heterogeneity can be the cause of both positive and negative socio-economic phenomena. The theoretical and empirical results give grounds to separate these effects and put forward the following hypotheses.

1. Cultural diversity has a positive impact on economic development.

2. The polarised cultural structure negatively affects the socio-economic results of development.

Methods and data

Quantitative estimates of the national heterogeneity of the population are carried out using the fractionalisation index, which shows the probability that two randomly selected people belong to different cultural groups, and is calculated as follows:

$$FRAC = 1 - \sum_{i=1}^{N}(s_i)^2, \quad (1)$$

where si is the share of the population of the i-th cultural group in the total population, N is the number of such groups. The index takes values from 0 to $1 - {}^{1}/_{N}$. The minimum value corresponds to a situation when the society is completely homogeneous and unites the population of one culture. The higher the index – the higher the heterogeneity of the population. Theoretically, the index can reach a maximum value of 1 when the number of groups tends to infinity, and all people belong to different groups. It means that the index depends on the number of cultural groups and increases with the number. Another property of the fractionalisation index that needs to be considered is that it depends on the distribution of the population by group, giving greater weight to large groups of the population. As a result, if the share of the dominant cultural group decreases, the fractionalisation index will decrease. However, the study of dynamics using this indicator with unchanged classifications is quite correct.

Cultural heterogeneity can be the source of disagreements in society. From this point of view, the diversity measure should reflect the possibility of conflicts. However, the threat of social tension is not so much related to the number of cultural groups, as to the nature of the distribution of the population between them, that is, not to the level of heterogeneity, but to its structure. Inequality is not always a source of conflict; social protest is a collective action and is associated with the polarisation of society. We can talk about the polarisation of society if the following conditions are met: firstly, there is a high degree of homogeneity within each group and, secondly, there is a high degree of heterogeneity between the groups. Thus, the polarisation involves the analysis of distribution features. And the fractionalisation index does not allow to identify the features of the heterogeneity structure, to determine whether a society is bipolar, multipolar or bal-

anced, to identify the presence of a dominant majority or a dominant minority. Esteban and Rey (Esteban, Ray, 1994) proposed the polarisation index, they formulated the theoretical basis for the polarisation evaluating and a system of axioms that must satisfy the measure of polarisation. The constructed polarisation index that satisfies these axioms is calculated as follows:

$$P(s, y, k, \alpha) = \\ = k \sum_{i=1}^{N} \sum_{i \neq j} s_i^{1+\alpha} s_j |y_i - y_j|, \quad (2)$$

where s_i is a share of the *i*-th group in the total population, $|y_i - y_j|$ is a measure of the difference (distance) between the two groups *i* and *j*, α and *k* are parameters.

This index was used to assess the degree of polarisation of the population by wealth and income, but in analysing the polarisation of the population by cultural characteristics, we face the problem that it is necessary to set a quantitative assessment of the level of differences between cultural groups. One of the attempts to solve this problem is presented in the paper (Montalvo, Reynal-Querol, 2002), where the polarisation index is a measure of the difference between the actual distribution of the population by ethnic groups and the bimodal distribution:

$$Q = 1 - \sum_{i=1}^{N} \left(\frac{0.5 - s_i}{0.5}\right)^2 s_i. \quad (3)$$

In the formula, the deviation of the share of each group from its maximum value at the extreme degree of polarisation (0.5) is weighted by the value of this share. The proposed index reaches a maximum when the society splits into two groups of equal size and decreases when its structure deviates from this pattern. Montalvo and Raynal-Querol (Montalvo, Reynal-Querol, 2002) showed that the polarisation index Q belongs to the class of polarisation measures proposed by Esteban and Rey (Esteban, Rey, 1994). Due to the complexity of determining the degree of difference between cultural groups, the authors assumed that the differences between any groups are equal.

The fundamental difference between the fractionalisation and polarisation indices is that an increase in the number of groups increases the fractionalisation index (the diversity of the population is higher) but reduces the polarisation index (it is maximum if there are two large groups). Therefore, the fractionalisation and polarisation indices characterise different aspects of population heterogeneity and are used to study different influence on economic development.

The analysis of the impact of cultural heterogeneity on development indicators is carried out using economic growth models. Empirical studies use regression of output on labour, capital, a system of controlling variables, and cultural heterogeneity indices. The implementation of this approach gives the specification of the econometric model as follows:

$$lnY_{it} = \beta_0 + \beta_1 lnC_{it} + \beta_2 lnL_{it} + \\ + ND_{it} + DP_{it} + \mu_i + \lambda_t + \varepsilon_{it}. \quad (4)$$

Where

Y_{it} – gross regional product in region i in year t;
C_{it} – fixed capital in region i in year t;
L_{it} – employment in region i in year t;
ND_{it} – cultural diversity index in region i in year t;
DP_{it} – cultural polarisation index in region i in year t;
μ_i – regional effect;
λ_t – time effect.

Important determinants of cultural differences are nationality and religion. The national structure of the Russian population is presented in 2002 and 2010 censuses. Information about the confessional structure of the population is available for 2012 in the Atlas of Religions and Nationalities of Russia, data for 2015 were prepared by the Federal Agency for Nationality Affairs. The confessional structure of the population of the Russian Federation, despite the dominance of the Orthodox religion, is quite diverse. Data for 2012 gives a more detailed structure of religions. Therefore, to ensure comparability, the 2015 grouping was taken as a basis, including the following religions: Orthodox, Islam, Buddhism, atheism, own faith, Protestantism, Christianity (but not Orthodox, Catholic, or Protestant), Judaism, Eastern religions and spiritual practices, Pentecostalism, paganism, old believers, Catholicism, etc.

Discussion

There were no major changes in the national diversity of the population in the Russian regions during the period under review (Table 1), while significant changes were observed in the heterogeneity of the religious structure (Table 2). The religious composition is more heterogeneous than the national one. However, both the ethnic and religious structures tended to increase homogeneity; the average values and median level of the fractionalisation indices declined. But, at the same time, interregional differences increased; the coefficients of variation and standard deviations were getting bigger.

The index of national polarisation in the regions varies from 0.1 to 0.9 (Table 3), and the religious polarisation from 0.2 to 0.9 (Table 4), which indicates a high cultural polarisation in certain regions. The average characteristics of the national polarisation for Russia can be attributed to moderate, while for the religious polarisation the average characteristics are quite high. But the average level of cultural polarisation in the country is reducing.

The obtained estimates bring to the conclusion that there is a wide variety of cultur-

Table 1. The index of the national fractionalisation in Russian regions

	2002	2010	Δ 2002-2010
Minimum	0.059	0.054	-0.005
Maximum	0.838	0.835	-0.003
Average	0.295	0.277	-0.018
Median	0.230	0.188	-0.042
Standard deviation	0.199	0.200	0.001
Variation coefficient	0.675	0.724	0.049

Table 2. The index of the religious fractionalisation in Russian regions

	2012	2015	Δ 2012-2015
Minimum	0,370	0,145	-0,225
Maximum	0,816	0,784	-0,032
Average	0,697	0,498	-0,199
Median	0,714	0,507	-0,208
Standard deviation	0,088	0,130	0,042
Variation coefficient	0,127	0,261	0,135

Table 3. The index of the national polarisation in Russian regions

	2002	2010	Δ 2002-2010
Minimum	0.113	0.104	-0.009
Maximum	0.912	0.926	0.014
Average	0.444	0.420	-0.024
Median	0.390	0.336	-0.054
Standard deviation	0.241	0.248	0.007
Variation coefficient	0.543	0.592	0.049

Table 4. The index of the religious polarisation in Russian regions

	2012	2015	Δ 2012-2015
Minimum	0,560	0,274	-0,286
Maximum	0,859	0,915	0,056
Average	0,709	0,693	-0,016
Median	0,708	0,714	0,006
Standard deviation	0,059	0,115	0,056
Variation coefficient	0,083	0,165	0,082

al structures in the regions of Russia, which allows us to study the relationship between cultural heterogeneity and indicators of social and economic development. Since information about the national and religious structure of the population is presented for different years, the regression estimates for these cultural characteristics were run separately.

Considering that inflation processes had different activity in the spatial dimension and over time, the gross regional product (GRP) was recalculated based on the indices of the physical volume of GRP. We have panel regression and should choose between fixed and random effects models. The Hausman test did not reveal significant differences in the estimates of models with fixed and random regional and time effects, so GLS estimates were used, which are more efficient. The estimates of the regressions (4) are presented in Table 5.

Like many empirical studies for a regional level, our regression estimates confirmed the hypothesis of a positive impact of cultural diversity on economic development in Russian regions. The coefficients for the national and religious fractionalisation indices are positive and statistically significant. At the same time, the hypothesis about the negative impact of cultural polarisation was confirmed only for the religious component. The coefficients for national and religious polarisation indices have a negative sign, but the national polarisation index is statistically insignificant.

Conclusion

Our estimates have shown that despite the growth of the internal and international mobility of the population, there were no significant changes in the diversity of the cultural structure in Russia. This result does not correspond to the popular opinion that the country experienced growing heterogeneity of national and religious structures. This assumption is based on the idea that active migration in the post-Soviet period should result in a more diverse cultural and ethnic composition. However, the obtained

Table 5. Regression estimates for cultural heterogeneity

Variable	Regression 1		Regression 2	
	coefficient	P-value	coefficient	P-value
Fixed capital	0.386	0.000	0,3206	0,000
Employment	0.661	0.000	0,6649	0,000
National fractionalisation	0.381	0.078		
National polarisation	-0.295	0.251		
Religious fractionalisation			0,2371	0,000
Religious polarisation			-0,2131	0,001
Number of observations	164		164	164
R2	0.89		0.90	

quantitative estimates did not confirm this hypothesis. This can be explained by the fact that the cultural structure of migrants is not very diverse, so demographic mechanical processes are not accompanied by an increase in cultural heterogeneity of the whole population.

The intercultural relations are not sources of acute conflicts and their institutional representation, formed over decades, have not experienced significant pressure and have not required significant changes. Assessments have shown that both national and religious diversity are positively correlated with the regional development. Due to the relative stability of the formal and informal institutional structures, the national diversity has shown positive effects, while the negative phenomena that are usually associated with the polarisation have not received a basis for development in inter-ethnic relations. However, religious polarisation has a negative impact on regional productivity. This phenomenon can be explained, firstly, by the fact that Russia has developed traditions and experience in managing inter-ethnic relations over the centuries, while the inter-religious interactions in our country do not have such a long history, and mechanisms for their coordination are only in the process of development. In addition, confessional differences in behaviour patterns and assessments of situations are more significant, and, accordingly, can create more serious contradictions in society.

Summarising, we can say that cultural characteristics can be both a source and a barrier for the development in Russia. This informal institution should be taken into account into the political decision-making and in the public finances managing. Given the large inter-regional differences in the national and religious structures of the population, a replication of management practices has very limited opportunities; regions must rely on their own experience and develop original models of governance.

References

Alesina, A., Baqir, R., Easterly, W. (1999). Public Goods and Ethnic Divisions. In *Quarterly Journal of Economics*, 114 (4), 1243–284.

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., Wacziarg, R. (2003). Fractionalization. In *NBER Working Papers 9411.*

Alesina, A., Harnoss, J., Rapoport, H. (2013). Birthplace Diversity and Economic Prosperity. In *NBER Working Paper.*

Alesina, A., La Ferrara, E. (2000). Participation in Heterogeneous Communities. In *Quarterly Journal of Economics*, 115 (3), 847 _904.

Alesina, A., La Ferrara, E. (2001). Who Trusts Others? In *Journal of Public Economics*, 85 (2), 207–234.

Alesina, A., La Ferrara E. (2005). Ethnic Diversity and Economic Performance. In *Journal of Economic Literature,* 43 (3), 762–800.

Alesina, A., Michalopoulos, S., Papaioannou, E. (2015). Ethnic Inequality. In *Journal of Political Economy*, 124 (2), 428–488.

Alesina, A., Perotti, R. (1996). Income Distribution, Political Instability and Investment. In *European Economic Review*, 40 (6), 1203–1228.

Bluedorn, J. (2001). Can Democracy Help? Growth and Ethnic Divisions. In *Economics Letters*, 70 (1), 121–126.

Bufetova, A., Kolomak, E. (2017). Natsional'naia neodnorodnost' v regionakh Rossii [National Diversity in Russian Regions]. In *EKO* [*ECO*], 4, 110-123.

Bufetova, A., Kolomak, E., Khrzhanovskaya, A. (2018). Natsional'noe i religioznoe raznoobrazie regionov Sibiri [National and Religious Diversity of Siberian Regions]. In *EKO* [*ECO*], 5, 28-44.

Collier, P. (2001). Ethnic Diversity: An Economic Analysis of Its Implications. In *Economic Policy,* 32, 129 – 166.

Easterly, W. (2001). *The Elusive Quest for Growth: Economists' Adventures and Misadventures in the Tropics.* Cambridge MA, MIT Press, 342 p.

Easterly, B., Levine, R. (1997). Africa's Growth Tragedy: Policies and Ethnic Divisions. In *Quarterly Journal of Economics*, 112 (4), 1203–1250.

Esteban, J., Mayoral, L., Ray, D. (2012). Ethnicity and Conflict: An Empirical Study. In *American Economic Review*, 102 (4), 1310–1342.

Esteban, J., Ray, D. (1994). On the Measurement of Polarization. In *Econometrica*, 62 (4), 819–851.

Esteban, J., Ray, D. (1999). Conflict and Distribution. In *Journal of Economic Theory*, 87 (2), 379–415.

Fearon, J., Laitin, D. (2003). Ethnicity, Insurgency, and Civil War. In *American Political Science Review*, 97 (1), 75–90.

Hamilton, B., Nickerson, J., Owan, H. (2003). Team Incentives and Worker Heterogeneity: An Empirical Analysis of the Impact of Teams on Productivity and Participation. In *Journal of Political Economy*, 111 (3), 465–497.

Horowitz, D. (1985). *Ethnic Groups in Conflict: Theories, Patterns, Policies*. Berkeley, CA, University of California Press, 707 p.

Keefer, P., Knack, S. (2002). Polarization, Politics, and Property Rights: Links Between Inequality and Growth. In *Public Choice*, 111 (1-2), 127–154.

Lazear, E.P. (1999). Globalization and the Market for Teammates. In *Economic Journal*, 109 (454), 15–40.

Lee, N. (2011). Ethnic Diversity and Employment Growth in English Cities. In *Urban Studies*, 48 (2), 407–425.

Lee, N. (2015). Migrants and Ethnic Diversity, Cities and Innovation: Firm Effect or City Effects? In *Journal of Economic Geography*, 15 (4), 769–796.

Limonov, L., Nesena, M. (2015). Osobennosti etno-kul'turnogo raznoobraziia rossiiskikh regionov [Features of the Ethno-Cultural Diversity of Russian Regions]. In *Region: ekonomika i sotsiologiia* [*Region: Economy and Sociology*], 3, 146–170.

Michalopoulos, S., Papaioannou, E. (2013). Pre-Colonial Ethnic Institutions and Contemporary African Development. In *Econometrica*, 81 (1), 113–152.

Michalopoulos, S., Papaioannou, E. (2014). National Institutions and Subnational Development in Africa. In *Quarterly Journal of Economics*, 129 (1), 151–213.

Montalvo, J., Reynal-Querol, M. (2002). Why Ethnic Fractionalization? Polarization, Ethnic Conflict and Growth. In *UPF Working Paper No. 660.*

Nehring, K., Puppe, C. (2002). A Theory of Diversity. In *Econometrica*, 70 (3), 1155–1198.

Nesena, M., Razumovsky, V. (2016). Vzaimosviaz pokazatelei etnicheskogo raznoobraziia i proizvoditel'nosti rossiiskikh regionov [The Relationship Between the Indicators of Ethnic Diversity and Productivity of Russian Regions]. In *Region: ekonomika i sotsiologiya* [*Region: Economy and Sociology*], 2, 81–101.

Ottaviano, G., Peri, G. (2006). The Economic Value of Cultural Diversity: Evidence from U.S. Cities. In *Journal of Economic Geography*, 6 (1), 9–44.

Papyrakis, E., Mo, P. (2014). Fractionalization, Polarization, and Economic Growth: Identifying the Transmission Channels. In *Economic Inquiry*, 52 (3), 1204–1218.

Parotta, P., Dario, P., Mariola P. (2010). Does Labour Diversity Affect Firm Productivity? In *ASB Working Paper No. 10 – 12.*

Perotti, R. (1996). Growth, Income Distribution, and Democracy: What the Data Say. In *Journal of Economic Growth*, 1 (2), 149–187.

Putnam, R. (1995). Bowling Alone: America's Declining Social Capital. In *Journal of Democracy*, 6 (1), 65–78.

Sokoloff, K., Engerman, S. (2000). History Lessons. Institutions, Factor Endowments, and Paths of Development in the New World. In *Journal of Economic Perspectives*, 14 (3), 217–232.

Sparber, C. (2010). Racial Diversity and Macroeconomic Productivity across US States and Cities. In *Regional Studies*, 44 (1), 71–85.

Культурная неоднородность и экономическое развитие в России

А.Н. Буфетова, А.А. Хржановская, Е.А. Коломак
Институт экономики и организации промышленного производства СО РАН
Российская Федерация, Новосибирск
Новосибирский национальный исследовательский государственный университет
Российская Федерация, Новосибирск

Аннотация. В статье исследуются изменения в национальной и религиозной структуре населения и оценивается влияние культурной неоднородности на экономическое развитие регионов России. Источниками информации о национальной структуре населения являются переписи 2002 и 2010 годов. Анализ неоднородности религиозной структуры проведен за 2012 и 2015 годы, источником данных являются Атлас религий и национальностей России и Федеральное агентство по делам национальностей. Уровень культурной гетерогенности оценивается с помощью индексов фракционализации и поляризации. Изучение этих характеристик показало, что, несмотря на усиление миграционных процессов в современной России, существенных изменений в культурной неоднородности населения не произошло. В то же время имеет место большое разнообразие национальных и религиозных структур в регионах. Влияние культурной неоднородности на экономическое развитие оценивается с помощью регрессионного анализа. Оценивалась панельная регрессия ВРП на труд, капитал, контролирующие переменные и индексы культурной неоднородности. Результаты показали: 1) положительное влияние этнокультурной фракционализации на экономическое развитие; 2) отсутствие статистически значимой связи между уровнем национальной поляризации и развитием; 3) негативное влияние религиозной поляризации на продуктивность. Полученные результаты свидетельствуют о необходимости учета культурной неоднородности общества в региональной политике и в управлении общественными финансами.

Ключевые слова: культурная неоднородность, регионы России, национальность, религия, эмпирический анализ, фракционалиация, поляризация, регрессия.

Статья выполнена при поддержке Российского фонда фундаментальных исследований, проект № 19-310-90010 «Этнокультурное разнообразие, экономическое развитие и проблемы управления в регионах России».

Научная специальность: 08.00.00 – экономические науки.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 464–476

DOI: 10.17516/1997-1370-0527
УДК 332.12:339.138

Approaches to Modelling Territorial Brand

Tatiana G. Butova[a], Irina V. Krotova[a], Evgeni[a] A. Demakova[a], Ekaterina Iu. Iakovleva[a] and Vasily N. Morgun[b]*

[a]*Siberian Federal University*
Krasnoyarsk, Russian Federation
[b]*State Regional Centre of Standardization, Metrology and Tests in Krasnoyarsk Krai, the Republic of Khakassia and the Republic of Tyva*
Krasnoyarsk, Russian Federation

Received 20.09.2019, received in revised form 21.11.2019, accepted 09.12.2019

Abstract. Strategic goals of stable development of territories of all levels at the expense of producing competitive goods and increase in export potential of regional producers, as well as the need to improve quality of life, have justified the necessity of using effective technologies for territory branding, which, in turn, requires theoretic solution of some scientific problems in terminological and instrumental areas of knowledge. Current problems of the regional branding as the branding of special areas have got less attention than national and regional branding, which has led to the lack of common concepts and continuation of terminological discussions, and also searching for universal model of the regional branding. Researches done by the specialists in this area have allowed us to know their views on the definition of the term "regional branding" in relation to the need to develop structural models of brands (different for different regions), to consider commodity brands as preferrable constituent parts of regional brands, to develop integrated model of consumer values which form preferences in selection of food products of well-known brands and brands of local producers. In the conclusion of the present work there is a list of problems to be solved in future studies through interdisciplinary approaches.

Keywords: regional brand, model of regional brand, models of consumer values, factors of models of consumer values, product preference criteria.

The project "Concept and Models of Product Branding of the Yeniseysk Siberia Macro-Region" was carried out with the support of the Krasnoyarsk Regional Science Fund.

Research area: economics.

* Corresponding author E-mail address: tgbutova@mail.ru
ORCID: 0000-0001-5037-5562 (Butova)

Citation: Butova, T.G., Krotova, I.V., Demakova, E.A., Iakovleva, E.Iu, Morgun, V.N. (2020). Approaches to modelling territorial brands. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 464-476. DOI: 10.17516/1997-1370-0527.

Introduction

As the analysis of publications shows, there is the great increase of attention of practitioners and researchers to the questions of area branding. While in the beginning of the 2000s territorial and regional branding were a completely new phenomenon for us (Guliaeva, 2011: 84-88), today the publication activity of practicing specialists and researchers, and also the rise in the number of Conceptions and government laws on creation of brands in the Russian regions illustrate the intensity of the process of developing territorial brands, which evolved from the fashionable trend of Russian regional politics (Pankrukhin, 2010) to an important strategic tool (Dubova, 2013: 43-48; Zenker, Jacobsen, 2015).

The incentive for the increased interest in the practice and the correspondent scientific justification of territorial branding was the aggravation of competition both between countries and between regions in developed countries not only for consumers, but also for investments, tourists, qualified staff, for holding sports, cultural and business events, so this competition penetrated through all spheres of the economy, culture, etc. (Anholt, 2007; Bazhenova, 2013; Rod'kin, 2018). The diversity of goals and problems of territorial branding have caused appearance of opponents of the competitive concept of special branding for different areas in Russia (Groshev, *Stepanycheva,* 2011) and abroad (Zenker, Jacobsen, 2015). They also reject those authors who go beyond the borders of competitive concept, considering the territorial brand as a tool for stable development of industries and territories (Butova et al., 2019; Dinni, 2013), improving the quality of life of local people to make population diversified, more qualified and satisfied (Dinni, 2013), and to ensure strong political influence in the country and abroad (Anholt, 2007), making people proud of their homeland (Dinni, 2013).

The strategic goals of stable development of the areas fostered the necessity of purposeful creating brands for certain areas or places. The analysis of publications in this sphere of research demonstrates that regional branding issues are paid less attention to than national and urban branding. This tendency is also noticed by foreign researchers (Zenker, Jacobsen, 2015). For instance, the author of the term "place branding", Simon Anholt, as well as other specialists of area branding, focus their studies on the problems of national (country) branding; the other well-known authors, such as Greg Clarke, concentrate on the problems of urban branding (Dinni, 2013).

At the same time, it is regions which are particularly important because they compete and collaborate both within and between countries, building so-called inter-regional brands (Zenker, Jacobsen, 2015; Guliaeva, 2011; Dubova, 2013). In addition, the countries' non-standard regionalization processes, leading to the emergence of new regional actors, need information and image support through their branding (Zenker, Jacobsen, 2015). Also, in Russia, the creation of new macro-regions (e.g., "Yeniseysk Siberia") or the restructuring of federal districts (e.g., the Far Eastern Federal District through the transfer of Buryatia and Zabaykalsky Krai), impose the need to create a "new" regional branding.

The relevance of regional branding in Russia is due to the need to patent trademarks of goods at their place of origin, and it has grown especially with the approval of the project "Export of APC products" in 2016. This project sets the order of use of regional sub-brands for export products of the Russian APC (*Passport of the priority project*, 2016).

Thus, the growing interest in the practice of regional branding both abroad and in Russia has conditioned the scientific justification of the basic categories. However, the complexity of this category has led to discussions on regional brand and branding, which still continue both in Russia and abroad.

Theoretical Framework

Analysis of Russian and foreign publications on the topic of the study showed that the dynamic scientific discussion does not result in the creation of common vocabulary, nor in the unified approaches to the conceptual apparatus of regional branding theory. As leading scientists admit, the theory of regional branding undergoes a process of improvement (Dinnie, 2013). In our opinion, there can be distinguished two vectors of development of theory that solve existing problems. First and foremost, in the field of conceptual apparatus. As the well-known scientist and practitioner P.E. Rod'kin rightly points out, the lack of a critical approach to the analysis of definitions of the concept "territorial brand", the interpretation of the brand of territories on the basis of one approach, professionally biased by the outside brand developers (Rod'kin, 2018), have culminated in contradictions among practitioners and theorists in defining the concepts of regional and territorial brands, in the emergence of a large number of synonymous terms, which, as a result, has spawned structural confusion as regards basic concepts. Hence, an interdisciplinary approach incorporating consumer behaviour theories, integrated marketing communications, cognitive theories, prevail as a conceptual basis for research on the basic concepts of territorial branding theory. We propose to define the essence of the concept "regional brand" basically within the theory of regional economy.

We take the use of approaches to modelling a regional brand as adaptive to the characteristics of the regions (territorial subjects), as the second direction of improving the theory of regional branding. An analysis of publications on the topic of modelling brands of different territories – national, regional, urban brands, revealed scientists' attempts to create a universal model of a territorial brand, which, in our opinion, is an unrealistic task due to the complexity of the structure of target stakeholders. Therefore, the proposals of some authors on the application of the network approach in modelling the brands of territories and regions are seen as breakthrough (Dinni, 2013, Zenker, Jacobsen, 2015). Let us note one more problem: most authors use the models of reputable Western scientists and practitioners to present their own concept of modelling brands of territories or regions without taking an advantage of an approach adaptive to the level of territorial subject; rather they simply replicate the same unified models, as it happens with the model of a territorial brand – hexagon introduced by S. Anholt, which is offered as universal for different regions, too. Meanwhile, the attempts of the authors of the present article to create a model of agricultural production for the Krasnoyarsk Krai based on the S. Anholt hexagon did not lead to any success, so the original model was built (Butova et al., 2019).

Statement of the Problem and Methods

Solving the problems of updating the practice of the regional branding is rooted in solving theoretical problems, e.g., of unanimous definition of the essence of a regional brand and its models. Understanding the content and structure of the concept of "regional brand" depends on understanding and describing its functional purpose, while determining regional brand models will allow the regional branding process to be successful, resulting not only in intensified regional competitiveness but also in the implementation of the strategic goals of sustainable development.

Having completed theoretical studies in the field of terminology and models of regional brands based on a comparative analysis of factors determining food selection criteria, we propose an integrated model of consumer values when choosing food products. The proposed model was tested on the studies of buyers' behaviour concerning the choice of food products by the method of a representative survey. The sample consisted of Krasnoyarsk buyers who bought food in the supermarkets of the retail chains *Krasny Yar* and *Komandor*. Consumer survey data were processed using the IBM SPSS Statistics program. To adapt and optimize the market supply of regional producers to consumer preferences, we created factor models of preference criteria for 3 age groups: aged 18-25; aged 26-45; aged 46-65. The significance of each of the preference criteria was calculated for 6 consumer groups differentiated

by sex and age: young men and women (aged 18-25); adult men and women (aged 26-45); senior men and women (aged 46-65).

Research findings and discussion

Theoretical substantiation of the concepts of "regional brand" and "regional branding" has not only scientific but also practical significance for the subjects of branding. The absence of a legal definition of these concepts in the Russian law gives free rein to scientists and practitioners to independently define and describe their essence at times without any scientific substantiation, which multiplies the number of definitions and, consequently, terminological discussions. As a result, this allows brand developers to use their own or borrowed concepts, convenient for customers, without worrying about the outcome, camouflaged by "convincing" pseudoscientific concepts. On the other hand, the legal definition of this concept is subject to serious responsibility and scientific justification, as introduction of federal and regional legislative acts will be carried out on the basis of well-defined concepts, which will revive the scientific discussion on the theory of regional branding and the problem of improving approaches to their modelling. Joining the discussion of this scientific problem, the authors were trying not only to identify methodological problems, but also to formulate their own point of view to validate the conducted research.

Desk research in the form of analysis of Russian and foreign scientific publications and documents, such as, for example, the "Concept of promotion of national and regional brands of goods and services of domestic production for 2007-2008" and the project "Export of agricultural and industrial complex products", showed that the definition of the concept of a regional brand, on the one hand, is made on the basis of differentiated approaches to the definition of the core essence, but either in terms of communication (Khandamova, 2013) and psychological models (Guliaeva, 2011), or on the basis of the value approach (Vazhenina, 2011). There is an approach that separates the concepts of "regional brand" and "brand of regions" (Bazhenova, 2013).

On the other hand, there is such an approach to the definition of the regional brand that does not take its territorial nature into account and instead rests on the adoption of the concepts of corporate or commodity brands (Bazhenova, 2013; Groshev, 2013). Many foreign researchers draw the parallel between the brand of territories, including regions, and the brand of corporations, as noted by K. Dinni (Dinni, 2013), while others use the concepts of territorial and regional brand as synonymous (Zenker, 2015).

Supporting the mentioned researchers' view of the regional brand as a complicated and complex phenomenon (Dinni, 2013; Zenker, 2015), we propose to view its definition as regards the cross-functional approach, applying the theory of regional economy to describing the essence of the region as a complex multi-level social, economic and natural system, besides, we took advantage of the theory of marketing, in particular, marketing communications and consumer behaviour, to describe the brand as a marketing tool. From the standpoint of the cross-functional approach, we take the definition of the concept of regional brands as instruments of regional marketing aimed at attracting investment and human resources, as well as brands of goods and services located in a particular geographical area. This strategy is prescribed by the "Concept of promotion of national and regional brands of goods and services of domestic production for 2007-2008" (Subjects of the Russian Federation, 2019), reflecting the essence of regional brands to a greater extent than others.

The regional brand is a multidimensional concept with a complicated network structure (Dinni, 2013; Zenker, 2015). The structure or content of the regional brand should be displayed through the models based on a network approach. Analysis of publications on this topic has shown that many authors are trying to create a universal regional brand model. For example, the authors cite as the only one the territorial brand model, hexagon introduced by Simon Anholt, which consists of such components as tourism; export brands; politics; business and investment; culture and people (Anholt, 2007: 26); and they do not adapt this model to dif-

ferent regions. In our opinion, this model has limited applicability for different types of areas, including regions. Supporting Dinni's point of view that owing to the huge difference between stakeholders and target audiences (from tourists to corporations) the development of a single model of the territorial brand is not only impossible, but also useless (Dinni, 2013: 156), the authors offer to develop models of regional brand components as network structures of the brand (Butova et al., 2019). In our opinion, regional brand models should be tailored to the geographical, natural, economic and social peculiarities of the regions.

The second important issue requiring scientific justification arises from the use of the brand as a marketing tool in the implementation of regional development strategies. Such definitions of the regional brand as a set of enduring values, which reflect the unique original consumer characteristics of the region and community and which are in steady consumer demand (Dubova, 2013), or the territorial brand as a symbolic conception designed to create "additional meanings" or such values of territories that identify territories and bring associations (Esch et al., 2006), are unlikely to be used in practical programs of regional development.

The definition of the concept of the regional brand and its models should be based on the understanding that its structural components exist in tangible and intangible "dimensions" (Rod'kin, 2018: 28). In our opinion, the practical application of regional brands is possible only with the clearly defined goals, which, in turn, enables identifying the main structural components of the brand as the "carriers" of tangible assets. In the light of the goals of regional branding (inter alia, building loyalty to the region) for various target groups, we can single out its main goal, which is to ensure the satisfaction of the population with living, studying and working conditions in the region. This satisfaction primarily determines sustainable economic, social, cultural and environmental development of the region. Citizens' wealth is not only economic benefits. In addition to obtaining economic and social benefits, people face the challenges of technocratic life. In order to attract and retain valuable people and ensure their long-term attachment to the region, the tasks of improving the quality of life in the region must be solved (Dinni, 2013). According to several authors, this is mainly ensured by healthy and high-quality nutrition. Therefore, the creation and support of goods of local manufacturers that can transform into regional brands (Demakova, 2019) becomes an important task for regional authorities and manufacturers. As a consequence, the search for the basic component of a regional brand should be done predominantly in the field of product branding, including service branding. In connection with this approach, the regional brand is defined as a complex of objects of tangible and intangible nature, providing stable association in the minds of consumers between certain goods and their production in the region (Subjects of the Russian Federation, 2019).

More and more often product branding is seen as an important branding tool. (Krotova, 2018: 192-195). That being said, modelling the product component of a regional brand based on the theory of consumer behaviour is a central task for other network components of the regional brand.

In the process of ensuring the strategic goal of stable development of the regions, the urgent task is to develop and maintain a regional market for goods of local producers, especially in the market for food products of daily demand (Demakova, 2019). In this segment, there are certain problems and challenges in the field of regional branding. In the context of this article, we single out the main one – the need to develop regional product brands within the framework of national branding (Kavaratzis, 2005) based on the interactions of regional authorities, manufacturers, retail chains and the public (Stoklasa, Starzyczna, 2016).

Creating a product brand that can become regional with an emphasis on the place of production should be centered on trust, therefore, first of all, on the quality of products felt by consumers (Tajik et al., 2016). So, it is crucial to consider models of product brand taking into consideration an interdisciplinary approach. For example, it is essential to implement a marketing strategy for entering the market and promoting a regional product brand, it is advis-

able to analyze not only competitive conditions using market methods, but also the characteristics of the target segment; consumer behaviour, respectively with the view to a psychological approach to the analysis of consumer perception of food products (Atilgan et al., 2005).

At the regional level, the problem of quality management in the process of branding regional products arises from different approaches to the interpretation of the criteria that shape and measure the product quality perceived by consumers. This problem leads to the decreased effectiveness of support measures introduced by regional authorities for local producers (Belskikh, 2014); the specific needs of the population of certain regions for products with special nutritional and biological value remain unknown and therefore unsatisfied (Demakova, 2019); the unique resource potential of the regions is not fulfilled and, as a result, local production does not expand, and the regions are far from sustainable development (Versan, 2019).

To resolve aforementioned problems it is imperative to analyse the theoretical concepts of consumer perception of product quality in order to identify its determining factors and specify criteria that characterize certain aspects of perceived quality relevant for brand management.

It has been proved that the effectiveness of regional branding is set by the concurrence of real consumer values and the values declared by the product brand (Repina, 2013). To ensure such concurrence in practice various authors recommend different theoretical models:

1. Model of common consumer values, which is based on preference criteria when choosing food products;

2. Model of local values of consumers, which is based on preference criteria when choosing food products of local production;

3. Model of information sources motivating the consumer choice of food products of local manufacturers.

From our point of view, the value of such differentiated models can increase if they will be integrated into one model which allows one to become aware of the motives and criteria for consumer choice in certain conditions of a particular region, as a result of which the interests of branded products manufacturers (Morgun, Sekatskii, 2017) and regional management bodies will coincide and facilitate creation of regional branding based on product branding (Cleave, 2016). And this will give rise to the increased customer satisfaction.

The practical implication of such an integrated model of consumer behaviour for regional branding will be reached only in the case of a statistically substantiated relationship between individual criteria and the factors that determine them, and also if there is a statistically proven significance of the criteria for groups united by certain factors (Spreng, 1996). Our analysis of publications on the creation of consumer behaviour models when choosing food products revealed the following groups of factors:

1. "Quality assessment by consumers", which is a set of characteristics of goods that a consumer can independently evaluate by organoleptic methods. The assessment is formed via

a) comparing consumer expectations based on individual preferences, experience of using analog products (Keller, 2008), actual feelings of contact with the product (Spreng, Mackoy, 1996) as well as expectations influenced by public opinion, advertising and other sources regarding what the individual characteristics of the product should be (Hsieh, Li, 2008);

2. "Promised quality", which is a set of feelings that the consumer develops on the back of the manufacturer's or distributor's description of the characteristics of the goods measured by instrumental methods, that is, not available for independent measurement by the consumer (Zhuang et al., 2007);

3. "Reliability of quality", which is a set of feelings that the consumer develops by virtue of personal experience in using the product (Atilgan et al., 2005), information from authoritative independent experts, testing centres and laboratories (Versan, 2018) from sources that cause a high degree of trust in the consumer, such as friends, relatives, etc. (Chiou, Droge, 2006).

The results of the focus group conducted during the study showed that the availability

of food purchases within the walking distance, the availability of the shops of all types, excepting pavilions, and the relevant cost of products made by local manufacturers are as important as all other factors. Therefore, the "product availability" factor, proposed by the authors, can also be a basis of consumers' commitment to a particular product brand, albeit it is not the part of the structure (Cronin et al., 2000). This gives reason to the authors to include this factor in the integrated model of consumer values, namely in the structure of preferences in choosing food products from local producers (Fig. 1).

The creation of the integrated model was preceded by the definition of preference criteria in choosing a food product. These criteria should reflect the product's tangible and intangible characteristics and be suitable for quantitative evaluation of different aspects of consumer perception of quality. The choice of criteria and their grouping by determining factors was based on content analysis found in scientific publications (Keller, 2008; Rybakov et al., 2017; Chiou, Droge, 2006; Spreng, Mackoy, 1996; Chebat, Michon, 2003), besides, it was backed up by group discussions in the field of quality evaluation of food products among the specialists of the State Regional Centre of Standardization, Metrology and Tests in the Krasnoyarsk Krai, Republic of Khakassia and Republic of Tyva.

For testing the integrated model of the structure of consumer preferences in choosing food products of local manufacturers there was

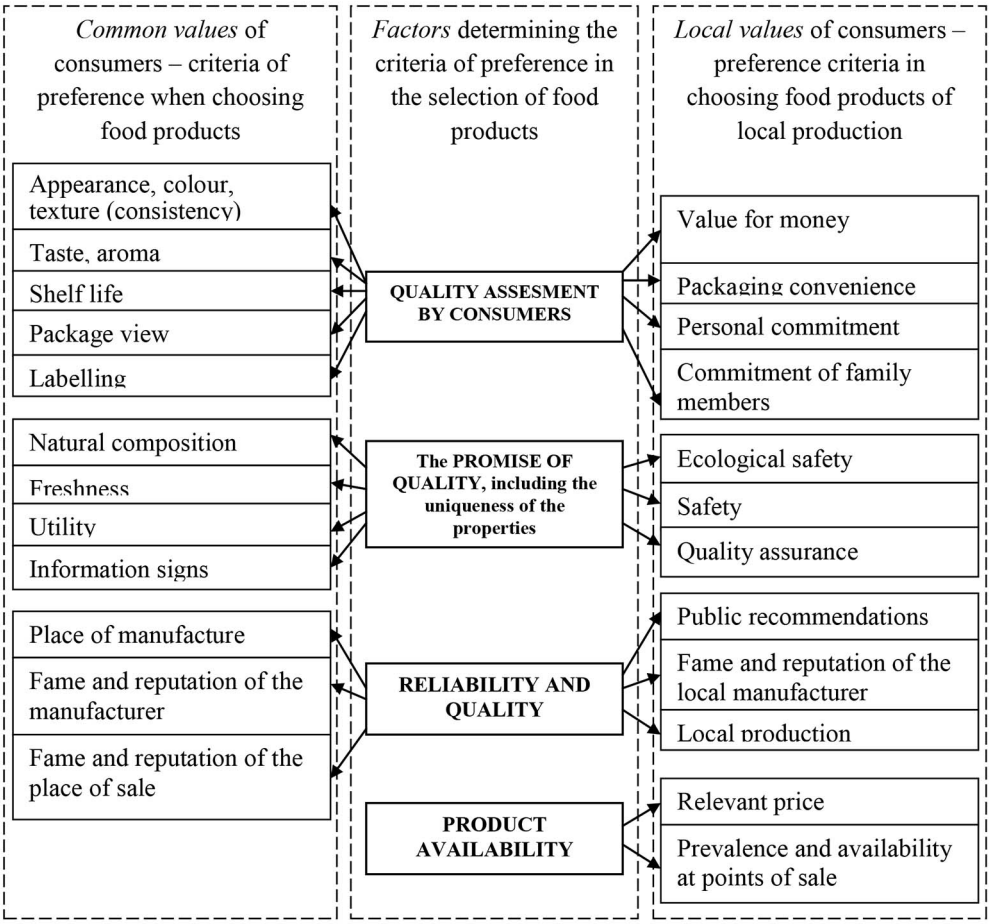

Fig. 1. Integrated model of consumer preferences structure characterizing the choice of food products from local producers

conducted a marketing research in the form of a survey of 283 consumers who purchase food in supermarkets of two large retail chains Krasny Yar and Komandor in Krasnoyarsk. The testing was done to identify the significance of preference.

Respondents were asked questions with open answers and they called the criteria that are important for them when choosing products from 13 product groups, the list of which was justified by their inclusion in the consumer basket (Federal Law, 2017): bread, pasta, potatoes, vegetables, berries, confectionery, meat products, fish products, dairy products, eggs, vegetable oil, flour, herbal tea.

Processing of consumer survey data has been made by software IBM SPSS Statistics.

As it has been mentioned before, importance of each preference criterion has been counted differentially for 6 segmented per gender and age consumer groups, with the application of A. Nasledov's method (Nasledov, 2004). There was made an analysis of the number of every criterion mentions by each consumer in all product groups with experts counting the average value for each gender and age group. As a result, the importance of preference criterion in our experiment corresponds to average percentage of products specific for each gender-age consumer group (in per cent of all 13 product groups). The products were chosen on the basis of this criterion of preference.

The results prove our hypothesis about differentiation of criterion relevance in consumer product choice for different gender-age groups.

As an example, you can see the indicators typical of a group of young men (aged 18-25) (Fig. 2) and a group of men aged 25-45 (Fig. 3).

The present study relies on comparison of the significance of the preference criteria determined by three factors. Now we can name the leading individual criteria in all age and gender groups. The results obtained allow us to set the goal of constructing a factor model of preference criteria, which will optimize the impact of the quality of goods by local manufacturers on the consumer perception to justify their branding.

Conclusion

The theoretical substantiation of the concept of "regional branding" is not only scientif-

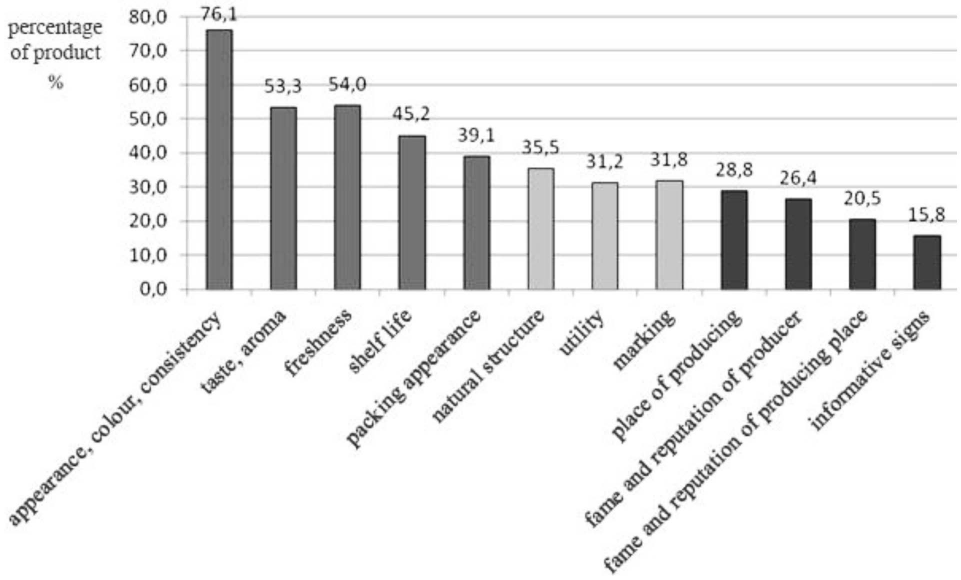

Fig. 2. Percentage of products, bought by young men (aged18-25 years), based on preference criteria grouped as:

Criteria "quality assessment by consumers"
Criteria "promised quality"
Criteria "quality reliability"

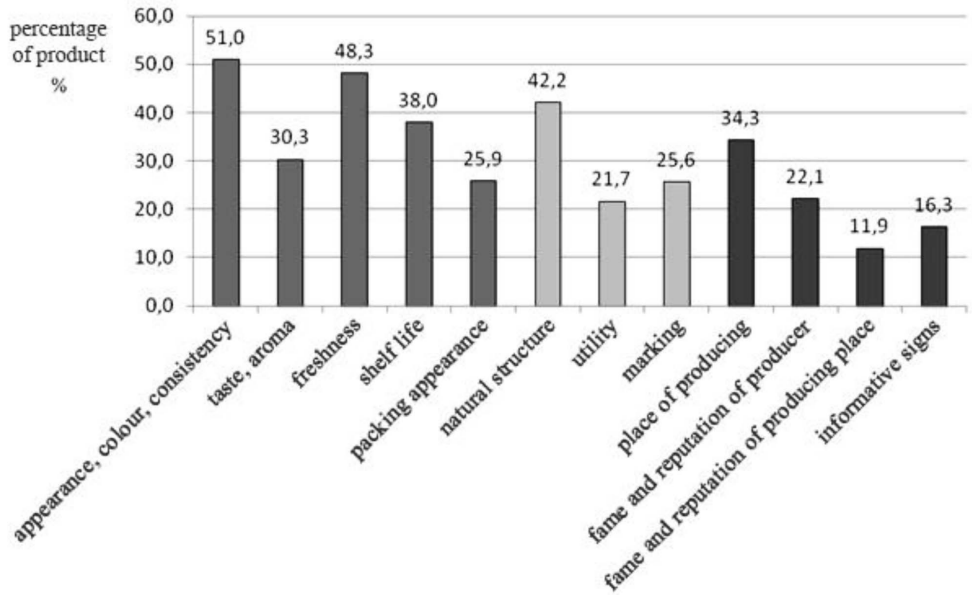

Fig. 3. Percentage of products, bought by men (aged 26-45 years), based on preference criteria grouped as

Criteria "quality assessment by consumers"
Criteria "promised quality"
Criteria "quality reliability"

ically meaningful, but also practical for regional authorities for the creation of the Concepts of regional branding. The regional branding 1) provides developers of regional brands and branding with regional models relevant to the characteristics of the region; 2) enables manufacturers of goods to integrate product brands into the umbrella brand of the region.

The problems identified in the research consist of the co-existence of differentiated approaches to the definition of the "regional brand", that do not distinguish between a corporation and a region, between the concepts of a territorial brand and a brand of a city, moreover, they require theoretical justification for the formation of legal documents regulating the process of branding regions in Russia.

The search for a universal model of territorial brands coupled with the multidimensionality of brands and the diversity of territorial types seems unrealizable and meaningless. This necessitates the creation of theoretical models of regional brands based on scientifically justified criteria.

The goal setting of regional brands, which lies in prioritizing the satisfaction of the region's population with the quality of life, made it possible to substantiate a product brand as the basic structural component of the regional brand. The theoretical justification for integrating product brands into regional branding and practical measures for using regional brands in the implementation of regional spatial development strategies shall lead to the creation of models of common and local consumer values that shall comply with the needs and preferences of consumers when the latter make a decision to buy well-known brands and brands of local manufacturers. The lack of scientific works devoted to detailing the phenomenon of "product quality perceived by consumer" calls for the development of new methods as part of an interdisciplinary approach.

References

Anholt, S. (2007). *Competitive Identity: The New Brand Management for Nations.* New York: Palgrave Macmillan, Cities and Regions, 147 p.

Atilgan, E., Aksoy, S. and Akinci, S. (2005). Determinants of the brand equity: A verification approach in the beverage industry in Turkey. In *Marketing intelligence & planning,* 23(3), 237-248.

Bazhenova, E.Yu. (2013). Brend territorii: soderzhanie, modeli formirovaniia, praktika konstruirovaniia v rossiyskikh regionakh [Brand territory: content of forming model, construction practices in Russian regions]. In *Prostranstvo ekonomiki* [*Terra Economicus*]*,* 11, 3 (2), 120-125.

Belskikh, I.E. (2014). Regional'nye brendy: spetsifika razvitiia v Rossii [Regional brands: specifics of development in Russia]. In *Regional'naia ekonomika: teoriia i praktika* [*Regional economy: theory and practice*], 20 (347), 2-7.

Butova, T.G., Bukharova, E.B., Morgun, V.N., Pantyukhov, I.V., Shmeleva, Zh.N. (2019). *The issues of territorial branding of agricultural products in modern conditions* [*Problemy territorial'nogo brendinga sel'skokhoziaistvennoi produktsii v sovremennykh usloviiakh*]. AGRITECH IOP. Conf. Series: Earth and Environmental Science 315 022097 IOP Publishing. doi:10.1088/1755-1315/315/2/022097.

Chebat, J.C. & Michon, R. (2003). Impact of ambient odors on mall shoppers' emotions, cognition, and spending: a test of competitive causal theories. In *Journal of Business Research*, 56, 529–539.

Chiou, J.S. & Droge, C. (2006). Service quality, trust, specific asset investment, and expertise: direct and ındirect effects in a satisfaction-loyalty framework. In *Journal of the Academy of Marketing Science*, 34, 613-627.

Cleave, E., Arku, G., Sadler, R., Gilliland, J. (2016). The role of place branding in local and regional economic development: bridging the gap between policy and practicality. In *Regional Studies, Regional Science*, 3, 1, 207-228.

Cronin, J.J., Brady, M., Hult, G. (2000). Assessing the effects of quality, value and customer satisfaction on consumer behavior intentions in service environments. In *Journal of Retailing*, 76 (2), 193-218.

Demakova, E.A. et al. (2019). System approach to the creation of Siberian brands on the example of adaptogenic drinks from local plant materials. In *IOP Conf. Ser.: Earth Environ. Sci.* 315 022070 DOI: 10.1088/1755-1315/315/2/022070.

Demakova, E.A., Krotova, I.V., Morgun, V.N., Kashin, S.N. (2019). Modelirovanie regional'nogo Brenda produktov pitaniia podtverzhdennogo kachestva [Modeling of regional branding of food products of confirmed quality]. In *Materialy 2-i nauchno-prakticheskoi konferentsii "Regional'nye rynki potrebitel'skikh tovarov: kachestvo, ekologichnost', otvetstvennost' biznesa"* [*Regional markets of consumer goods: quality, environmental friendliness, business responsibility: proceedings of the II Russian scientific and practical conference*]. Krasnoyarsk: Siberian Federal University, 257-261.

Dinnie, K. (2013). *Branding territories. The best world practices*. Moscow: Mann, Ivanov and Ferber, 336.

Dubova, Iu.I. (2013). Konkurentnosposobnost' regiona [Competitiveness of the region. Marketing in Russia and abroad]. *In Marketing v Rossii i za rubezhom [Marketing in Russia and abroad],* 5, 43-48.

Esch, F.-R., Langner, T., Schmitt, B.H., Geus, P. (2006). Are brands forever? How brand knowledge and relationships affect current and future purchases. In *Journal of Product & Brand Management,* 15(2), 98-105.

Groshev, I.V., Stepanycheva, E.V. (2011). Instrumenty formirovaniia brenda territorii [Instruments of territorial brand creation]. In Marketing v Rossii i za rubezhom [Marketing in Russia and abroad], 5, 24-29.

Guliaeva, M.K. (2011). Brend regiona: mif ili ral'nost'? [Brand of the region: myth or realit?]. In *Vestnik KGU im. N.A. Nekrasova* [*Bulletin of KSU named after N.A. Nekrasov*], 4, 84-88.

Hsieh, A.-T., Li, C.-K. (2008). The moderating effect of brand image on public relations perception and customer loyalty. In *Marketing intelligence & planning,* 26(1), 26-42.

Kapferer, J.N. (2007). *Brend navsegda: sozdanie, razvitie, podderzhka tsennosti Brenda* [*The New Strategic Brand Management: Creating and Sustaining Brand Equity Long Term*]. Moscow: "Vershina", 448 p.

Kavaratzis, M. (2005). Place branding: a review of trends and conceptual models. In *The Marketing Review*, 5, 329–342.

Keller, K.L. (2008). Strategic Brand Management: Building, measuring, and managing brand equity. In *Prentice Hall, third edition*.

Khandamova, E.F., Shchepakin, M.B., & Tesheva, A.N. (2013). O razrabotke kommunikatsionnoi modeli brenda v sisteme marketinga [On the development of brand communication model in the marketing system]. In *Ekonomika i predprinimatel'stvo* [*Economy and entrepreneurship*], 6, 584-588.

Krotova, I., Demakova E., Kashin, S., Zrazhevskaia, I. (2018). Obosnovanie napravlenii regional'nogo brendinga po rezul'tatam izucheniia potrebitel'skikh predpochtenii [Justification of regional branding directions based on the results of consumer preferences study]. In *Problemy identifikatsii, kachestva i konkurentnosposobnosti potrebitel'skikh tovarov: Sb. statei 6 Mezhdunarodnoi konf. Kurs* [*Problems of identification, quality and competitiveness of consumer goods: collection of articles of the 6th International Conf., Course*], 192-195.

Morgun, V.N., Sekatskii, V.S. (2017). Rol' standartizatsii v kommertsializatsii rezul'tatov nauchno-tekhnicheskoi deiatel'nosti [The role of standardization in the commercialization of the results of scientific and technical activities]. In *Standarty i kachestvo* [*Standards and quality*], 12, 16-20.

Nasledov, A.D. (2004). *Matematicheskie metody psikhologicheskogo issledovaniia. Analiz i interpretatsiia dannykh* [*Mathematical methods of psychological research. Analysis and interpretation of data*]. Saint-Petersburg, "Rech"", 392 p.

Pankrukhin, A.P. (2010). *Marketing Territorii rossiiskikh regionov: litsa, obrazy i pozitsii* [*Marketing of Russian regions: faces, images and positions*], available at: http://www.ludidela.ru/articles/508516/ (accessed 15 September 2019).

Passport of the priority project "Export of products of the priority project 'Export of products of agriculcural and industrial complex", available at: https://legalacts.ru/doc/pasport-prioritetnogo-proekta-eksport-produktsii-apk-utv-prezidiumom-soveta/ (accessed 2 marth 2019).

Repina, A.V. (2013). Razrabotka kontseptsii brend-marketinga, orientirovannogo na tsennosti [Development of the concept of value-oriented brand marketing]. In *Abstract of Thesis for Candidate of Economical Sciences.* St. Petersburg, St. Petersburg State University of Economics, 18 p.

Rod'kin, R.E. (2018). Brending territorii: k probleme reprezentatsii i brend-identifikatsii [Territory branding: on the problem of representation and brand identification]. In *Sovremennye problemy servisa i turizma* [*Modern problems of service and tourism*], 4, 12, 25-33.

Rybakov, G.R., Krotova, I.N., Demakova, E.A. (2017). *Sistemnyi podkhod v upravlenii assortimentom i kachestvom produktsii: monografiia* [*System approach to product range and quality management: a monograph*]. Krasnoyarsk, Siberian Federal University, 236 p.

Spreng, R.A. & Mackoy, R.D. (1996). An empirical examination of a model of perceived service quality and satisfaction. In *Journal of retailing*, 72(2), 201-214.

Stoklasa, M., Starzyczna, H. (2016). Regional Brand Benefits for Companies – Comparison of 2013 and 2015/6. In *Klímová, V., Žítek, V. (eds.) 19th International Colloquium on Regional Sciences. Conference Proceedings.* Brno: Masarykova univerzita, 210-217

Sub'ekty RF stali udeliat' bol'she vnimaniia prodvizheniiu regional'nykh brendov [*The Subjects of the Russian Federation began to pay more attention to the promotion of regional brands*] (2019). available at: https://rupto.ru/ru/news/sovet-federacii-subekty-rf-stali-udelyat-bolshe-vnimaniya-prodvizheniyu-regionalnyh-brendov (Accessed 20 March 2019).

Tajik, A., Gharibi, J., Nategh, T. (2016). Studying indicators related to factor of customers' perception of quality from brand equity and their ranking in the bank of industry and mine. In *J Fundam Appl Sci.,* 8(3S), 1499-1520.

Vazhenina, I.S. (2011). O sushchnosti brenda territorii [On the essence of the territory brand]. In *Ekonomika regiona* [*Regional economy*], 3, 18-23.

Versan, V.G. (2018). Kotrafakt i fal'sifikatsiia: kak pobedim? [Counterfeit and falsification: how will we win?], In *Standarty i kachestvo* [*Standards and quality*], 2, 64-69.

Versan, V.G. (2019). Kachestvo i rabotosposobnost' ekonomicheskoi modeli [Quality and efficiency of the economic model]. In *Standarty i kachestvo* [*Standards and quality*], 1, 72-78.

Walsh, G., Shiu, E., Hassan, L.M., Michaelido, N., Beatty, S.E. (2010), Emotions, store-environmental cues, store-choice criteria, and marketing outcomes. In *Journal of Business Research*, 64(7), 737-744.

Wong, A., Sohal, A. (2003). Service quality and customer loyalty perspectives on two levels of retail relationships. In *Journal of services marketing,* 17(5), 495-513.

Zenker, S., Jacobsen, B.P. (2015). *Editors Inter-Regional Place Branding. Best Practices, Challenges and Solutions.* Switzerland, Springer International Publishing, 184 p.

Zhuang, H., Savage, E., Kays, S.E., & Himmelsbach, D.S. (2007). A survey of the quality of six retail brands of boneless, skinless chicken breast fillets obtained from retail supermarkets in the Athens, Georgia area. In *Journal of Food Quality*, 30, 1068–1082.

Подходы к моделированию территориальных брендов

Т.Г. Бутова[а], И.В. Кротова[а], Е.А. Демакова[а], Е.Ю. Яковлева[а], В.Н. Моргун[б]
[а]Сибирский федеральный университет
Российская Федерация, Красноярск
[б]Государственный региональный центр стандартизации, метрологии и испытаний в Красноярском крае, Республике Хакасия и Республике Тыва
Российская Федерация, Красноярск

Аннотация. Стратегические цели обеспечения устойчивого развития территорий всех уровней за счет производства конкурентоспособных товаров и роста экспортного потенциала региональных производителей, а также обеспечения качества жизни населения актуализировали необходимость использования эффективных технологий брендинга территорий, что требует теоретического решения ряда научных проблем в терминологической и инструментальной области знаний. Между тем вопросам регионального брендинга как брендинга особенных территорий уделяется меньше внимания, чем национальному и городскому брендингу, что привело к отсутствию общепринятых понятий и продолжению терминологических дискуссий, а также к поиску универсальной модели регионального бренда. Проводимые авторами в данной области исследования позволили обозначить свою позицию по определению понятия «региональный бренд» по отношению к необходимости разработки дифференцированных к особенностям регионов структурных моделей брендов, к определению товарных брендов как приоритетных базовых компонентов региональных брендов, к разработке интегрированной модели ценностей потребителей, формирующих предпочтения при выборе пищевых продуктов известных брендов и брендов местных производителей, а также предоставили возможность сформулировать проблемы для решения в будущих исследованиях на основе междисциплинарных подходов.

Ключевые слова: региональный бренд, модель регионального бренда, модели ценностей потребителей, факторы моделей ценности потребителей, критерии предпочтительности выбора продуктов.

Проект «Концепция и модели товарного брендирования макрорегиона «Енисейская Сибирь» был реализован при поддержке Красноярского краевого фонда науки.

Научная специальность: 08.00.00 – экономические науки.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 477–486

DOI: 10.17516/1997-1370-0583
УДК 332.146.2

The Role of a Region in the Implementation of Innovative Projects for Non-Defence High-Technology Production

Iurii V. Erygin*[a] and Elena V. Borisova[b]
[a]*Reshetnev Siberian State University of Science and Technology*
Krasnoyarsk, Russian Federation
[b]*Joint Stock Company "Krasnoyarsk Machine Building Plant"*
Krasnoyarsk, Russian Federation

Received 14.11.2019, received in revised form 03.03.2020, accepted 10.04.2020

Abstract. The article discusses the problems of involving the innovative potential of enterprises of the military-industrial complex in the implementation of innovative projects for the non-defence high-technology production, as well as determining the role and place of the regional innovation infrastructure in their implementation. The aim of the study is to justify the role of a region in the implementation of innovative projects for the non-defence high-technology production, to determine features and formulate requirements for the development of the regional innovation infrastructure that provides support for these innovative projects based on the interaction of the regional innovation system enterprises with the military-industrial complex and infrastructure facilities at the national and international levels. As a result of the study, the authors highlighted the most important areas of interaction between the enterprises of the military-industrial complex and the region's innovative infrastructure facilities (raising funds, promoting high-tech civilian products to national and international markets, etc.) and formulated the requirements for its formation. The results of the study can be used in managing the innovative development of the regions where high-tech enterprises of the military-industrial complex are located.

Keywords: military-industrial complex, innovative infrastructure of a region, innovative projects for the non-defence high-technology production, interaction.

Research area: innovation management.

Citation: Erygin, Iu.V., Borisova, E.V. (2020). The role of a region in the implementation of innovative projects for non-defence high-technology production. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 477-486. DOI: 10.17516/1997-1370-0583.

* Corresponding author E-mail address: yuri_erygin@mail.ru, borisovaev2015@mail.ru
ORCID: 0000-0002-0609-1412 (Erygin); 0000-0001-5137-6882 (Borisova)

Introduction

At present, high-tech enterprises of the military-industrial complex with a significant innovative potential play a leading role in the country's innovative development and are able to ensure both national security and the solution of the tasks set by the Government of the Russian Federation to increase the share of non-defence high-technology products to 50% by 2030 (Message from the President…, 2016), thereby developing their innovative and economic potential.

Given the current trends and conditions of innovative development, the effective use of the existing innovative potential of the enterprises of the military-industrial complex (MIC) in the non-defence high-technology production can become the main one for its functioning in order to ensure the country's defence capability, increase stability and efficiency of the economy, both of the MIC enterprises and the economy of the regions where these enterprises are located, which determines the relevance of the study.

Theoretical framework

The theoretical basis of the study is the works of foreign and Russian scientists on the problems of the formation and development of regional innovation systems, including the innovative infrastructure, as well as the innovative development of the MIC enterprises and the use of their innovative potential in the production of the non-defence high-technology products.

The requirements formulated in the article for the formation of the innovative infrastructure of a region develop the existing theoretical ideas about its structure, which are set forth in the works of D.D. Dorzhieva (Dorzhieva, 2009: 9), A.A. Vishniakov (Vishniakov, Shikhverdiev, 2008: 33), L.G. Elkina (Elkina, 2015: 96-97), N.N. Maksimov (Maksimov, 2013: 345), M.V. Rakhova (Rakhova, 2009: 290-291), P.A. Shikhverdiev (Vishniakov, Shikhverdiev, 2008: 33) and others, and serve as the basis for the development of a new conceptual approach to the formation of the innovative infrastructure of a region, providing support for the production and sales of the non-defence high-technology products.

Statement of the problem

The issues of formation of the innovative infrastructure in a region, which provide conditions for the development of non-defence high-technology products in a region and the integration of the MIC enterprises in the market economy, are still insufficiently developed, which justifies the need for the development of theoretical principles and methodological tools for building an innovative infrastructure in a region taking into account the specifics of production and sales of the non-defence high-technology products.

Methods

The study used general scientific research methods, including survey methods, system and comparative analysis, which allowed to ensure the relevancy of the results and conclusions of the study.

Discussion

In the course of the study, in order to assess the possibility of increasing the share of non-defence high-technology products, the authors analysed the high-tech enterprises of the leading MIC enterprises and the level of innovative development of the regions where they are located. Indicators of the level of innovative development of the regions where the high-tech MIC enterprises (corporations) are located are presented in Table 1.

The results of the analysis of the data in Table 1 indicate a slight effect of the production of non-defence high-technology products of MIC enterprises on the level of innovative development of regions. Along with this, the values of the regions' export shares and high-tech products indicate the presence of the export potential of high-tech products manufactured by the MIC enterprises and, as a rule, its insignificant share in the region's exports.

The conclusion is supported by the results of the correlation analysis, which showed that the share of the high-tech products export and the region's export share are negatively correlated (the correlation coefficient is mi-

Table 1. Indicators of the level of innovative development of the regions where the high-tech MIC enterprises (corporations) are located

Corporation	Type of non-defence high-technology products	Regions where corporations are located	Level (rating) of innovative development of regions where corporations are located (Reiting innovatsionnykh…,2019)	Index of sufficiency of innovative infrastructure for high-tech business (Zemtsov, 2019)	Share of the region's exports (export quota)1, %	Share of exports of high-tech MIC products in the region's export2, %
Rostec State Corporation	aeronautical equipment; unmanned aerial vehicles; electric cars; laser measuring and information systems; medical equipment; innovative vaccines, etc.	Saint-Petersburg	1	0.26-0.51	20-40	11.49
		Moscow	3	0.07-0.13	More than 40	2.98
		Republic of Tatarstan	2	0.26-0.51	20-40	2.79
		Voronezh Region	17	0.07-0.13	5-10	7.01
		Samara Region	10	0.07-0.13	10-20	10.89
		Kaluga region	7	0.26-0.51	5-10	27.89
		Sverdlovsk region	14	0.07-0.13	10-20	16.12
		Perm Territory	18	0.07-0.13	20-40	4.09
		Novosibirsk Region	6	0.26-0.51	5-10	27.41
		Omsk Region	38	0.07-0.13	1-5	13.41
Rosatom State Corporation	modern technologies for modelling complex technical systems; remote computing technologies; polymer composite materials; medical equipment. etc.	Moscow	3	0.07-0.13	More than 40	2.98
		Chelyabinsk Region	22	0.07-0.13	10-20	12.0
		Sverdlovsk Region	14	0.07-0.13	10-20	16.12
		Tver Region	43	0.01-0.06	1-5	23.33
		Perm Territory	18	0.07-0.13	20-40	4.09
		Tomsk Region	4	0.26-0.51	1-5	12.50
		Krasnoyarsk Territory	20	0.01-0.06	10-20	1.16
Roscosmos State Corporation	small spacecraft; earth remote sensing devices; satellite communication systems; geographic information and navigation services systems	Moscow	3	0.07-0.13	More than 40	2.98
		Saint-Petersburg	1	0.26-0.51	20-40	11.49
		Samara Region	10	0.07-0.13	10-20	10.89
		Voronezh Region	17	0.07-0.13	5-10	7.01
		Chelyabinsk Region	22	0.07-0.13	10-20	12.0
		Sverdlovsk Region	14	0.07-0.13	10-20	16.12
		Tver Region	43	0.01-0.06	1-5	23.33
		Tomsk Region	4	0.26-0.51	1-5	12.50
		Krasnoyarsk Territory	20	0.01-0.06	10-20	1.16

Note: 1 – calculated according to: (State statistics, 2019); 2 – calculated according to: (State statistics, 2019).

nus 0.59), and that the index of sufficiency of the region with an innovative infrastructure for the development of high-tech business has a weak effect on the export share of high-tech products of the MIC enterprises (correlation coefficient is 0.31).

The conclusion is also confirmed by the results of a survey conducted during a study among 59 organizations, including enterprises of Roscosmos State Corporation, innovative infrastructure facilities and development institutions.

As shown by the results of the survey, in half of the surveyed enterprises the share of innovative non-defence products does not exceed 10% in the total volume of production, as for the other half of the respondents – it does not exceed 5%.

According to the defence industry enterprises, by 2025, an additional increase in the share of innovative non-defence products, including high-tech products, can raise from 10% to 25% (Fig. 1), which will increase the value of this indicator to 20–35% at 38% planned by the Government of the Russian Federation in 2025 and 39.2% in 2027 (Decree of the Government, 2019).

Deviation of the expected level of the share of the innovative non-defence products from the planned one is caused, first of all, by the underdevelopment of certain competencies of the MIC enterprises for the implementation of the full innovation cycle for the production of the high-tech non-defence products (attracting financing, promoting these products to national and international markets, etc.), as well as by the lack of financial and non-financial support for the MIC enterprises, as subjects of large high-tech business, by the institutes of development and the innovation infrastructure facilities existing in the regions.

The most popular type of support for the MIC enterprises provided by the innovation infrastructure facilities and development institutions is non-financial support (98% of enterprises surveyed) (Fig. 2).

According to the results of the survey, the following are of great importance for the development of production of high-tech non-defence products of the MIC enterprises: the promotion of innovative products in national markets, as well as the stimulation of demand for innovative products and services (Fig. 3).

Thus, the results of the survey allow us to confirm the lack of existing support measures for the MIC enterprises, as subjects of a large high-tech business. When the MIC enterprises turned to innovation infrastructure facilities and development institutions for non-financial support, they received a 97% negative result (Fig. 4), which confirms the need to expand the possibilities of using the existing types of support for innovation infrastructure facilities and development institutions of the MIC enterprises as subjects of a large high-tech business.

The survey also made it possible to rank the objects of innovative infrastructure and development institutions in terms of the demand for their services by the MIC enterprises. Priorities are given to issues of commercialization, certification, licensing, export of manufactured high-tech non-defence products, etc. (Fig. 5)

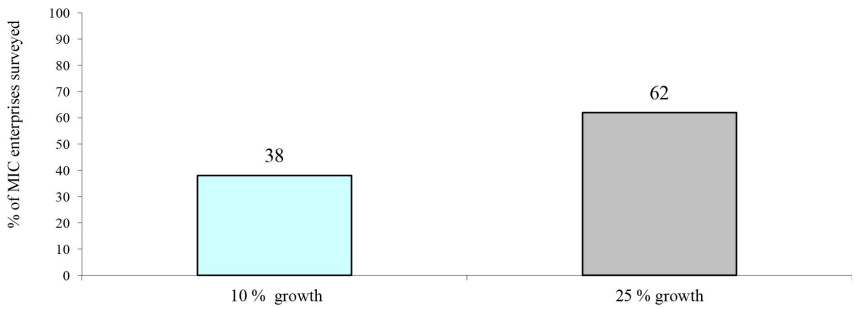

Fig. 1. Possible additional increase in the share of non-defence high-technology products in total production by 2025, % of enterprises surveyed

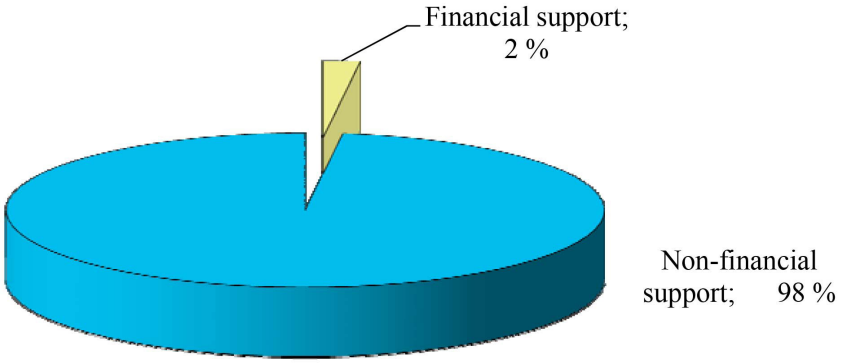

Fig. 2. The importance of types of support for the MIC enterprises, % of enterprises surveyed

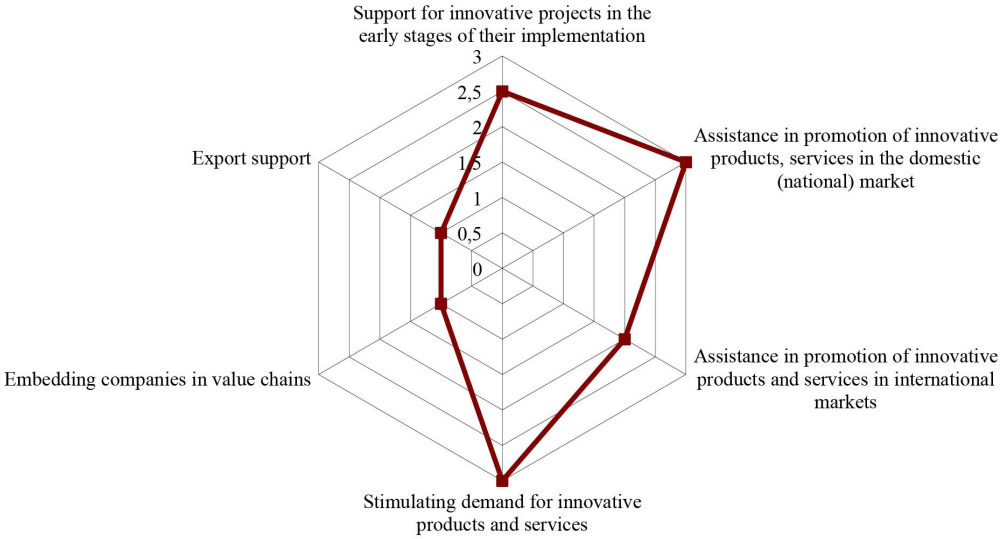

Fig. 3. The importance of types of non-financial support for innovative infrastructure and development institutions for the MIC enterprises.
Note: significance from 1 to 3, where 1 is low; 2 – average; 3 – high

The survey also revealed that the MIC enterprises, in the framework of the production of high-tech non-defence products, attach great importance to expanding cooperation in certain types of high-tech products and services with industry development institutions, innovative entities and innovative enterprises of related types of economic activity not included in the existing regional innovation infrastructure (Fig. 6).

The difficulty in expanding the cooperation between the MIC enterprises and various subjects of innovative activity is caused by the inaccessibility for the MIC enterprises as subjects of a large high-tech business, most of the financial and non-financial support measures provided by development institutions and innovative infrastructure subjects due to the predominant orientation of their activities towards supporting small and medium-sized enterprises.

A survey of regional subjects of innovation infrastructure, development institutions and other subjects of innovative activity confirms their predominant focus on supporting small and medium-sized enterprises.

At the same time, according to estimates of the surveyed subjects of innovation infrastructure, development institutions and other

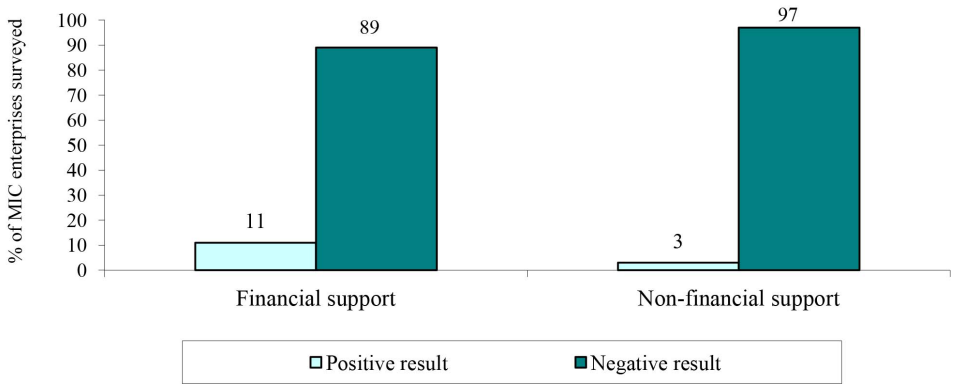

Fig. 4. The results of the appeal of the MIC enterprises to the subjects of innovation infrastructure and development institutions for support, % of enterprises surveyed

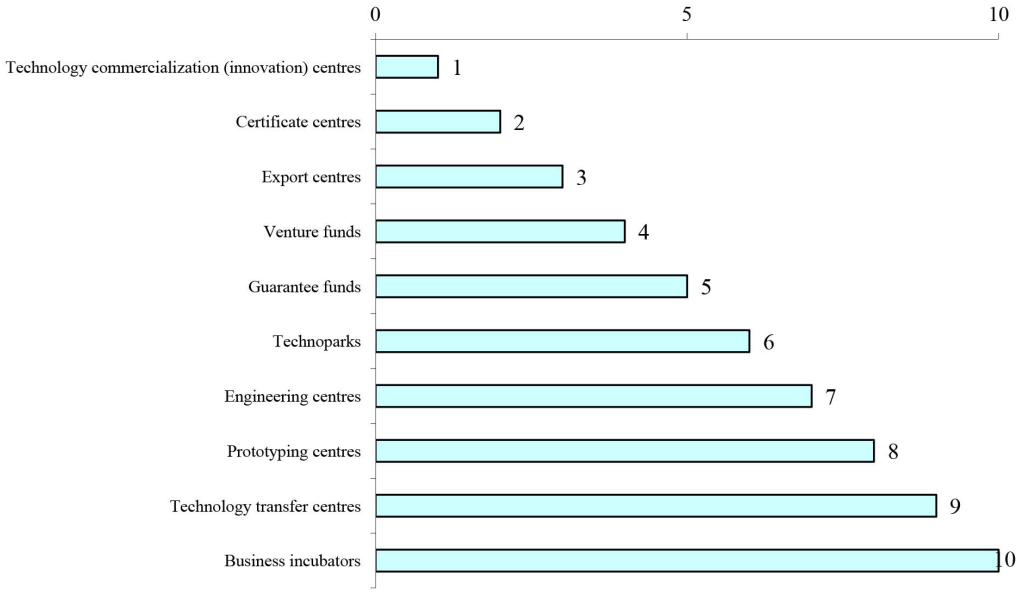

Fig. 5. Ranking of innovation infrastructure facilities by significance for the MIC enterprises.
Note: significance is from 1 to 10, where 1 is the most important, 10 is the least important subject of innovation infrastructure

subjects of innovative activity, including entities supporting the infrastructure of small and medium-sized enterprises, by 2025 the share of innovative products in the total gross regional product may increase to 20-35% (Fig. 7) due to the build-up of high-tech non-defence products by the MIC enterprises.

Herewith, subjects of small and medium-sized innovative entrepreneurship also confirm the possibility of developing their cooperation with the MIC enterprises in the framework of the production of certain types of high-tech non-defence products and services (Fig. 8) (75% of the respondents).

Conclusion / Results

Thus, the solution of the task set by the Government of the Russian Federation to in-

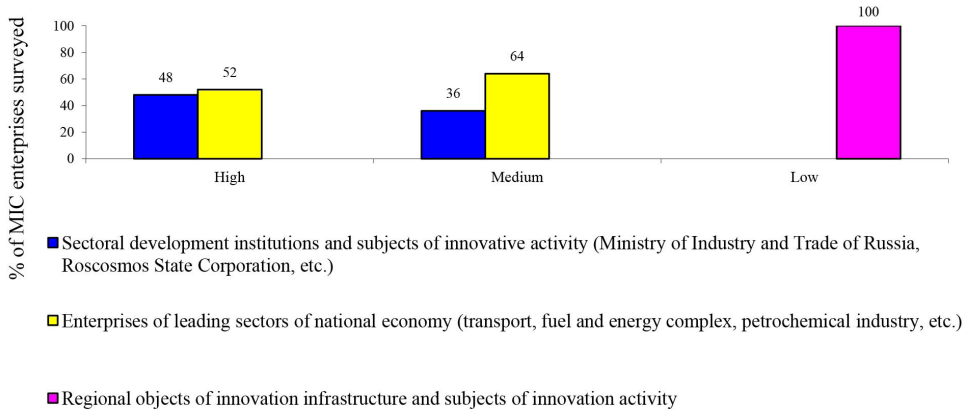

Fig. 6. The importance of expanding the cooperation of the MIC enterprises with subjects of innovative activity, % of enterprises surveyed

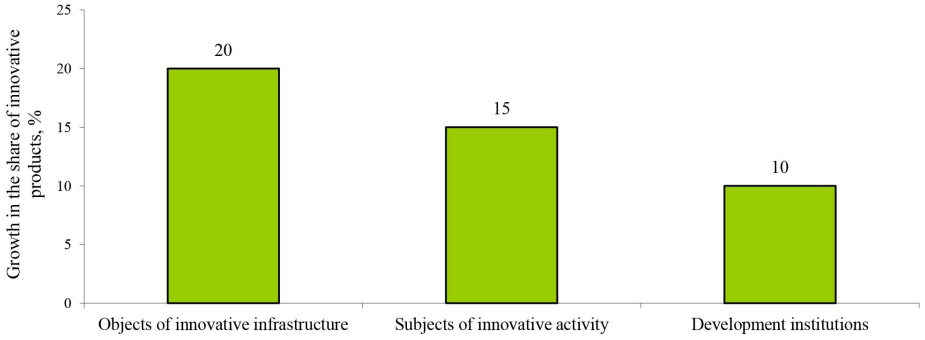

Fig. 7. Additional increase in the share of innovative products in the total gross regional product by 2025 due to innovations in large business (including the MIC enterprises), %.
Note: Infrastructure entities supporting small and medium-sized enterprises answered "it is hard to say"

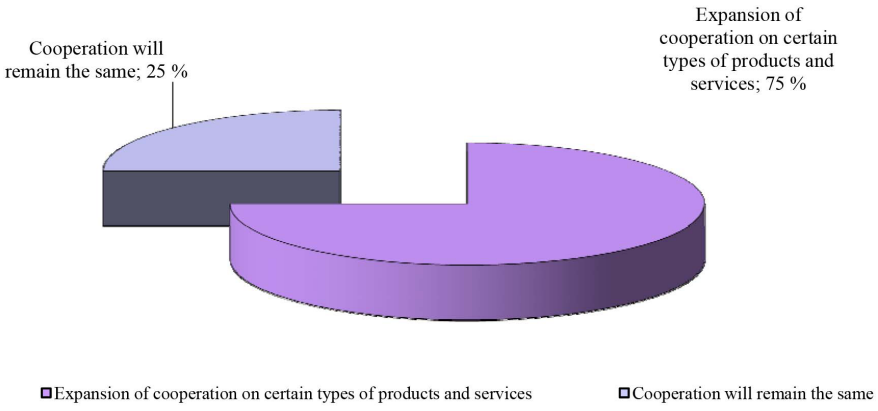

Fig. 8. The possibility of developing cooperation between small and medium-sized enterprises with the MIC enterprises in the framework of the production of high-tech non-defence products, services, % of enterprises surveyed

crease the share of high-tech non-defence products of the MIC enterprises is of great importance for the development of the economy of the regions where these enterprises are located. The results of the survey indicate that there is a significant growth potential for the share of high-tech non-defence products of the MIC enterprises (as large business entities) in the total gross regional product.

Increasing the production of high-tech non-defence products of the MIC enterprises determines the need to involve in the implementation of innovative projects related to the production of these products, both subjects of innovative activity in the region, primarily innovation infrastructure facilities, and the innovative potential of the MIC enterprises in order to realize the full innovation cycle of production of the high-tech non-defence products, which, of course, leads to the need to build interaction of subjects of the regional innovation system with enterprises of the defence industry and infrastructure projects of national and international levels in the implementation of some innovative projects of high-tech non-defence products.

The need to implement the full innovation cycle of the production of high-tech non-defence products increases the role of the regional innovation infrastructure in solving the problem, as a determining factor in the development of production of high-tech non-defence products, and allows us to formulate requirements for the formation of the innovative infrastructure in the region, which take into account the need to involve the innovative potential of large MIC enterprises in the innovative activity of the region and provisions:

- compliance of the types of activities and functions of the innovation infrastructure facilities with the necessary competencies, ensuring the implementation of the full innovation cycle;
- organization of effective interaction of subjects of innovative activity at the regional, national and international levels in the implementation of innovative projects on the basis of partnership and responsibility;
- provision of targeted state support to all subjects of innovative activity – participants in the implementation of the full innovation cycle of production of high-tech non-defence products, subject to maximizing their commercial and budgetary effectiveness, as well as state incentives;
- possibility of increasing the number of participants in the implementation of an innovation project who have the status of an innovation infrastructure facility on an ongoing basis through the additional involvement of other innovation entities acquiring a temporary status as an innovation infrastructure facility (for the period of the innovation project implementation).

The implementation of the formulated requirements determines the need to develop a new conceptual approach to the formation of the innovative infrastructure of the region, which is the subject of further research.

References

Decree of the Government of the Russian Federation of February 6, 2019 No. 85-6 "On Amending the State Program of the Russian Federation" Development of the Military-Industrial Complex." Available at: http://www.consultant.ru/document/cons_doc_LAW_317786/a317f928f87598e0c39e3c6a836d5aee-7ac45460/ (accessed 21 August, 2019).

Dorzhieva, D.D. (2009). *Innovation infrastructure as a factor in the socio-economic development of the region: dissertation abstract PhD in Economics*. 22 p.

Elkina, L.G. (2015). *Metodologicheskie osnovy formirovaniia i razvitiia innovatsionnoi infrastruktury regiona* [*Methodological foundations of the formation and development of the innovation infrastructure of the region*]. Moscow. Bashkir State University,160 p.

Maksimov, N.N. (2013). Osnovnye printsipy i zadachi innovatsionnoi deiatel'nosti organizatsii v sovremennykh usloviiakh [Basic principles and tasks of the innovative activity of organizations in modern conditions]. In *Molodoi uchenyi* [*Young scientist*], (10), 344-347.

Message from the President to the Federal Assembly (2016). Available at: http://www.consultant.ru/document/cons_doc_LAW_207978/ (accessed 20 March, 2019).

Rakhova, M.V. (2009). Printsipy formirovaniia innovatsionnoi infrastruktury regiona [Principles of the formation of the innovative infrastructure of the region]. In *Ekonomika obrazovaniia* [*Economics of Education*], (3), Part 2, 283-291.

Reiting innovatsionnykh regionov Rossii [Rating of innovative regions of Russia] (2019). In *Assotsiatsiia innovatsionnykh regionov Rossii* [*Association of innovative regions of Russia*], 55 p.

Russian export center (2019). Available at: http://regionstat.exportcenter.ru/ (accessed 18 December, 2019).

State statistics (2019). Available at: https://www.fedstat.ru/indicator/ (accessed 21 December, 2019).

Vishniakov, A.A., Shikhverdiev, P.A. (2008). Problemy sozdaniia innovatsionnoi infrastruktury v severnom regione (na primere Respubliki Komi) [Problems of creating innovative infrastructure in the northern region (case of the Komi Republic)]. In *Korporativnoe upravlenie i innovatsionnoe razvitie Severa: Vestnik Nauchno-issledovatel'skogo tsentra korporativnogo prava, upravleniia i venchurnogo investirovaniia Syktyvkarskogo gosudarstvennogo universiteta* [*Corporate governance and innovative development of the North: Bulletin of the Research Center for Corporate Law, Management and venture capital investment Syktyvkar State University*], (4), 25-35.

Zemtsov, S.P. (2019). Natsional'nyi doklad "Vysokotekhnologichnyi biznes v regionakh Rossii" [National report "High-tech business in the regions of Russia"] In *ANKhIGS, AIRR* [*Russian Presidential Academy of National Economy and Public Administration, Association of Innovative Regions of Russia*], (2), 108 p.

Роль региона в реализации инновационных проектов производства высокотехнологичной гражданской продукции

Ю.В. Ерыгин[а], Е.В. Борисова[б]
[а]Сибирский государственный университет науки и технологий имени академика М.Ф. Решетнева
Российская Федерация, Красноярск
[б]АО «Красноярский машиностроительный завод»
Российская Федерация, Красноярск

Аннотация. В статье рассматриваются проблемы вовлечения инновационного потенциала предприятий оборонно-промышленного комплекса в реализацию инновационных проектов производства высокотехнологичной гражданской продукции, а также определения роли и места региональной инновационной инфраструктуры в их реализации. Целью проводимого исследования является обоснование роли региона в реализации инновационных проектов производства высокотехнологичной гражданской продукции, определении особенностей и формулировании требований к развитию региональной инновационной инфраструктуры, обеспечивающей поддержку данных инновационных проектов на основе взаимодействия объектов региональной инновационной системы с предприятиями оборонно-промышленного комплекса и инфраструктурными объектами национального и международного уровней. В результате исследования авторами выделены наиболее важные сферы взаимодействия предприятий оборонно-промышленного комплекса с объектами инновационной инфраструктуры региона (привлечение финансирования, продвижение высокотехнологичной гражданской продукции на национальный и международные рынки и др.) и сформулированы требования к ее формированию. Результаты исследования могут быть использованы в управлении инновационным развитием регионов размещения высокотехнологичных предприятий оборонно-промышленного комплекса.

Ключевые слова: оборонно-промышленный комплекс, инновационная инфраструктура региона, инновационные проекты производства высокотехнологичной гражданской продукции, взаимодействие.

Научная специальность: 08.00.05 – инновационный менеджмент.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 487–495

DOI: 10.17516/1997-1370-0592
УДК 330.341.2

Institutional Reforms of the Waste Management in the Russian Federation

Tatiana O. Tagaeva* and Vadim M. Gil'mundinov
Novosibirsk State University
Novosibirsk, Russian Federation
Institute of Economics and Industrial Engineering of SB RAS
Novosibirsk, Russian Federation

Received 08.11.2019, received in revised form 03.03.2020, accepted 13.04.2020

Abstract. The current status of protection of the natural water and atmospheric resources is assessed as negative, without clear improving tendencies but with a stable pro-cyclical character. Unfortunately, the same cannot be said about the management of production and consumption waste. Even in the stagnation periods, the volume of generated and accumulated waste continues growing. In the year 2018, the first indicator doubled compared to the year 2005. Thus, the urgency of the research is augmented by the unfavourable ecological situation in Russia. The objective of the paper is to develop methodological approaches to the analysis and forecasting of the situation. The objective determined the following targets: to study the current state of the environment regarding the handling of waste, to develop premises to forecast generation and accumulation of waste, to assess the ecological load for the nearest future. Despite the active efforts to reform the waste management system undertaken since 2014, the Russian legislation is imperfect and contradictory in this aspect, not capable of stimulating the processing of waste. The principal contradictions of the ongoing reforms are considered in this paper.

Keywords: generation and accumulation of production and consumption waste, municipal solid waste, recycling, utilization and deactivation of waste, environmental legislation.

This paper presents the results of the research financed under the plan of Scientific research of IEIE SB RAS, project XI.170.1.1. "Innovative and ecological aspects of structural transformation of the Russian economy in conditions of new geopolitical reality", No. AAAA-A17-117022250127-8.

Research area: economics and national economy management (economics of environmental management).

Citation: Tagaeva, T.O., Gil'mundinov, V.M. (2020). Institutional reforms of the waste management in the Russian Federation. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 487-495. DOI: 10.17516/1997-1370-0592.

* Corresponding author E-mail address: tagaeva@ieie.nsc.ru, gilmundinov@mail.ru
ORCID: 0000-0002-9467-6436 (Tagaeva); 0000-0002-1991-0114 (Gil'mundinov)

Introduction

Despite the economic stagnation, the ecological situation in the Russian Federation remains rather dramatic. As far as the protection of the natural water and atmospheric resources is concerned, there is some positive dynamics (according to Rosstat (Russian Statistics Committee), the annual discharge of contaminated sewage waters fell by 26% and discharge of air pollutants dropped by 10% over the period from 2005 to 2018). This is attributed to the crisis-related phenomena in the economy and some legislative restrictions. At the same time, current waste management has brought the ecological situation to a critical level. According to the Russian Public Report on Environmental Protection for 2018, by the end of 2017, the total amount of accumulated and registered production and consumption waste in the country reached about 31.5 billion tons, and 40.7 billion tons (29% more) by the end of 2018. The volume of waste generation is growing year after year. In 2017, it was 6220.6 while in 2018 it counted 7266.1 million tons (17% more, see Fig.1). Waste is one of the reasons why natural biochemical cycles are breaking down. The wastes occupy vast territories for storage, produce dangerous toxic elements and dust, and discharge pollutants into the atmosphere, soil, into the ground and underground waters. Regulating these flows is vital to protect the human habitat. The actual waste disposal situation in Russia is the same as that of some developed countries in the early nineties. The average level of waste processing in the world is 85–90%, while in the RF it is still below 60%. The level of the municipal solid waste (MSW) processing is even worse. According to Rosstat, the share that goes to processing (waste processing and waste-burning enterprises) does not exceed 10%, whereas in the developed countries it reaches 90%. In the RF, over 90% of MSW is buried.

Problem statement. The waste management reform appears to have started with the adoption of the Federal Law No. 458-FZ of 29.12.2014 "On amendments to the Federal Law No. 89-FZ of 24.06.98 'About production and consumption waste' and some legislative acts". However, many articles of the Law have not been properly formulated or specified, which in turn required a new law, FZ of 31.12.2017 No. 503-FZ "On amendments to the Federal Law 'About production and consumption waste'". In September 2019, the Ministry of Natural Resources and Environment of the Russian Federation published a draft federal law "On amendments to the Federal Law 'About production and consumption waste'".

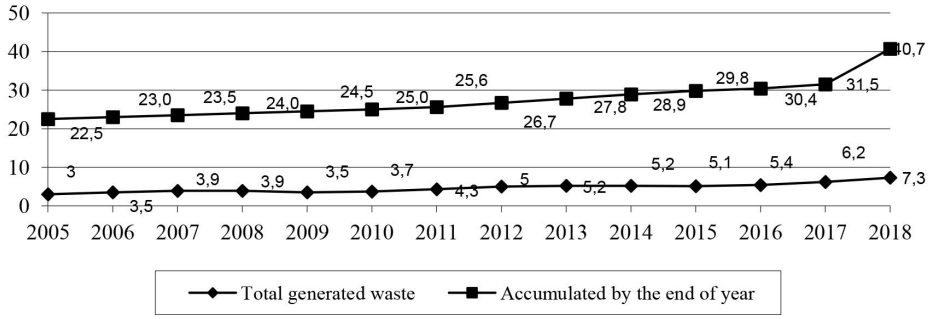

Fig. 1. Dynamics of generation and accumulation of production and consumption waste (bln tons). The source: based on Rosstat data

Besides the principal waste management laws, the legislation has recently adopted several important program documents. In 2018, the Strategy to develop industrial processing, utilization and decontamination of production and consumption waste was approved for the

period till 2030[1]. The Strategy is planned to be implemented in two stages: the first lasting from 2018 to 2021 and the second, from 2022 to 2030. The first stage includes such measures as laying down the required technological and industrial capacity, comprehensive spatial development and design of the location of the enterprises for processing, utilization and decontamination of waste, establishing an equipment certification centre and enforcement of the regulatory norms. The same stage envisages implementing pilot projects of industrial technical facilities for the processing, utilization and decontamination of waste, multi-functional complexes for industrial decontamination and regional eco-techno-parks. The second stage starting in 2022 includes the operation of Russian scientific, technological and industrial infrastructure incorporating hi-tech equipment and machinery for processing, utilization, decontamination of waste and manufacture of products out of salvaged raw materials.

However, besides the successful scenario of Strategy implementation (the Innovative scenario), the document leaves a margin for a possible Conservative scenario (preservation of the current trends, factors, parameters and conditions of environmental protection, operation of the existing industrial basis for processing, utilization and decontamination of waste without infrastructure development). This aspect appears rather strange, as it implies that the Strategy developers assume its possible failure from the very beginning.

Among the principal goals of the Innovative scenario, we see the following: to raise the share of the utilized and decontaminated waste in the total volume of generated waste from 59.6% in 2016 to 86% in 2030; to raise the share of MSW sent in processing in the total volume of generated waste from 8.9% in 2016 to 80% in 2030; to reduce waste generation by 3.7% in 2030 versus 2016.

[1] *Strategiia razvitiia promyshlennosti po obrabotke, utilizatsii i obezvrezhivaniiu otkhodov proizvodstva i potrebleniia na period do 2030 g.* [*The Industry Development Strategy for Treatment, Recycling and Disposal of Production and Consumption Waste*] (2018). Available at: http://static.government.ru/media/files/y8PMkQGZLfbY7jhn6QMruaKoferAowzJ.pdf (accessed 5 February 2020).

The authors set themselves the task of modelling the results of Strategy targets implementation with the help of the forecast of the environmental and economic development of the Russian Federation until 2030.

Methods

By the present moment, environmental protection has accumulated a certain practice of applied forecast modelling. It has been proven that the most suitable method for describing the environmental protection processes is the input-output tables representing reproduction of natural resources, laying out the input and output values. In the 1960-s, U. Ayres, A. Knees and H. Daly, the first authors of the mathematical models describing the relations between ecology and economy, faced the impossibility of implementing such models in practice due to the lack of necessary information (Ayres, Knees, 1969; Daly, 1968). The problem was partially resolved by W. Isard, who tried to find a solution for a similar model and made a significant contribution into its database structure in 1972 (Isard, 1972).

In the years 1970-1973, the father of more sophisticated models of this class, V. Leontief, built an input-output model better suited for practical implementation, with due regard to the environmental protection sector (Leontief, Ford, 1972). The model is based on the recognition of the possibility and necessity to include waste treatment measures (anti-pollution facilities) in the input-output structure. The later works of V. Leontief present more general input-output tables that include processes of treatment of polluting substances as well as the use of the primary natural resources and utilized pollutants by the end consumers.

Leontief-type modelling schemes are widely used by numerous economists in forecasting economic development of countries with due regard to pollution of the environment. Some dynamic input-output models that included environmental protection costs were presented in the works by J. Tsukui and Y. Murakany (Tsukui, Murakany, 1977), based on the regional and national input-outputs of NO_x, SO_x and solid waste values. There are examples

of some recent researches in the same sphere (Nansai et al., 2009; Bouwmeester et al., 2010; Marin, 2010). However, the above models are often theoretical and focus on the ecological problems of particular regions. Other than that, little attention is paid to input-output methods when describing problems of generation and accumulation of production and consumption waste.

To carry out our research, we used a dynamic input-output model (DIOM) with an ecological block, developed by the Institute of Economics and Industrial Engineering of SB RAS. The proposed approach is distinguished with the capacity of forecasting volumes of generation, elimination and distribution in the environment of all types of pollutants including production and consumption waste. Besides, the model is adapted to real statistical data provided by Rosstat. A detailed description of the model is put forward in (Gil'mundinov et al., 2011). The forecast calculations for DIOM were based on the following principal hypotheses of the RF economic development over the period till 2030: high oil prices (around $70 per barrel of Brent), low exchange rate volatility, growing monetary policy efficiency (lower interest rate), successful import replacement policy, low inflation rate (about 5% p.a.), growing labour productivity. All of these assumptions will ensure the average annual GDP growth rate over the forecast period at the level of 3-4%.

Results

Calculations within the ecological block of the DIOM demonstrated that raising the share of used and decontaminated waste to 86% by 2030 (under the Innovative scenario of the Strategy) allows reduction of accumulated waste growth rate by the end of the year by over six times (from 6.8% in 2018 to 1.1% in 2030, and 5.3% in 2030 under the Conservative scenario). Thus, according to the calculations, the overall volume of accumulated production and consumption waste will not decrease (as could be expected by 2030 after implementation of the Strategy), but the growth rate will be lower. The results of the forecast calculations are represented in Fig. 2.

Discussion

The authors do not consider the Innovative scenario truly innovative (the volume of accumulated waste will continue growing, though at a slower pace). The current state of legislation is not favourable employing such a scenario, requiring working mechanisms for reducing the waste generation capacity of manufacturing processes and increased waste utilization.

Notwithstanding a considerably improved conceptual framework, restructured federal, regional and local waste management authorities, corrected waste management requirements and some other measures, there are many "blank spots" appearing in the ecological legislation. Current legislation still has some flaws concerning waste management, and there are some worth pointing out.

1) We see that the legislative acts that do not contain any specific mechanisms of the fulfilment of the set tasks remain unfeasible.

According to the Federal Law No. 458-FZ of 29.12.2014, all constituent entities of the RF

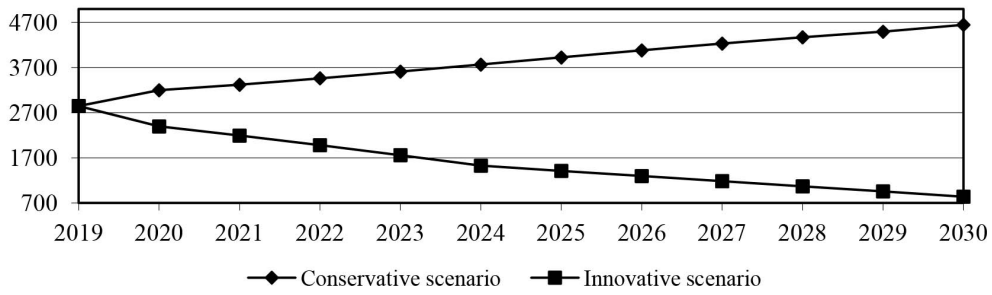

Fig. 2. Forecast dynamics of the waste accumulation annual growth, million tons.
Source: forecast calculation results

were required to adopt a territorial waste management scheme, to identify regional waste management operators and to approve the relevant tariffs for the services of such regional operators by the beginning of 2017. Accumulation, transportation, processing, decontamination, burial in the territory of a constituent entity of the RF had to be assured by the regional operators under the regional waste management program and the territorial scheme. The regional operator needed to sign an agreement with the municipal authorities. In their turn, the solid waste owners had to conclude an MSW management agreement with the regional operator whose territory comprises the municipal solid waste and the places for the accumulation of such.

So, that was the suggested transparent arrangement of MSW management. However, due to some complications that sprang up at the regional level, the date of transition to the new formula shifted to 1 January 2019, while the conditions for conclusion of agreements with de facto operators were seriously modified. This allowed granting the regional operator status to other entities without tenders, therefore creating ample opportunities for public servants to misuse their powers. Registration of uncertified dumps without due control as well as the use of such by the regional operators was also permitted. These circumstances froze the construction of new waste treatment facilities, undermining the investment attractiveness of the industry. Corporations got the right to refuse to make contracts with a regional operator if they had a waste storage site of their own.

The proposed arrangements are dangerous because of the monopoly position of the regional operators they may objectively acquire, as such selection eliminates any competition in the MSW handling. One may thus expect considerable risks for independent companies dealing with sorting and advanced processing of waste. This is likely to undermine the incentives for more efficient processing and burial of MSW, as the costs may be transferred directly to the end consumers. As everyone knows, since the 1st of January 2019, removal and processing of the household wastes has become a separate public service item included in the housing and utility services list, which caused the rise in the waste removal fees.

There are also no mechanisms to encourage the regional operators to observe the decree of the RF Government No. 1589-r of 25.07.2017, which approves the list of production and consumption waste types containing useful components and prohibited to bury. Prohibition of burials is introduced in stages for the years 2018-2021. Compliance with the Decree requires transiting to separate waste collection which is expected only in 2024, and which, in its turn, requires large investments into equipment, as education and enlightenment measures alone would not be sufficient.

As could be expected, most regions are developing the advanced MSW processing and ecological responsibility slowly, as it requires evaluation of the potential and prospects of development with due regard to the ongoing changes and the regional specificity.

By the end of the first quarter of 2018, only 18 regional entities selected 32 regional operators, which started actual operation in five regions only (Babich, 2018: 25). By the beginning of 2019, waste management programs were adopted in 60 regions and territorial schemes were approved in all constituent entities of the RF, but this is not that simple. Thus, in September 2018, the Supreme Court of the Republic of Tatarstan sustained a claim of environmentalists against the adopted territorial scheme. The decision of the Supreme Court overturned the key parts of the document, such as norms of accumulation, flows and conditions of separate MSW collection, location and development of the waste treatment infrastructure (waste burner construction and bottom ash waste range arrangement). Without the above-mentioned parts, the territorial scheme cannot normally function and shall be recognized as non-operational. This is a situation when the Republic appointed the regional operators but they cannot commence their operation due to the invalidity of the territorial scheme. Similar problems occurred in other regions, such as the Transbaikal Territory, the Krasnoyarsk Territory, the Republic of Buryatia, and the Novosibirsk

Oblast[2]. As the regions are poorly prepared for the reform, the deadline for its launch is said to be delayed in several constituent entities that have not managed to complete the preparatory actions; the deadline is put off to January 1, 2020, and to January 1, 2022, for the federal cities.

2) The size of NIE payments for waste does not cover the waste disposal costs and does not stimulate recycling. According to the current legislation, the payment needs to be done by companies or individuals that produce waste in the course of their economic or other kinds of operation except for municipal solid waste. The municipal solid waste payments are done by the regional operators responsible for disposal. However, this was like this from the start: in 2016-2018 there was a confusion whether it is the enterprise or the regional operator that effects the payment, as the laws contradict each other. Finally, in 2018 the NIE payment for 2016 and 2017 was cancelled (Fil'chenkova, Azueva 2018: 14). Today, those "rushed" environment taxes (since 2019 NIE payments are considered as taxes) for those years are being criticized for being subject to either repayment or recalculation. Such legislative behaviour does not encourage any responsible attitude towards NIE payments as a serious fiscal policy tool that should not be ignored and delayed.

The NIE payment bears a compensatory character, though their size casts doubt as to its adequacy. In particular, those payments can hardly cover reclamation of the lands used as landfills. In 2018, the basic payment rates did not rise despite the annual inflation of 4%. In 2019, the rates established for 2018 with an insignificant adjustment for 1.04% were used, although a higher inflation rate was expected.

Payments for the contamination hazard class of wastes are close to zero. However, these are mostly technogenic wastes of fuel and energy companies that exert pressure on the environment due to: alienation of land, disruption of natural biogeochemical cycles, emission of dangerous and toxic substances into the air, soil, ground and underground water. According to experts, the negative impact of technogenic wastes is apparent on the territory that exceeds the waste storage space by 10–15 times. Companies often seek to reclassify the I-IV hazard class wastes into class V or to certify them as raw materials to save on the NIE payments. Such reclassification is an attractive solution, as it resolves the problem of disposal of wastes to the special sites: I-IV class wastes can only be sold to a licensed organization while those of V class can be sold to anybody (Al'geshkina, 2018: 61). However, the waste classification criteria are not properly formulated. It is worth pointing out that the legislation is contradictory as to the definition of the waste hazard degree. For example, according to clause 4.1 of the Federal Law No. 89-FZ of 24 June 1998 "About production and consumption waste", wastes are classified into five classes of hazard with the 5th (V) class presenting no danger to the environment. But in the "Sanitary norms for determination of the hazard class of toxic production and consumption waste" SP 2.1.7.1386-03, there is another classification of wastes where the last, 4th (IV) class being "not very hazardous". Thus, two classifications are relying on different data used to appraise the same waste based on different criteria.

3) The waste disposal licensing scope has not been sufficiently clarified. Since the end of 2017, waste transportation has become a separate activity requiring no license (Alymova, 2018: 34). Companies are allowed to collect wastes as well as to do processing, utilization, and decontamination. An economic agent may not do collection or collection with transportation only (Endeko, 2018: 6). Thus, the simultaneous collection and transportation of waste (e.g. 'green' containers for the collection of separate waste transported by the vehicles of the companies that installed them, or collection of wastes in such public spaces as shopping cen-

[2] Chernykh, K. (2016). 120 milliardov v musor [120 Billion Going Into Waste]. In *Kontinent Sibir'* [*Siberia Continent*], 9 September 2016, available at: https://ksonline.ru/238495/120-milliardov-v-musor/

Viktorov, V. (2018). Zarastiom musorom? [About to Get Inundated with Rubbish?]. In *Argumenty i fakty* [*The Arguments and Facts*], 22 May 2018, available at: http://www.nsk.aif.ru/society/zarastem_musorom_pochemu_nevozmozhno_razvitie_musoropererabotki_v_sibiri

Vlasov, Ia. (2018). Musornaia reforma zabuksovala v Sibiri [The Waste Management Reform Failing in Siberia]. In Taiga.info, 18 December 2018, available at: https://tayga.info/144190

tres) has got banned. To evade this ban, such type of activity as "accumulation" was made up, though basically, it stands for collection, as one must collect rubbish first to accumulate it, but requires no license. In its turn, transportation license cancellation is doubtful. as waste transport containers have to meet special requirements to ensure safe transportation. On the other hand, there are not enough arguments for licensing some kinds of waste collection (batteries, pulp paper).

Licensing requirements for stockpiling, processing and sale of scrap iron and non-ferrous metal put considerable restrictions on small businesses. To collect scrap metal, according to the license requirements the company or the individual entrepreneur needs to have a production site, scrap metal processing equipment and a laboratory (not essential for this type of activity). On the other hand, as we have pointed out earlier, there are no licensing requirements for handling V class wastes, as generation and accumulation of such waste may be damaging and not desirable.

4) There is a need to improve the mechanisms for the ecological and utilization charges collection. In January 2015, the ecological charge part of the Federal Law "About production and consumption waste" (of 24.06.98 No. 89) was amended (see Law No. 458 of 29.12.2014). The money collected as ecological and utilization charges are deposited to the federal budget and then directed to the constituent entities of the Russian Federation as subsidies. Earlier, it was decided to provide the subsidies in proportion to the size of the population; in 2019 this decision was cancelled, and the approach is still not clear. The state retains the right to delay subsidies until the end of products' lifecycle and often uses the money on current expenses not related to waste management. As a result, real subsidies get indefinitely delayed and the municipal waste treatment enterprises get no support, holding back the modernization of the entire industry. So, the existing approach to distribution and spending ecological charge revenues does not help to resolve the problem of waste collection and processing. It is necessary to channel the money collected as ecological charge directly to the companies and regional operators, involved in the disposal of waste. It might be done as compensation for every ton of the collected recycled material.

The ecological charge fee should stimulate the compensatory mechanism because the separation of recycling from the principal technological processes augments the cost of the recycled material. The compensatory mechanism must stimulate the manufacturing of products that are simple to dispose of in the future. It is necessary to stream subsidies to the investment projects within the limits of the charge paid for the products, the lifecycle of which has not yet expired. The ecological charge is expected to become an extra-budgetary fund so that its rise would not only compensate the current expenditures of regional operators and manufacturers but also enhance the recycling industry development as a whole (Koroleva, 2016).

If the utilization charge is obligatory (the charge paid by the vehicle manufacturer or, in some cases, by the imported car owner), the enterprise has no choice (whether to pay the charge or utilize the waste as in case of transportation charge). So, this charge is just an instrument of the protection policy that increases the manufacturing costs. It is not a fiscal stimulus tool for the recycling industry. We believe that the utilization charge should follow the same principle as the ecological charge.

Conclusion

To sum up, it should be explained that the paper was intended only to point out the main drawbacks in the existing waste management mechanism. There are many more problems, including adjustment of fees (increasing and decreasing coefficients in addition to the ecological tariffs and charges), limiting and standard-setting (standards of waste generation, limits for their localization and disposal values), category setting (assignment of hazard classes), etc. Thus, implementation of the Innovative scenario of the Strategy for developing the waste treatment, utilization and deactivation industry till 2030 requires effective mechanisms of reducing the wastes generated by the production processes.

References

Al'geshkina, O.A. (2018). Sertifikatsiia otkhodov kak syr'ia [Certification of Waste as Raw Material]. In *Ekologiia proizvodstva* [*Ecology of Production*], 7, 60-65.

Alymova, V.A. (2018). Sbor "ushel", transportirovanie ostalos' [Collection is Over, Transportation Pending]. In *Ekologiia proizvodstva* [*Ecology of Production*], 3, 33–39.

Ayres, U., Kneese, A. (1969). Production, Consumption and Externalities. In *American Economic Review*, 3 (59), 289–298.

Babich, M.E. (2018). Tverdye kommunal'nye othody: ot obiazannosti k otvetstvennosti [Solid Municipal Waste: from Duty to Responsibility]. In *Ekologiia proizvodstva* [*Ecology of Production*], 3, 24-28.

Bouwmeester, M., Oosterhaven, J., Duchin, F. (2010). Consumption-Based Environmental Accounting of CO_2 Emissions and Water Use in a World-Wide Multi-Regional Input-Output Framework. In *Materials of ISEE Conference,* Oldenburg, Press of Carl von Ossietzky Oldenburg University, 227.

Daly, H. (1968). On Economics as a Life Science. In *The Journal of Political Economy*, 3, 392–406.

Endeko, A.I. (2018). Raz'iasneniia ob izmeneniiakh v oblasti obrashcheniia s otkhodami [Explanations of Changes in Waste Management]. In *Ekologiia proizvodstva* [*Ecology of Production*], 6, 6-10.

Fil'chenkova, O.A., Azueva, L.M. (2018). Raz'iasneniia po ischisleniiu i vzimaniiu platy pri razmeshchenii otkhodov [Explanations on Calculation and Collection of the Waste Disposal Fees]. In *Ekologiia proizvodstva* [*Ecology of Production*], 3, 9-18.

Gil'mundinov, V.M., Kazantseva, L.K., Tagaeva, T.O. (2011). *Problemy okhrany vodnykh i atmosfernykh resursov Rossii* [*Challenges of Aqueous and Air Resources Protection in Russia*]. Novosibirsk, IEIE SD RAS, 166 p.

Isard, W. (1972). *Ecologic-Economic Analysis for Regional Development*. N.Y., The Free Press, 270 p.

Koroleva, L.P. (2016). *Gde vzyat' den'gi na retsikling?* [Where Can We Get Money for Recycling?]. In *EKO,* 10, 142-155.

Leontief,V., Ford, D. (1972). Mezhotraslevoy analiz vozdeystviia struktury ekonomiki na okruzhaiushchuiu sredu [Intersectoral Analysis of Economic Structure's Impact on the Environment]. In *Ekonomika i matematicheskie metody* [*Economics and Mathematical Methods*], 8 (3), 370–399.

Marin, G. (2010). Sector CO_2 and SOx Emissions Efficiency and Productivity: Homogeneous and Heterogeneous Estimates using the Italian NAMEA. In *Proceedings of ISEE Conference,* Oldenburg, Press of Carl von Ossietzky Oldenburg University, 226.

Nansai, K., Kagawa, S., Kondo, Y., Suh, S., Inaba, R., Nakajima, K. (2009). Improving the Completeness of Product Carbon Footprints using a Global Link Input-Output Model: the Case of Japan. In *Economic Systems Research*, 3(21), 267–290.

Tsukui, J., Murakany, Y. (1977). *Turnpike Optimality in Input-Output Systems: Theory and Application for Planning*. N.Y., Kluwer Academic Publishers, 217 p.

Институциональные реформы в сфере обращения с отходами в РФ

Т.О. Тагаева, В.М. Гильмундинов
Новосибирский государственный университет
Российская Федерация, Новосибирск
Институт экономики
и организации промышленного производства СО РАН
Российская Федерация, Новосибирск

Аннотация. Ситуация в области охраны водных и атмосферных ресурсов оценивается специалистами как стабильно негативная, без явных тенденций к улучшению, имеющая проциклический характер. Чего, к сожалению, нельзя сказать о системе обращения с отходами производства и потребления. Даже в кризисные периоды объемы образующихся и накапливаемых отходов продолжают расти. В 2018 году первый показатель удвоился по сравнению с 2005 годом. Таким образом, актуальность предмета исследования объясняется неблагоприятной экологической обстановкой в России. Целью работы является разработка методологических подходов к ее анализу и прогнозированию. Поставленная цель позволила сформулировать следующие задачи: изучить текущее состояние окружающей среды в сфере обращения с отходами, разработать предпосылки для прогнозирования объемов образования и накопления отходов, оценить экологическую нагрузку на ближайшее будущее. Несмотря на активные усилия по реформированию системы обращения с отходами, предпринятые начиная с 2014 года, российское законодательство в этой области остается несовершенным, противоречивым, лишенным стимулирующих переработку отходов механизмов. Основные недостатки происходящих в данной сфере реформ рассмотрены в статье.

Ключевые слова: производство и накопление отходов производства и потребления, твердые коммунальные отходы, рециклинг, утилизация и обезвреживание отходов, природоохранное законодательство.

Работа выполнена по плану НИР ИЭОПП СО РАН, проект XI.170.1.1. «Инновационные и экологические аспекты структурной трансформации российской экономики в условиях новой геополитической реальности», № АААА-А17-117022250127-8.

Научная специальность: 08.00.05 – экономика и управление народным хозяйством (экономика природопользования).

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 496–506

DOI: 10.17516/1997-1370-0584
УДК 504.03

Jevons' Paradox Revisited: Do Russian Environmental Institutions Contribute to Green Growth?

Irina P. Glazyrina* **and Irina A. Zabelina**
Department for ecological economics
Institute of Natural Resources, Ecology and Cryology SB RAS
Chita, Russian Federation
Transbaikal State University
Chita, Russian Federation

Received 12.11.2019, received in revised form 11.03.2020, accepted 10.04.2020

Abstract. The purpose of this work is to quantify the effectiveness of the environmental institutions in Russia from the perspective of the concepts of green economy and green growth. For these purposes we used the indicators of the environmental and economic dynamics, which can be considered as characteristics of the quality of growth from an environmental point of view: eco-intensity, representing direct quantitative characteristics of resource use or negative impact per unit of economic result, and decoupling coefficients. The authors adhere to the approach to the quantitative assessment of green growth, proposed by P. Victor in 2014. The proposed tools allow analyzing environmental and economic trends for individual regions, industries and types of negative anthropogenic impact. Based on the calculation results, it can be concluded that Russian environmental institutions are not a sufficiently fine instrument of regulation, as they do not fully take into account the regional characteristics and, in general, do not create sufficient incentives for greening the economy. The results of the work can be used both in theoretical studies of ecological and economic dynamics for individual countries and regions, and in practical development of programs for the development of territories.

Keywords: eco-intensity, decoupling, environmental and economic trends.

The work was carried out within the framework of the basic research program of the Siberian Branch of Russian Academy of Sciences (XI.174.1).

Research area: economics and national economy.

Citation: Glazyrina, I.P., Zabelina, I.A. (2020). Jevons' paradox: do Russian environmental institutions contribute to green growth? J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 496-506. DOI: 10.17516/1997-1370-0584.

* Corresponding author E-mail address: iglazyrina@bk.ru
ORCID: 0000-0001-6774-9284 (Glazyrina); 0000-0003-4464-2593 (Zabelina)

Introduction: theoretical framework and statement of the problem

Most studies investigating the resource economy in the last three decades are inextricably linked with the issues of environmental protection, both in theoretical research and in practical developments. Due to the fact that the consequences of negative anthropogenic impact (despite its initially local nature) are becoming increasingly important for large areas, the issue of environmental modernization arises not only for individual industries, but also for socio-ecological and economic systems, which state environmental institutions are called upon to solve.

Tools for "systemic" modernization are almost always developed and introduced through the efforts of states. They can be varied to a greater or lesser extent. In the European Union, the set of these tools is quite broad: not only environmental taxes and fees, but also rules for the use of natural resources (including land use, subsoil use, water use, forest use, etc.), as well as support of the development and implementation of new environmentally friendly technologies (Baker, 2000). The same measures are also used in Russia for the greening of production facilities. However, both in the West and in Russia, they do not always produce the desired results, and this largely depends on the quality of state environmental institutions and the existing institutional environment.

Environmental measures of state regulation are almost always aimed at stimulating environmental modernization of production facilities, while the target is more efficient use of natural resources. This means getting better economic results with using less natural resources and causing less damage to the environment in each specific case of production of goods and services. But does "individual technological modernization" always mean ecological modernization of socio-ecological and economic systems as a whole?

This is called into question by the effect noted in some studies (Alcott, 2005; Hovardas, 2016; etc.), similar to that described in the famous "Jevons paradox" during the industrial revolution. Jevons (Jevons, 1905) noted that although the initial motivation for modernizing steam engines was to reduce the consumption of coal, it nevertheless resulted in the increase of coal consumption. More efficient use of coal in steam engines actually increased the overall consumption of coal, iron, and other resources. This, in turn, led to significant negative environmental consequences, which are well known. Similar processes often occur when environmental management measures create comparative advantages for those industries that use resources more efficiently and reduce their negative impact on the environment. Theoretically, as a result of economic incentives for technology development, the efficiency of using natural resources increases and the per unit demand of economic output decreases. However, in practice an improvement in efficiency increases the commercial appeal of the modernized sector (Warner, 2010; Wolfe, 2012) with the investment being directed there and ultimately increasing the demand for natural resources and the negative anthropogenic impact on natural systems.

The term "green growth" in most works refers to the path of development that leads to the achievement of the goals of the green economy and assumes an increase in the gross domestic product. However, this definition certainly requires the application of quantitative "diagnostic" tools, the use of which could give an answer to the question: is the observed growth really "green"? The conceptual scheme was proposed in P. Victor's work (Victor, 2015). He used one of the well-known indicators of eco-intensity: the amount of carbon emissions per unit of gross domestic product (GDP), and on this basis developed a rule that allows to characterize the dynamics of development as "green", "brown" or "black" growth in relation to the climatic effects caused by the economic activity, which can also be applied to the characteristics of the economic degrowth. This work was presented in a report at the Kenneth Boulding's award ceremony in 2014 in Reykjavik. His calculations showed that the economic growth in Canada over the past decades can be characterized mainly as "brown".

Victor's model was used in the work of (Shang et al., 2015) to assess the dynamics of the Chinese economy, also in relation to carbon emissions. The authors showed that for the period from 1971 to 2010, the economic growth in China was "black" or "brown". Some improvements have been observed since 2005.

The purpose of this work is to quantify the effectiveness of the environmental institutions in Russia from the perspective of the concepts of "green" economy and "green" growth.

The methodology assumes the use of characteristics of environmental and economic dynamics for these purposes, which can be considered as growth quality indicators from an environmental point of view (Glazyrina, Faleychik, et al., 2005). The most common indicators are eco-intensity, which provide direct quantitative characteristics of resource use or negative impact per unit of economic output. (De Haan, 2004; Glazyrina et al., 2018; Zabelina, Deluga, 2019a). These include widely used indicators of GDP energy intensity (Bobylev et al., 2010; Gulbrandsen et al., 2010). In the past few years, researchers have been attracted to an approach based on the assessment of decoupling – the divergence or mismatch of economic growth rates, resource consumption and negative environmental impact (Decoupling..., 2011; Nagvi, Zwickl, 2017; OECD..., 2002; Shkiperova, 2014; Zabelina, 2019; Kudryavtseva, Yakovleva, 2019). This method is becoming popular not only in scientific research, but also in public environmental discourses related to climate change.

Methods

The authors adhere to the approach to quantifying "green growth" proposed by P. Victor in (Victor, 2015). In accordance with this approach, the positive value of the coefficient of decoupling observed during the studied time interval is a necessary but insufficient condition for the green growth. The authors proposed a methodology for diagnosing "green" growth, the idea of which also goes back to P. Victor, and is described in detail in (Glazyrina, Zabelina, 2016; Glazyrina, Zabelina, 2018).

To measure the effect of decoupling, the following formula is used:

$$D_t = 1 - \frac{E_t/Y_t}{E_0/Y_0},$$

where E_0 and E_t are the indicators that characterize the negative impact on the environment in the initial and current periods; Y_0 and Y_t are the indicators that characterize an economic result. The positive value of the indicator demonstrates that the trends in economic and environmental dynamics have opposite directions. If the value of the coefficient of D_t equals to zero or is negative, then there is no decoupling effect. The positive value of the decoupling coefficient is a necessary but insufficient condition for the green growth. This may correspond to the "brown" growth, that is, a situation where the efficiency of resource use increases, and at the same time the total volume of their use increases as well. That is, we are talking about an effect similar to the "Jevons paradox". This is associated with a certain pessimism in assessing the prospects for economic growth per se and discussing the concept of the inevitability of degrowth in the scientific literature (O'Connor, 1994; Victor, 2015). However, the emergence and further sustainable manifestation of the decoupling effect indicates that a step has been taken towards a positive dynamic in the development of ecological and economic systems.

The gross regional product was used as an economic indicator in this work. The indicators are presented in 2009 prices and adjusted to take into account the cost of a fixed set of goods and services, which may differ significantly in different regions. The approach proposed in (Mel'nikov, 2005) was used for the correction, which was also used for this class of problems in (Zabelina, Deluga, 2019b).

Results and discussion

The most common tool of state regulation to encourage the greening of production processes is the introduction of payments for negative environmental impact. However, this tool does not always yield unambiguously positive results. In a number of countries, environmental taxes become a "drop in the ocean" and have little impact on the environ-

mental processes. In other cases, we can say that this is the drop that "sharpens the stone". Russia is a large country with a high degree of diversity of natural and socio-economic conditions. However, the main instruments of environmental regulation and corresponding institutions for all regions are formed at the Federal level. We believe that quantitative indicators of environmental and economic dynamics can serve as characteristics of the effectiveness of these institutions for different conditions and territories. They can also identify industries and sectors that are the main sources of disadvantage, and identify activities where institutions "work" with a high or low degree of efficiency. As an example, we report the calculations results of the coefficients of decoupling for the energy sector. In Table 1 data is presented for the Russian Far East regions for two categories: when the economic result is selected as (A) the contribution to GRP, and (B) the physical volume of energy produced. We can see that the trends do not always coincide. In the Irkutsk region within the 2009-2016 period, the decoupling coefficient is positive, while calculations of natural indicators give a negative value. This means that the contribution of GRP (and, accordingly, the decoupling coefficient) has increased more due to the growth of cost components, rather than physical energy production. A similar situation is observed in some other regions. Obviously, in this case, it is more appropriate to use calculations in natural quantities.

The spatial distribution of the decoupling coefficient values for total air emissions and GRP for the entire country is shown in Fig. 1. Despite the fact that air emissions from stationary sources are one of the most "controlled" processes of the negative impact on the environment, we see that the dynamics of environmental and economic processes in this context is very heterogeneous. Institutions for paid environmental impacts, including standards for payments for emissions of pollutants, are established at the federal level. As a result, 28% of regions for the 2009-2017 period have a negative decoupling coefficient for this type of impact. This shows that the format of environmental institutions in this case does not take into account the heterogeneity of the natural and socio-economic conditions of a large country. This is due to large spatial differences in their effectiveness.

Table 1. The decoupling coefficient (Dt) for the economic activity "Electricity, gas and water production and supply": air emissions from stationary sources

Region	(A) Contribution of the energy industry to the GRP			(B) Volume of production of electric and thermal energy		
	2009-2012	2012-2016	2009-2016	2009-2012	2012-2016	2009-2016
Amur Region	-0.31	0.17	-0.09	-0.20	-0.001	-0.20
Jewish Autonomous Region	0.09	0.29	0.35	0.05	0.15	0.19
Trans-Baikal Territory	-0.03	0.37	0.35	0.08	0.19	0.25
Irkutsk Region	-0.11	0.26	0.18	-0.29	0.09	-0.18
Kamchatka Territory	0.33	-0.03	0.32		0.03	
Magadan Region	0.08	-0.12	-0.04	0.04	0.02	0.06
Primorye Territory	0.11	0.13	0.23	0.21	0.27	0.42
Republic of Buryatia	0.12	0.21	0.30	0.05	0.20	0.24
Republic of Sakha (Yakutia)	0.20	0.27	0.42	0.12	0.15	0.25
Sakhalin Region	0.14	0.44	0.52	0.33	0.43	0.62
Khabarovsk Territory	0.09	0.09	0.17	0.12	0.07	0.18
Chukotka Autonomous Area	0.04	0.28	0.31	0.10	-0.29	-0.16
Russian Federation as a whole	0.06	0.14	0.19	0.02	0.14	0.15

Source: calculated by the authors using the official data from the Federal State Statistics Service.

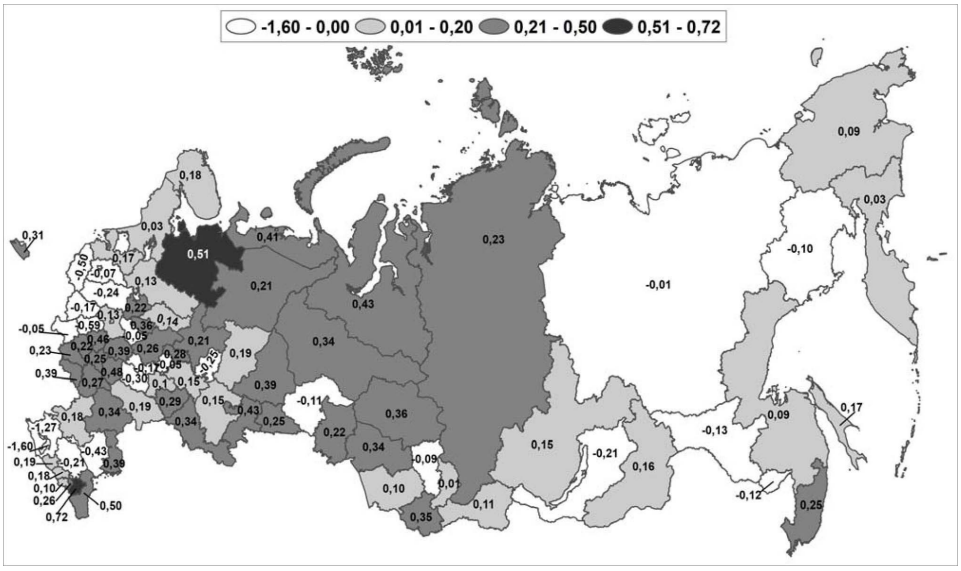

Fig. 1. The decoupling coefficient (D_t) in Russia's regions:
air emissions from stationary sources, 2009 and 2017

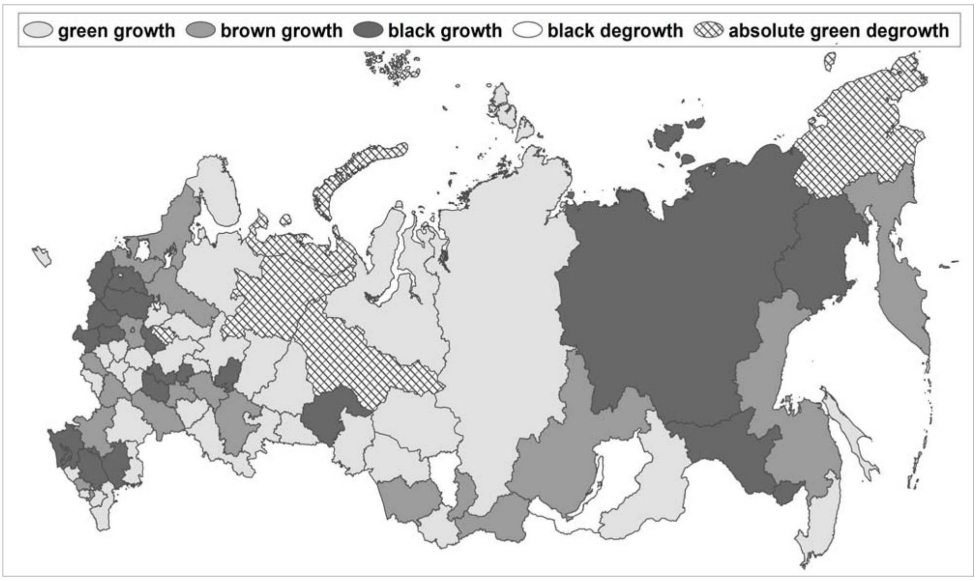

Fig. 2. Spatial distribution of the "color" of growth in the Russian regions during
the 2009-2017 period by the ratio of the total emissions from stationary sources and GRP

As already noted, a positive value of the coefficient of decoupling does not guarantee the availability of "green" growth. Just like the decoupling effect, the "color" of growth is determined for a specific territory and for a fixed period of time (Glazyrina, Zabelina, 2018). Figure 2 shows that, brown growth is diagnosed for the 2009-2017 period in 20 regions with positive decoupling. This means that despite the decrease in eco-intensity, the total number of emissions has increased. The number of regions with brown and black growth (in relation

to the total emissions into the atmosphere) is 49% – and there are such territories in the East and West of the country. It is worth paying attention to the fact that in some regions, where oil and gas resources are traditionally extracted (and a significant part of revenues to the Federal budget of the Khanty-Mansiysk and Nenets Autonomous Areas is formed), the changes for 2009-2017 are characterized as absolute green degrowth. This means that both the total air emissions and the emissions per unit of GRP are reduced. This effect is due to the fact that the GRP values are adjusted to take into account the level of consumer prices, which in these regions is (talking about "the level") consistently higher compared to other territories.

The proposed tools can be used both for individual sectors and for specific types of impact. Figure 3 shows the spatial distribution of the decoupling effect in relation to the SO_2 emissions. According to the Russian regulations, this substance belongs to the class III hazard and has a negative impact on the human cardiovascular system (Tian, 2014). Therefore, there are an increased payment for its emissions. However, in 10 (13%) regions the negative value of the coefficient of decoupling has been identified. This means that the total SO_2 emissions have increased in these regions, despite the government regulation.

Figure 4 shows that the number of environmentally disadvantaged areas is even greater in terms of trends towards a green economy: in 7 (9%) of the regions we see black growth, in 10 (13%) – brown growth, and in 3 (4%) – black degrowth.

Calculations show that the coefficient of decoupling can be positive for some polluting substances and negative for others. This is also true for the "color" of economic growth. This is illustrated by the example in Table 2. In the Krasnoyarsk Territory, there was a green growth in solid particle emissions between 2009 and 2017, but there was a brown increase in nitrogen oxide emissions and a black increase in carbon monoxide emissions. At the same time, in the Trans-Baikal Territory, there is a green growth in all three types of impact. These differences are related to the different structure of the economy, industry, and energy supply. That is, in each case, problems are "formed" at the regional and local levels. At the same time, the main powers of regulation, including the establishment of standards for emissions to be concentrated at the federal level. This impedes not only the "diagnosis",

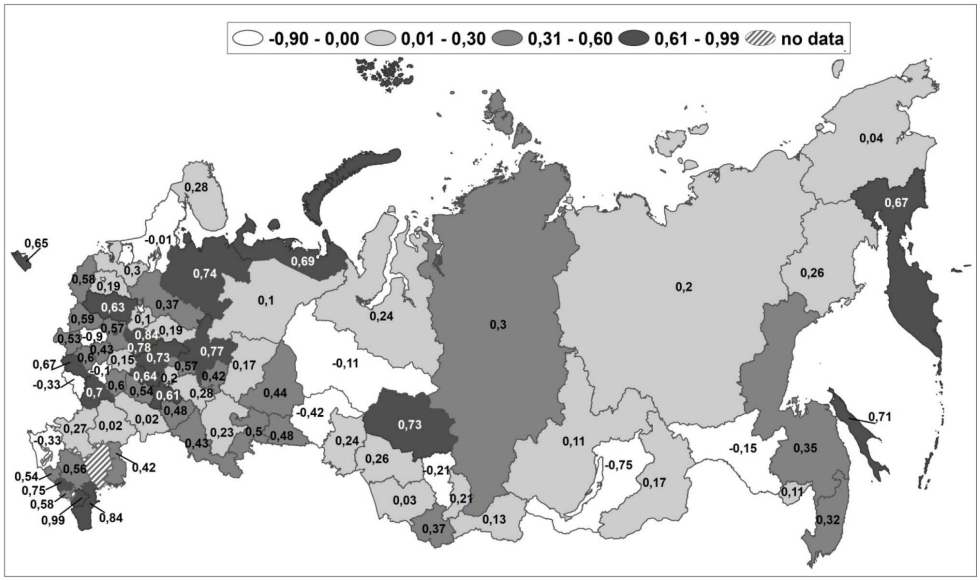

Fig. 3. The decoupling coefficient (D_t) in Russia's regions: sulphur dioxide emissions from stationary sources, 2009 and 2017

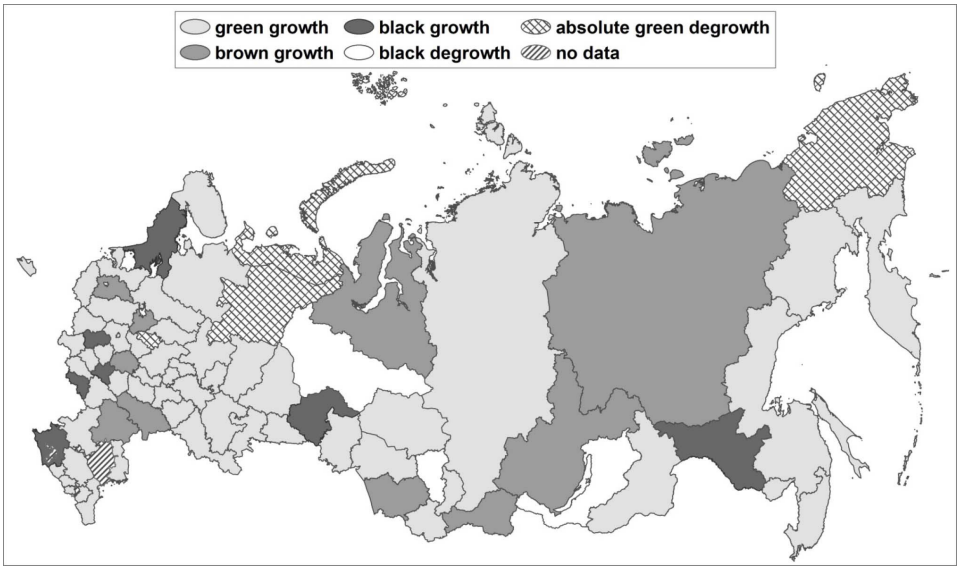

Fig. 4. Spatial distribution of the "color" of growth in the Russian regions during the 2009-2017 period by the ratio of sulphur dioxide emissions and GRP

Table 2. Nitrogen and carbon emissions for Krasnoyarsk and Trans-Baikal Territories (2009-2017)

	Krasnoyarsk Territory	Trans-Baikal Territory	Russian Federation
The decoupling coefficient (D_t)			
Solid emissions	0.30	0.21	0.38
Emissions of nitrogen oxides	0.06	0.11	0.09
Carbon monoxide emissions	-0.55	0.10	0.25
"Color" of economic growth by the ratio of emissions from stationary sources and GRP			
Solid emissions	Green growth	Green growth	Green growth
Emissions of nitrogen oxides	Brown growth	Green growth	Brown growth
Carbon monoxide emissions	Black growth	Green growth	Green growth

Source: calculated by the authors using the official data from the Federal State Statistics Service.

but also the prevention of environmental violations, as well as the establishment of rules for a rapid response to them.

Environmental institutions to a certain extent focus on the reduction of eco-intensity and the formation of the decoupling effect. Nevertheless even in this respect, their effectiveness is low; the calculations show a significant number of regions that are experiencing black growth and black degrowth. They are not immune to the formation of "brown" trends in the development of regional industry and the emergence of new industries. If the previous levels of pollution are maintained, even with a relatively "gentle" anthropogenic impact, the region will be doomed to "brown" growth with each new project. To move to "green" growth (or maintain the "green" development trend), a parallel environmental modernization of existing production facilities is necessary. It allows reducing the overall impact through the use of new technologies, improving energy efficiency, etc.

The "polluter pays" principle is implemented in the Russian institutional environment in the form of payments for emissions of

pollutants. In order to reduce unit costs, manufacturers are upgrading to reduce eco-intensity. However, under conditions of resource abundance, this often leads to an increase in the economic attractiveness of the natural resource sectors, and ultimately to an increase in the negative impact on the environment. One of the most systematic studies of this issue presented in the paper (Tagaeva, 2011) shows that it is more profitable for most enterprises to transfer payments for pollution than to carry out environmental protection measures and environmental modernization of their production chains. In the system of economic regulation of environmental activities, payments for pollutant emissions do not properly take into account changes in price proportions under the conditions of inflation. The indexation rates for pollution charges for many years have not corresponded to the actual inflation rate, and were significantly lower. Calculations have shown that the existing payment standards are underestimated, especially in the Siberian Federal district (5-7 times), in the Ural Federal district (9-11 times, in the Far Eastern Federal district (10-12 times). Payments for negative environmental impacts are at best one-hundredth of a percent in the cost price and one-tenth of a percent of the enterprises' profit.

Having played a positive role in the first years after its formation, this institution has now largely lost the regulatory function for which it had been created. In (Glazyrina et al, 2017), it is shown that in the segment of subsurface use associated with the extraction of placer gold, this function is almost completely lost. As for the compensation function, that is, the role of this tool for collecting and accumulating funds for environmental purposes, it was significantly reduced after 2000, when changes in budget legislation had led to the loss of the intended (environmental) purpose of these financial resources.

For most types of pollutants, the level of payments obviously does not correspond to the actual damage caused by emissions and discharges. Environmental payments reduce the profitability of commodity companies, and the examples of "environmental" lobbying support the hypothesis that if the state is dominated by institutions that promote rent-oriented behavior among the economic agents, then significant financial resources will be diverted and directed to unproductive activities. The struggle for rent in the raw materials industries is also manifested in the "suppression" of environmental laws, and becomes a more profitable activity than the development of environmentally friendly technologies.

Conclusion

The proposed tools allow analyzing environmental and economic trends for different types of negative anthropogenic impact. Based on the results of the calculations, it can be concluded that Russian environmental institutions are not sufficiently fine instruments of regulation, and do not fully take into account the regional characteristics and, in general, do not create sufficient incentives for greening the economy.

The weakness and inflexibility of the regional institutions is due to the current structure of distribution of rights and powers between the federal, regional and local levels of government. There is already a certain consensus in the scientific literature on the need to strengthen the regional level of regulation of environmental management processes. E. Ostrom notes that for successful regulation of the use of natural resources, it is extremely important to have operational and low-cost mechanisms for resolving emerging environmental and economic conflicts (Ostrom, 2009), which implies the presence of appropriate authorities at the regional and municipal levels. In Russia, the result of purposeful formation of the "vertical of power" was the practical absence of flexible and adaptive tools of state management that take into account the regional specifics and differences in the dynamics of socio-economic processes. The Russian "budget trichotomy" is becoming an increasingly noticeable barrier – the inability, except in special cases (under the threat of "misuse"), to combine financial resources at various levels to solve important and obvious problems, as well as to combine the resources of municipalities to solve common problems. Regional governments should

have real capacity and resources to prevent and promptly resolve environmental problems, and to develop and implement long-term environmental programs and projects. It is very important that they can initiate economic incentives for priority areas in the economy, create industries with deep processing of natural resources, technological and environmental modernization, set long-term goals and manage their achievement.

References

Alcott, B. (2005). Jevons' paradox. In *Ecological Economics,* 54(1), 9-21. DOI: 10.1016/j.ecolecon.2005.03.020

Baker, S. (2000). The European Union: integration, competitions, growth and sustainability. In *Implementing Sustainable Development: Strategies and Initiatives in High Consumption Societies,* 303-421.

Bobylev, S.N., Averchenkov, A.A., Soloveva, S.V., Kirushin, P.A. (2010). *Energoeffektivnost' i ustoichivoe razvitie* [*Energy Efficiency and Sustainable Development*]. Moscow: Institut ustoichivogo razvitiia, 148 p.

De Haan, M. (2004). *Accounting for goods and bads.* Voorburg, Statistics Netherlands, 216 p.

Decoupling natural resource use and environmental impacts from economic growth. A Report of the Working Group on Decoupling to the International Resource Panel (2011). Available at: http://www.gci.org.uk/Documents/Decoupling_Report_English.pdf (accessed 14 June 2019).

Glazyrina, I.P., Mikheev, I.E., Eloyan, A.Yu. (2017). Accommodation of Ecological and Economic Interests in Placer Gold Mining. In *Geography and Natural Resources*, 38(3), 275-280. DOI: 10.1134/S1875372817030088.

Glazyrina, I.P., Faleychik, L.M., et al. (2005). *Ekologicheskie indikatory kachestva rosta regional'noi ekonomiki* [*Quality of growth indicators for regional economies*]. Moscow, NIA-Priroda, 192 p.

Glazyrina, I.P., Fattahov, R.V., Deluga, A.V., Stroev, P.V., Grigorov, A.A. (2018) Baikal'skii region: "ekologicheskaia tsena" ekonomicheskogo rosta [The Baikal Region: "environmental cost" of economic growth]. In *Region: Ekonomika i Sotsiologiia* [*Region: Economics and Sociology*], 1(97), 231-249, DOI: 10.15372/REG20180111.

Glazyrina, I.P., Zabelina, I.A. (2016). The Silk Road Economic Belt and green growth in the east of Russia. In *Journal of Resources and Ecology*, 7(5), 342-351. DOI: 10.5814/j.issn.1674-764x.2016.05.004.

Glazyrina, I.P., Zabelina, I.A. (2018). Spatial heterogeneity of Russia in the light of the concept of a green economy: the social context. In *Geography and Natural Resources*, 39(2), 103-110. DOI: 10.21782/GIPR0206-1619-2018-2(14-22).

Gulbrandsen, T.Kh., Padalko, L.P., Chervinskii, V.L. (2010). *Energoeffektivnost' i energeticheskii menedzhment* [*Efficiency and energy management*]. *Minsk, BGATU,* 240 p.

Hovardas, T. (2016). Two paradoxes with one stone: a critical reading of ecological modernization. In *Ecological Economics,* 130, 1-7. DOI: 10.1016/j.ecolecon.2016.06.023

Jevons, W.S. (1905). *The Coal Question: an Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of our Coal-mines*. New York, Macmillan and Co, 467 p.

Kudryavtseva, O.V., Yakovleva, E.Y. (2019). Effekt dekaplinga i ekologicheskaia krivaia Kuznetsa v kontekste ekologo-ekonomicheskogo razvitiia regionov Rossii [Decoupling effect and environmental Kuznets curve in the context of ecological- economic development of Russian regions]. In *Zelyonaia ekonomika i tseli ustoichivogo razvitiia dlia Rossii* [*Green economy and sustainable development goals for Russia*]. Moscow, Faculty of Economics of Moscow state University, 152-157.

Mel'nikov, R.M. (2005). Analiz dinamiki mezhregional'nogo ekonomicheskogo neravenstva: zarubezhnye podkhody i rossiiskaya praktika [Analysis of the dynamics of regional economic differentiation: foreign approaches and domestic practice]. In *Region: Ekonomika i Sotsiologiia* [*Region: Economics and Sociology*], 4, 3-18.

Nagvi, A., Zwickl, K. (2017). Fifty shades of green: Revisiting decoupling by economic sector and air pollutants. In *Ecological Economics*, 133, 111-126. DOI: 10.1016/j.ecolecon.2016.09.017.

O'Connor, J. (1994). The second contradiction of capitalism. In *Capitalism Nature Socialism* 5, 105–114.

OECD annual report (2002). Available at: https://www.oecd.org/about/2080175.pdf (accessed 5 February 2020).

Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. In *Science*, 325, 419-422.

Shang, Y., Si, Y., Zang, G. (2015). Black or Green? Economic growth patterns in China under low carbon economy targets. In *Journal of Resources and Ecology*, 6(5), 310-317.

Shkiperova, G.T. (2014). Analiz i modelirovanie vzaimosviazi mezhdu ekonomicheskim rostom i kachestvom okruzhaiushchei sredy (na primere Respubliki Kareliia) [Analysis and modeling of relationship between economic growth and environmental quality (the case of the Republic of Karelia)]. In *Ekonomicheskii analiz: teoriia i praktika* [*Economic Analysis: Theory and Practice*], 43 (394), 41-49.

Tagaeva, T.O. (2011). Improving environmental charges using results of the forecast of the environmental and economic development of the Russian Federation. In *Studies on Russian Economic Development,* 22(3), 331-338.

Tian, H. (2014). Advances in the study on endogenous sulfur dioxide in the cardiovascular system. In *Chinese Medical Journal,* 127(21), 3803-3807

Victor, P. (2015). The Kenneth E. Boulding Memorial Award 2014: Ecological economics: A personal journey. In *Ecological Economics*, 109, 93-100. DOI: 10.1016/j.ecolecon.2014.11.009.

Warner, R. (2010). Ecological modernisation theory: towards a critical ecopolitics of change? In *Environmental Politics*, 19(4), 538-556. DOI: 10.1080/09644016.2010.489710.

Wolfe, M. (2012). Beyond "green buildings": exploring the effects of Jevons' Paradox on the sustainability of archival practices. In *Archival Science*, 12(1), 35-50. DOI: 10.1007/s10502-011-9143-4.

Zabelina, I.A. (2019). Decoupling in environmental and economic development of regions-participants of cross-border cooperation. In *Economic and Social Changes: Facts, Trends, Forecast*, 12(1), 241-255. DOI: 10.15838/esc.2019.1.61.15.

Zabelina, I.A., Deluga, A.V. (2019a). Geoekologicheskie indikatory ustoichivogo razvitiia: prostranstvennyi analiz [Geoecological indicators of sustainable development: spatial analysis]. In *Ustoichivoe razvitie gornykh territorii* [*Sustainable development of mountain territories*], 11(1), 15-25. DOI: 10.21177/1998-4502-2019- 11-1-15-25.

Zabelina, I.A., Deluga, A.V. (2019b). Ekologo-ekonomicheskie tendentsii v baikal'skom regione i na dal'nem vostoke v usloviiakh institutsional'nykh izmenenii [Trends of Ecological and Economic Development of the Far East Regions and Sub-federal Units of the Baikal Region under Conditions of Institutional Change]. In *EKO* [*ECO*], 5(539), 66-88. DOI: 10.30680/ECO0131-7652-2019-5-66-88.

Парадокс Джевонса: способствуют ли российские природоохранные институты «зеленому» росту?

И.П. Глазырина, И.А. Забелина
Лаборатория эколого-экономических исследований
Институт природных ресурсов, экологии и криологии СО РАН
Российская Федерация, Чита
Забайкальский государственный университет
Российская Федерация, Чита

Аннотация. Целью данной работы является количественная оценка эффективности природоохранных институтов в России с позиций концепций «зеленой» экономики и «зеленого» роста. Для этих целей использовались показатели эколого-экономической динамики, которые можно рассматривать как характеристики качества экономического роста с экологической точки зрения: экоинтенсивность, которая представляет собой прямые количественные характеристики использования ресурсов или негативного воздействия на окружающую среду в расчете на единицу экономического результата, и коэффициенты декаплинга. Авторы придерживаются подхода к количественной оценке «зеленого» роста, предложенного П. Виктором в 2014 году. Предлагаемый инструментарий позволяет анализировать эколого-экономические тенденции для отдельных регионов, отраслей и видов экологической нагрузки. На основании результатов расчетов можно сделать вывод, что российские природоохранные институты не являются достаточно тонким инструментом регулирования, так как они не в полной мере учитывают региональные особенности и в целом не создают достаточных стимулов для экологизации экономики. Результаты работы могут быть использованы как в теоретических исследованиях эколого-экономической динамики отдельных стран и регионов, так и в практической разработке программ развития территорий.

Ключевые слова: экоинтенсивность, декаплинг, эколого-экономические тренды.

Работа выполнена в рамках Программы фундаментальных исследований СО РАН (XI.174.1).

Научная специальность: 08.00.05 – экономика и управление народным хозяйством.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 507-516

DOI: 10.17516/1997-1370-0585
УДК 339.5

Assessing Competitiveness of Forest Industry: Theoretical and Empirical Aspects

Roman V. Gordeev*
Siberian Federal University
Krasnoyarsk, Russian Federation
Institute of Economics and Industrial Engineering of the SB RAS
Novosibirsk, Russian Federation

Received 10.03.2020, received in revised form 15.03.2020, accepted 20.03.2020

Abstract. Numerous studies are dedicated to the competitiveness assessment of countries, regions and industries. However, it is not easy to choose the methodology to assess the competitiveness of forest products. The main difficulties arise even at the stage of defining the term "competitiveness", selecting the criteria for its achievement and choosing the measure suitable for its evaluation. This article analyzes the theoretical foundations of competitiveness in terms of two main approaches: comparative and competitive advantages. The main novel result of this work is a comprehensive review of empirical competitiveness assessments as regards the forest industry. Several methods have been identified as the most popular means to explore forest products' competitiveness. One of the most convenient approaches to estimate competitiveness at the national and regional level is to calculate the comparative advantage revealed. The last section of the article covers the benefits and disadvantages of this approach.

Keywords: competitiveness, comparative advantage, competitive advantage, trade theory, forestry, timber industry.

The reported study was funded by the Russian Foundation for Basic Research (the research project No. 18-010-01175).

Research area: economics and national economy management.

Citation: Gordeev, R.V. (2020). Assessing competitiveness of forest industry: theoretical and empirical aspects. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 507-516. DOI: 10.17516/1997-1370-0585.

* Corresponding author E-mail address: rgordeev@sfu-kras.ru
ORCID: 0000-0002-2769-3914

Introduction

The use of the term "competitiveness" has become widespread in the economic literature, business communication and even public discourse. Capobianco-Uriarte et al. (2019) found that the number of articles on competitiveness published annually increased from 15 in 1983 to 146 in 2017. However, there is no universal definition or coordinated estimation procedure for competitiveness.

Durand and Giorno (1987) argued that the ideal tool for measuring competitiveness should meet three criteria: represent all goods involved in competition, cover all the markets and use internationally comparable data. But in practice, the researcher often faces various constraints. Therefore, under different conditions, the choice of evaluation approach depends on the object of the study, the set of available statistics and the purpose of the analysis. The analysis of forest product competitiveness is no exception within this framework.

Forestry is the kind of economic activity that strongly affects Earth's ecosystems. It is closely connected with the different aspects of hydrological cycle (Bartík et al., 2018), climate change (Pyzhev, Vaganov, 2019; Chugunkova, 2019) and changes in fauna (Mezei et al., 2017; Ivantsova et al., 2019). Therefore, the study of forest sector competitiveness is an important and relevant task.

There are many articles that address the competitiveness of the forest sector. However, a large part of them is devoted to identifying factors of competitiveness and opportunities to improve it. A direct empirical assessment of forest sector competitiveness at the national or regional level has received much less attention in the literature. This article presents an attempt to summarize and analyze the studies on forest sector competitiveness assessment.

Theoretical framework of competitiveness

Initially, the concept of competitiveness was associated primarily with the Porter's theory of competitive advantages (Porter, 1990) and was perceived by representatives of academia with skepticism. For example, Krugman (1994) actively opposed the transfer of this idea from the firms to the national economies, calling the "obsession with competitiveness" meaningless, erroneous and dangerous. However, Cho and Moon (2000) show that competitiveness theory is rooted in classical trade theories. Therefore it is necessary to discuss two main approaches to competitiveness assessment: using methodology of international trade theories and building a multi-criteria model within the framework of the Porter's theory.

Trade theories and comparative advantage

The starting point for the development of trade theories was mercantilism. Mercantilists studied the movement of money and goods between countries, encouraged government intervention in international trade and supported protectionism.

Smith in "The Wealth of Nations" (1776) criticized mercantilism and supported the idea of free trade. He claimed that if countries specialized in trade according to their natural absolute advantages, all nations would benefit. According to Smith, the country shall specialize in exporting goods in producing which it spends less resource than other nations and has to import products that are produced by other countries at lower costs.

Ricardo (1917) developed this idea and argued that nations without absolute advantages can also benefit from international trade if they have a comparative advantage over other countries in producing certain products. It was the concept of Ricardian comparative advantage that laid the foundation for the development of subsequent trade theories: The Heckscher-Ohlin model, New trade theory and "New" New Trade Theory.

Classical trade theories were mainly criticized for the need to expand the model by increasing the number of factors of production. At the beginning of the 20th century, a two-factor model was formulated by Heckscher and Ohlin within the framework of neoclassical economic theory. According to the Heckscher-Ohlin theorem, the country exports capital-intensive goods if it has a relative abundance in capital or the labour-intensive products if it is labour-abundant (Ohlin, 1933). In other words,

different proportions of factors of production in countries are the basis of comparative advantage and cause the existence of international trade.

However, the Heckscher-Ohlin model could not explain several issues. For instance, why developed economies with similar factor proportions trade with each other (Volchkova, 2009). In addition, it performed poorly in econometric studies. One of the most well-known cases was Leontief paradox (1953).

To explain the contradictions accumulated by classical theories of international trade, Krugman (1980) developed the New Trade Theory using the toolkit of modelling monopolistic competition developed by Dixit and Stiglitz (1977). This theory is based on completely different assumptions: heterogeneity of goods, imperfect competition and increasing returns to scale. According to the New Trade Theory, the basis of comparative advantage is the market size: supplying products to a large market allows reducing production costs through economies of scale. Another important difference from the Heckscher-Ohlin model is that New Trade Theory focuses on competition among firms, not nations.

In the early 2000s, Melitz (2003), Antras and Helpman (2004) have formed a new direction in the study of international trade, called the "New" New Theory of Trade. The main idea is that the productivity of firms, as well as the market size, are the main determinants of the comparative advantages. Marginal costs vary from company to company, and as a result of increasing competition, many firms have to leave the market, thus, only the most efficient firms can successfully integrate into world trade (Wagner, 2007).

Competitive advantage

Porter has integrated in his theory some ideas from international trade theory and world business practice (Porter, 1990). He believed that national prosperity is not inherited, but created. While comparative advantages based on factors of production are stable, competitive advantages are dynamic and based on innovations and human capital development. At the same time, a decisive role in increasing competitiveness is played by productivity, which depends on the efficiency of production, quality and other characteristics of manufactured goods.

Based on a study of the reasons for competitive success in ten leading trading countries, Porter defines his Diamond Model of national advantage consisting of four determinants:

1. Factor conditions. Porter shares the classic view of the influence of production factors on competitive advantages. However, to enlarge the array of traditional factors (labour, land, capital) he adds some new ones, which are created, not inherited. They are adapted to a specific industry and include, for instance, the scientific and information potential of the state, the state of transport and communication, the health care system and the provision of housing.

2. Demand conditions, according to Porter, play a huge role in improving product competitiveness. In assessing the conditions of domestic demand it is necessary to take into account the characteristics of market capacity, the dynamics of its development, consumer demand, etc.

3. Presence of related and supporting industries is another crucial factor in developing competitive advantage. For any company it is extremely important to have the necessary equipment, close ties with suppliers, commercial and financial structures.

4. Strategy, structure and rivalry. High competition in the domestic market increases the chances of firms to successfully claim a significant share in the world market (Porter, 1990).

Subsequent empirical studies have shown that the Diamond model can be supplemented by other factors, including multinational activity and government. These ideas were developed as the Nine-Factor Model (Cho, 1994) and the Generalized Double Diamond Model (Moon et al., 1998).

Here there were considered the main theoretical approaches to defining and assessing the competitiveness. The next section will cover the world experience of empirical competitiveness assessments as regards the forest industry.

Empirical competitiveness estimations of forest industry

Dieter and Englert (2007) assessed the level of competitiveness of the German timber industry in the world market. This research is devoted to the study of the main trends on the world market of timber industry products in the period 1993–2002. The authors classify all forest products into three groups according to the processing level (raw wood, semi-finished and finished wood products) and two sectors (wood and paper). Using revealed comparative advantage (RCA) indexes (Balassa, 1965; Aquino, 1999), they explored the nature of Germany's international specialization in wood products trade and analyzed the dynamics of competitiveness of 21 major exporters in the global timber market. In addition, the Constant Market Share analysis (Milana, 1988) was used to explain export growth by four effects: world growth, commodity-composition, market-distribution and competitiveness. This approach allowed the authors to establish the positive correlation between the export growth rate and the country's competitiveness level.

Daigneault et al. (2008) analyzed the competitiveness of the US timber sector depending on different exchange rate policies. They used a dynamic global timber market model (Sedjo, Lyon, 1990; Sohngen et al., 1999) that includes optimal managing investments, timberland area and age class distributions of forests. The results show that the level of competitiveness of the US forest industry is sensitive both to domestic policies to maintain a relatively high dollar exchange rate and the depreciation of South American developing countries' currencies against the US dollar.

The analysis of global competitiveness of Chinese furniture products is carried out in the article by Han et al. (2009). The Grubel and Lloyd index (1975), Balassa index and the Trade Competitiveness Index (Greenaway, Milner, 1993) were chosen as the main competitiveness indicators for the study. The purpose of the study was to assess the current level of competitiveness of the Chinese furniture industry. It was found that during the period under review, from 1993 to 2007, China went from comparative disadvantage to a relatively high advantage in furniture trade, gaining a strong position in the world markets for these products. The competitiveness analysis has shown that developed countries still have the largest share in the world furniture market, but over the period under review, they are gradually losing their competitiveness in favour of the rapidly developing countries of Southeast Asia, Eastern Europe and Latin America.

Kovalčík (2011) explored profitability and competitiveness of forest industry in 18 European countries. This study uses several indicators of competitiveness such as: output of forestry, GDP of forestry, contribution of forestry to GDP, gross value added, net value added and entrepreneurial income. All of them measured in two dimensions: per hectare of forest and per employee. The results of the comparative analysis conducted for each of the indicators show that competitiveness is strongly influenced by the state of economy (developed economy or economy in transition) and the type of region according to the author's classification. However, while indicators per employee calculated for developed countries are 5-10 times higher than for countries in transition, the difference is lower per hectare, which can be explained by the insufficient quality of statistical data used for per capita indicators.

Karpuk (2011) conducted the study of Ukrainian wood products concerning foreign trade. The author analyzed the foreign trade balance and used Grubel and Lloyd and Balassa indices to assess the competitiveness of forest products in Ukraine and compare the volume of its foreign trade with major trading partners, in particular, with the EU countries. Besides, the author provides the results of the the SWOT analysis of foreign economic activity of Ukrainian enterprises of forest industry and offers a number of measures to improve the efficiency of foreign trade in Ukrainian forest products.

A study by Bojnec and Fertő (2014) reveals the problem of forest industry competitiveness in relation to the so-called "new" EU member states that joined the EU in 2004 and 2007. The main objective of the study was to find out to what extent the trade flows of the countries under consideration have changed

since EU accession. As a main competitiveness measure these authors chose revealed trade advantage (RTA) index, proposed by Vollrath (1991). They also calculated the duration of revealed trade advantage using methodology of survival analysis (Cleves et al., 2004). The results show that all "new" EU member states, except Cyprus, experienced comparative disadvantages in exporting their goods to the EU market. At the same time, it is noted that for most countries considered, products with high added value play a key role in the supply chains of the forest industry.

Parobek et al. (2016) analyzed the competitiveness of Slovakian wood and semi-finished wood products. Using modified Balassa index and comparative price level index the authors found that the abundance of forest resources and competitive prices determine the comparative advantage in industrial coniferous roundwood trade for Slovakia.

Vokhmyanin (2017) used the integral indicator to assess competitiveness of the Russian forest sector on regional level. It contains several indices that describe the state of the forest industry, including production factors, regional investment activity, presence of related industries, export volumes, etc. The methodology was applied to ten regions of the Northwestern Federal District. As a result, the Arkhangelsk Oblast and the Republic of Karelia were recognized as the leaders of the industry, and the lowest level of competitiveness was found for the Murmansk and Pskov Oblasts. The best dynamics of forestry development were demonstrated by the Vologda Oblast, which is explained by the renewal of fixed assets, increase in the volume of investments, improvement in the financial condition of the regional forest industry enterprises.

Rossato et al. (2018) studied wood pulp competitiveness in 6 countries: USA, Brazil, Canada, Sweden, Finland and China. For this purpose, the authors calculated several indicators of competitiveness: Balassa index, symmetric version of RCA (Dalum et al., 1998) and trade balance index (Lafay, 1990). The results showed that all countries except China have comparative advantages in wood pulp trade. The pulp industry was also found to have significant positive effects on the export economies of Brazil, Finland, Canada and Sweden, as well as moderate positive effects in the USA.

In the paper (Gordeev, Pyzhev, 2015) we studied competitiveness on national level using Balassa and Aquino indices. We also used Grubel and Lloyd index for a more thorough study of Russian intra-industry trade. However, it would not be quite correct to assess comparative advantages only at the country level. Geographical factors also have a great influence on institutional, social and economic aspects of development of Russian regions (Zubarevich, 2015; Shida, 2019). This is also true for the timber industry, as Russian regions are very heterogeneous in terms of resource endowment, proximity to markets, etc. The concept of comparative advantage can also be applied on regional level. Such studies have been conducted to analyze the competitiveness of industries in a number of countries, including Italy (Benedictis, 2005), USA (Clark et al., 2007), Brazil (Feistel, Hidalgo, 2010), China (Sawyer et al., 2017). Thus, we also assessed competitiveness at the regional level (Gordeev et al., 2018). The results show that the specialization of the Russian trade is determined by the resource abundance and low efficiency of the state forest policy. We also classified Russian regions into four groups by the number of forest products with comparative advantage in trade.

Hence, it can be concluded that the following approaches are generally used to conduct empirical studies on forest industry competitiveness (Table 1):

– various revealed comparative advantage indexes;
– estimation of price indices for timber products;
– constant market share analysis;
– optimization models;
– analysis of different sectoral indicators.

Discussion

One of the most popular approaches to assess competitiveness is to identify comparative advantages using different indices. With regard to the task of assessing competitiveness of Rus-

Table 1. Studies on competitiveness assessment of forest products

Authors	Level of competitiveness	Methods
Dieter, Englert, 2007	National	Revealed comparative advantage indices (Balassa index, Aquino index), the Constant Market Share analysis
Daigneault et al., 2008	National	Dynamic global timber market model
Han et al., 2009	National	The Grubel and Lloyd index, Balassa index, the Trade Competitiveness Index
Kovalčík, 2011	National	Analysis of several indicators (Output of forestry, GDP of forestry, contribution of forestry to GDP, gross value added, net value added and entrepreneurial income)
Karpuk, 2011	National	Revealed comparative advantage (Balassa index) and the Grubel and Lloyd index
Bojnec, Fertő, 2014	National	Revealed trade advantage index, survival analysis
Parobek et al., 2016	National	Revealed comparative advantage index (modified Balassa index), comparative price level index
Vokhmyanin, 2017	Regional	Integral assessment, including a number of indicators characterizing production, foreign trade, investment climate, etc. in the forest industry sector
Rossato et al., 2018	National	Revealed comparative advantage indexes (Balassa index, RSCA, TBI)
Gordeev, Pyzhev, 2015; Gordeev et al., 2018	National, regional	Revealed comparative advantage indexes (Balassa index, Aquino index, RTA), the Grubel and Lloyd index

sian forest industry, this approach also seems to be the most convenient. In fact, it has several important advantages over other alternatives.

1. Consistency with theoretical notions of competitiveness. The concept of revealed comparative advantages was developed by B. Balassa (1965) in accordance with the Ricardo's theory of comparative advantages and the Heckscher-Ohlin model. The analysis is based on an ex-post assessment of competitiveness by calculating the share of a particular commodity in the export of the certain country compared to other countries. The above review shows that there are many different ways to measure revealed comparative advantages in trade. Comprehensive comparison of different RCA indicators was given by Gnidchenko and Salnikov (2015).

2. Availability of data. The lack or absence of the necessary statistics is a serious limitation for many studies. Calculating revealed comparative advantages requires only trade statistics, which is available for Russia and is very detailed. With respect to the forest sector, this allows: (1) to conduct analysis not only at the national level but also at the regional level; (2) to calculate comparative advantages not only by product groups but also by certain products.

3. Simplicity of calculation. Even if the necessary data were available, the approaches of assessing competitiveness mentioned above would have different labour intensity. And with limited access to data it seems difficult to use alternative approaches to assess competitiveness at the regional level or for a specific forest product. Calculating revealed comparative advantages appears to be the simplest way to assess competitiveness and its results are easy to interpret. Besides, this approach does not require additional use of optimization modelling or multi-criteria models such as the Diamond Model.

However, it should also be noted that the concept of revealed comparative advantage has some limitations.

1. New Trade Theory and "New" New Trade Theory indicate that the subjects of com-

petition are corporations, not countries, regions or industries. However, firm statistics are still largely unavailable, making it impossible to build complete models under these theories.

2. Perhaps the main shortcoming of revealed comparative advantages is that interregional trade flows within a country remain unaccounted for. Therefore, it is possible to evaluate competitiveness of forest products only on the global market and not on the domestic one.

3. The estimates may be biased due to the fact that the country (or region) in which the product is produced is not always the final exporter as well. This problem has been widely discussed in literature, but there seems to be no way to offset this effect beyond the use of other data sources (Coughlin, Mandelbaum, 1991; Erickson, Hayward, 1991; Cronovich, Gazel, 1998). In respect to the forest sector, the problem is that current timber turnover control system does not allow for credible assurance that exported wood has been harvested in the same region.

Conclusion

This article contributes to the literature on forest sector competitiveness in several dimensions. First, theoretical approaches to assess competitiveness from the perspective of international trade theories and Porter's theory of competitive advantage were analyzed. The evolution of the competitiveness definition within these approaches was shown.

Secondly, an overview of empirical studies on competitiveness assessment with regard to forest industry was made. It was found that usually the following approaches are used in order to conduct competitiveness analysis of forest products: revealed comparative advantage indices; price indices; constant market share analysis; optimization models; various indicators of forest sector state.

Finally, it was concluded that one of the most popular measures to assess competitiveness is an approach based on the concept of revealed comparative advantage. The pros and cons of its application to assess the competitiveness of forest products were described.

References

Antràs, P., Helpman, E. (2004). Global Sourcing. In *Journal of Political Economy*, 112(3), 552–580. DOI: 10.1086/383099

Aquino, A. (1978). Intra-industry trade and Inter-industry specialization as concurrent sources of international trade in manufactures. In *Weltwirtschaftliches Archiv,* 114(2), 275–296.

Balassa, B. (1965). Trade Liberalisation and "Revealed" Comparative Advantage. In *Manchester School*, 33(2), 99–123. DOI: 10.1111/j.1467-9957.1965.tb00050.x

Bartík, M., Holko, L., Jančo, M., Škvarenina, J., Danko, M., & Kostka, Z. (2019). Influence of Mountain Spruce Forest Dieback on Snow Accumulation and Melt. In *Journal of Hydrology and Hydromechanics*, 67(1), 59–69. DOI: 10.2478/johh-2018-0022

Bojnec, Š., Fertő, I. (2014). Forestry industry trade by degree of wood processing in the enlarged European Union countries. In *Forest Policy and Economics*, 40, 31–39. DOI: 10.1016/j.forpol.2013.11.009

Capobianco-Uriarte, M. de las M., Casado-Belmonte, M. del P., Marín-Carrillo, G.M., & Terán-Yépez, E. (2019). A Bibliometric Analysis of International Competitiveness (1983–2017). In *Sustainability: Science Practice and Policy*, 11(7), 1877. DOI: 10.3390/su11071877

Cho, D.S. (1994). A dynamic approach to international competitiveness: The case of Korea. In *Journal of Far Eastern Business*, 1(1), 17–36. DOI: 10.1080/13602389400000002

Cho, D.S., Moon, H.C. (2000). *From Adam Smith to Michael Porter. Evolution of Competitiveness Theory*. World Scientific Publishing Co. Re. Ltd., 223 p.

Chugunkova, A.V. (2019). Napravleniia adaptatzii i smiagcheniia posledstvii izmeneniia klimata dlia ekonomiki lesnogo khoziaistva Rossii [Climate change mitigation and adaptation options in the Russian forestry sector]. In *Ekonomicheskii analiz: teoriia i praktika* [*Economic analysis: theory and practice*] 18(11), 2078–2102. DOI: 10.24891/ea.18.11.2078

Clark, D.P., Sawyer, W.C., & Sprinkle, R.L. (2005). Revealed Comparative Advantage Indexes for Regions of the United States. In *Global Economy Journal*, 5(1), 1–26. DOI: 10.2202/1524-5861.1033

Cleves, M.A., Gould, W.W., & Gutierez, R.G. (2004). *An Introduction to Survival Analysis Using STATA*. Stata Press, College Station, Texas, 372 p.

Coughlin, C.C., Mandelbaum, T.B. (1991). Measuring State Exports: Is There a Better Way? In *Federal Reserve Bank of St. Louis Review*, 73(4), 65–79.

Cronovich, R., Gazel, R. (1998). Do Exchange Rates and Foreign Incomes Matter for Exports at the State Level? In *Journal of Regional Science*, 38(4), 639–657. DOI: 10.1111/0022-4146.00114

Daigneault, A.J., Sohngen, B., & Sedjo, R. (2008). Exchange rates and the competitiveness of the United States timber sector in a global economy. In *Forest Policy and Economics*, 10(3), 108–116. DOI: 10.1016/j.forpol.2007.07.001

Dalum, B., Laursen, K., & Villumsen, G. (1998). Structural Change in OECD Export Specialisation Patterns: de-specialisation and "stickiness." In *International Review of Applied Economics*, 12(3), 423–443. DOI: 10.1080/02692179800000017

De Benedictis, L. (2005). Three Decades of Italian Comparative Advantages. In *The World Economy*, 28(11), 1679–1709. DOI: 10.2139/ssrn.454060

Dieter, M., Englert, H. (2007). Competitiveness in the global forest industry sector: an empirical study with special emphasis on Germany. In *European Journal of Forest Research*, 126(3), 401–412. DOI: 10.1007/s10342-006-0159-x

Dixit, A., Stiglitz, J. (1977). Monopolistic competition and optimum product diversity. In *American Economic Review*, 67(3), 297–308.

Durand, M., Giorno, C. (1987). Indicators of International Competitiveness: Conceptual Aspects and Evaluation. In *OECD Econ. Stud.*, 147–182.

Erickson, R.A., Hayward, D.J. (1991). The International Flows of Industrial Exports from U.S. Regions. In *Annals of the Association of American Geographers. Association of American Geographers*, 81(3), 371–390. DOI: 10.1111/j.1467-8306.1991.tb01700.x

Feistel, P., Hidalgo, A. (2010). Brazilian regions' trade in MERCOSUR: An analysis of comparative advantages. In *Integration and Trade*, 31(14), 81–89.

Gnidchenko, A.A., Salnikov, V.A. (2015). *Net Comparative Advantage Index: Overcoming the Drawbacks of the Existing Indices*. Higher School of Economics Research Paper No. WP BRP 119/EC/2015. DOI: 10.2139/ssrn.2709009

Gordeev, R.V., Pyzhev, A.I. (2015). Analiz global'noi konkurentosposobnosti rossiiskogo lesopromyshlennogo kompleksa [Analysis of the Global Competitiveness of the Russian Timber Industry]. In *EKO,* 6, 109–130.

Gordeev, R.V., Pyzhev, A.I., & Zander, E.V. (2018). Konkurentosposobnost' lesopromyshlennykh kompleksov regionov Rossii [Competitiveness analysis of Russian regions' forest industries]. In *Tomsk State University Journal of Economics,* 43, 65–87. DOI: 10.17223/19988648/43/5.

Greenaway, D., Milner, C. (1993). Trade and Industrial Policy in Developing Countries. In *A Manual of Policy Analysis, Part IV Evaluating Comparative Advantage*. New York. The Macmillan Press, 181–208.

Grubel, H., Lloyd, P. (1975). *Intra-industry Trade: The Theory and Measurement of International Trade with Differentiated Product*. London: Macmillan, 205 p.

Han, X., Wen, Y., & Kant, S. (2009). The global competitiveness of the Chinese wooden furniture industry. In *Forest Policy and Economics*, 11(8), 561–569. DOI: 10.1016/j.forpol.2009.07.006

Ivantsova, E.D., Pyzhev, A.I., & Zander, E.V. (2019). Economic Consequences of Insect Pests Outbreaks in Boreal Forests: A Literature Review. In *Journal of Siberian Federal University. Humanities & Social Sciences*, 12(4), 627–642. DOI: 10.17516/1997-1370-0417

Karpuk, A. (2011). Development of foreign trade of Ukraine with the wood products [Razvitie vneshnei torgovli Ukrainy drevesnoi produktciei]. In *Commodities and markets*, 2, 26–36.

Kovalčík, M. (2011). Profitability and competitiveness of forestry in European countries. In *Journal of Forest Science*, 57(9), 369–376. DOI: 10.17221/138/2010-jfs

Krugman, P. (1980). Scale Economies, Product Differentiation, and the Pattern of Trade. In *American Economic Review*, 70(5), 950–959.

Krugman, P. (1994). Competitiveness: A Dangerous Obsession. In *Foreign Affairs*, 73(2), 28–44.

Lafay, G. (1990). The measurement of revealed comparative advantages [La measure des avantages comparatifs revéles]. In *Economie Prospective Internationale,* 41, 27–43.

Leontief, W. (1953). Domestic Production and Foreign Trade; The American Capital Position Re-Examined. In *Proceedings of the American Philosophical Society*, 97(4), 332–349.

Melitz, M. (2003). The impact of trade on aggregate industry productivity and intra-industry reallocations. In *Econometrica: Journal of the Econometric Society*, 71(6), 1695–1725.

Mezei, P., Jakuš, R., Pennerstorfer, J., Havašová, M., Škvarenina, J., Ferenčík, J., Slivinský, J., Bičárová, S., Bilčík, D., Blaženec, M., & Netherer, S. (2017). Storms, temperature maxima and the Eurasian spruce bark beetle Ips typographus – An infernal trio in Norway spruce forests of the Central European High Tatra Mountains. In *Agricultural and Forest Meteorology*, 242, 85–95. DOI: 10.1016/j.agrformet.2017.04.004

Milana, C. (1988). Constant-market-share analysis and index number theory. In *European Journal of Political Economy,* 4, 453–478. DOI: 10.1016/0176-2680(88)90011-0.

Moon, H.C., Rugman, A.M., & Verbeke, A. (1998). A generalized double diamond approach to the international competitiveness of Korea and Singapore. In *International Business Review,* 7, 135–150. DOI:10.1016/s0969-5931(98)00002-x.

Ohlin, B.G. (1933). *Interregional and international trade.* Cambridge, Harvard University Press, 617 p.

Parobek, J., Paluš, H., Kalamárová, M., Loučanová, E., Križanová, A., & Štofková, K.R. (2016). Comparative Analysis of Wood and Semi-Finished Wood Product Trade of Slovakia and Its Central European Trading Partners. In *Drewno*, 59(196), 183–194. DOI: 10.12841/wood.1644-3985.143.15

Porter, M.E. (1990). The Competitive Advantage of Nations. In *Harvard Business Review*, 68(2), 73–93.

Pyzhev, A.I., Vaganov, E.A. (2019). Rol' rossiiskikh lesov v realizatcii Parizhskogo klimaticheskogo soglasheniia: vozmozhnosti ili riski? [Global Climate Change Economics: The Role of Russian Forests]. In ECO, 11, 27–44. DOI: 10.30680/ECO0131-7652-2019-11-27-44

Ricardo, D. (1917). *The principles of political economy & taxation*. London, J.M. Dent & sons, ltd.; New York, E. P. Dutton & co., 300 p.

Rossato, F.G.F.S., Susaeta, A., Adams, D.C., Hidalgo, I.G., de Araujo, T.D., & de Queiroz, A. (2018). Comparison of revealed comparative advantage indexes with application to trade tendencies of cellulose production from planted forests in Brazil, Canada, China, Sweden, Finland and the United States. In *Forest Policy and Economics*, 97, 59–66. DOI: 10.1016/j.forpol.2018.09.007

Sawyer, W.C., Tochkov, K., & Yu, W. (2017). Regional and Sectoral Patterns and Determinants of Comparative Advantage in China. In *Frontiers of Economics in China*, 12(1), 7–36. DOI: 10.3868/s060-006-017-0002-6

Sedjo, R.A., Lyon, K.S. (1990). *The Long-Term Adequacy of World Timber Supply. Resources for the Future.* Washington DC, 230 p.

Shida, Y. (2019). Russian business under economic sanctions: is there evidence of regional heterogeneity? In *Post-Communist Economies*, 1–21. DOI: 10.1080/14631377.2019.1659567

Smith, A. (1776). An Inquiry into the Nature and Causes of the Wealth of Nations. Vol. II (1 ed.). *London: W. Strahan; and T. Cadell.* 588 p.

Sohngen, B., Mendelsohn, R., & Sedjo, R. *(1999).* Forest management, conservation, and global timber markets. In *American Journal of Agricultural Economics,* 81(1), 1–13. DOI: 10.2307/1244446.

Vokhmyanin, I.A. (2017). Otzenka konkurentosposobnosti lesnykh kompleksov territorii [Assessment of Competitiveness of the Timber Complexes of the Territories]. In *Problemy razvitiia territorii* [*Problems of Territory's Development*], 2(88), 77–91.

Volchkova, N. (2009). Novaia teoriia mezhdunarodnoi torgovli i novaia ekonomicheskaia geografiia (Nobelevskaia premiia po ekonomike 2008 goda) [New Theory of International Trade and New Economic Geography (Nobel Prize in Economics 2008)]. In *Voprosy Ekonomiki,* 1, 68–83. DOI: 10.32609/0042-8736-2009-1-68-83

Vollrath, T.L. (1991). A theoretical evaluation of alternative trade intensity measures of revealed comparative advantage. In *Weltwirtschaftliches Archiv*, 127(2), 265–280. DOI: 10.1007/bf02707986

Wagner, J. (2007). Exports and Productivity: A Survey of the Evidence from Firm-Level Data. In *World Economy*, 30(1), 60–82.

Zubarevich, N. (2015). Regional Dimension of the New Russian Crisis. In *Social Sciences*, 46(4), 3–18.

Теоретические и прикладные аспекты оценки конкурентоспособности лесной промышленности

Р.В. Гордеев
Сибирский федеральный университет
Российская Федерация, Красноярск
Институт экономики
и организации промышленного производства СО РАН
Российская Федерация, Новосибирск

Аннотация. В отечественной и зарубежной литературе большое внимание уделяется вопросам конкурентоспособности стран, отраслей, регионов. Однако сегодня не существует универсальной меры ее оценки. В настоящей работе анализируются теоретические и прикладные аспекты проблемы конкурентоспособности с точки зрения двух основных подходов: сравнительных преимуществ, берущих свое начало в теории международной торговли, и конкурентных преимуществ, традиционно ассоциирующихся с теорией М. Портера. Дан анализ современных прикладных исследований, посвященных тематике конкурентоспособности продукции лесопромышленного комплекса. Показано, что наиболее часто для решения данной задачи используют следующие методы: расчет выявленных сравнительных преимуществ; оценку индексов цен на лесопромышленную продукцию; анализ постоянной доли рынка; построение оптимизационных моделей; анализ различных отраслевых показателей. Проанализированы плюсы и минусы подхода выявленных сравнительных преимуществ в торговле как наиболее удобного для оценки конкурентоспособности отечественного лесного комплекса.

Ключевые слова: конкурентоспособность, сравнительные преимущества, конкурентные преимущества, теории международной торговли, лесной комплекс.

Исследование выполнено при финансовой поддержке РФФИ в рамках научного проекта № 18-010-01175.

Научная специальность: 08.00.05 – экономика и управление народным хозяйством.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 517–528

DOI: 10.17516/1997-1370-0531
УДК 316.43, 338.2

Social Tension Factors: Estimation and Analysis Issues (Case Study: the City of Omsk)

Evgeny A. Kapoguzov*[a], Roman I. Chupin[b], Maria S. Kharlamova[c] and Anastasia V. Pligunova[a]

[a]*Dostoevsky Omsk State University*
Omsk, Russian Federation
[b]*Institute of Economics and Industrial Engineering of SB RAS*
Novosibirsk, Russian Federation
[c]*Omsk Scientific Centre SB RAS*
Omsk, Russian Federation

Received 01.11.2019, received in revised form 22.11.2019, accepted 11.12.2019

Abstract. The study describes the problems of social tension factors measurement and estimation in cities and its current state in Omsk. The empirical basis of the study is the sociological survey data, conducted by the Omsk Regional Center of Public Relations and the Sociology Department of Dostoevsky Omsk State University. 975 people from 5 urban districts of Omsk were interviewed during the survey. Data analysis was carried out using frequency analysis methods and contingency tables. The significance and essentiality of the differences were estimated using the chi-square and Cramer's V criteria.
Age and education turn out to have the most significant impact on respondents' opinions; people with secondary or higher education are more often dissatisfied with the situation in the region, as for the age criterion, the group from 30 to 44 is the most dissatisfied one. The ranking of problems by importance from the respondents' point of view was done on the basis of frequency analysis. The leading positions are occupied by the social and economic problems such as low salaries, consumer goods prices, infrastructure of the city and public utilities, as well as bureaucracy of local authorities. Judging by the protest potential of Omsk citizens, it was concluded that the population is dissatisfied with the work of the local government. However, the protest potential is estimated as low, which is partially explained by the growing negative migration balance. As a result, recommendations on improving monitoring and analysis of social tension factors in the city have been offered.

Keywords: social tension, social tension estimation, social tension factors, social well-being, protest potential, trust in government.

* Corresponding author E-mail address: KapoguzovEA@omsu.ru
ORCID: 0000-0001-8083-5654 (Kapoguzov); 0000-0002-8904-1380 (Chupin); 0000-0003-4144-5893 (Kharlamova); 0000-0001-7816-9250 (Pligunova)

The study was carried out within the framework of the state assignment of the Omsk Scientific Center SB RAS (the Programme of FSR SAS for 2013-2020 (state No. Reg. AAAA-A17-117041210229-2)).

Research area: sociology.

Citation: Kapoguzov, E.A., Chupin, R.I., Kharlamova, M.S., Pligunova, A.V. (2020). Social tension factors: estimation and analysis issues (case study: the city of Omsk). J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 517-528. DOI: 10.17516/1997-1370-0531.

Introduction

Over the past few years, urban refinement trend, which explores the ways to improve the quality and standard of living in large cities, has been growing in the Russian Federation. At MOSCOW URBAN FORUM, the image on the metropolis's future was presented as "smart" and comfortable residence for people, encouraging them to start families, work and develop personally. The National Project "Housing and Urban Environment" has the similar tasks, i.e. "a sharp increase of the urban environment comfort" as its priority (which means reducing the number of cities with an unfavorable urban environment).

According to the architects designing "the cities of the future", by 2024 the key role in the construction of the "Smart City" in almost every constituent entity of the Russian Federation should be played by citizens themselves, whose participation is planned to be approximately 30% of the total number of the municipality residents. However, the conducted studies show that the requirements of urban activists are not fully echoed by the authorities, which creates a tense social atmosphere in the region. The situation is aggravated with strong negative connotation of media reports about the urban environment (Ovodova, Chupin, Zhigunov, 2018: 126). In addition, researchers emphasize the "corporate nature" of smart cities that are built around high-tech companies, while ordinary citizens do not have place in the dominant model of entrepreneurial management (Hollands, 2015), which subordinates them to its needs (Tadiar, 2016) associated with new risks (Bibri, Krogstie, 2017), in particular, for the environment, not-age-friendly structure (Buffel, Phillipson, 2016), etc.

The transformation processes, which are accompanied by political and economic instability, worsening living standards and other negative consequences, inevitably affect the mood of the population. They lead to a change in social relations and give rise to contradictions that take place in all spheres of society. The contradictions in society and their dynamics are manifested in social tension changes.

Aggravation of economic and political problems is dangerous, since it entails negative emotional and psychological moods of the population (Lezhnina, 2016). According to the Public Opinion Foundation (FOM) survey "The Main Problems of Regions", citizens of the Siberian Federal District are the most dissatisfied ones[1]. Omsk is among the territories of increased social tension[2]. During the economic crisis in 2014 in the city inhabited by more than a million people, approximately half of the population did not trust the local authorities (65%) and the head of the region (48%), which significantly exceeded the national average (45% on average in Russia). The activists' request for a "comfortable city" was not satisfied by the authorities and, therefore, the activists united in lots of different urban communities started transforming the public space of the city themselves. Moreover, this trend is noticeable in a wide range of megalopolises (Vakhshtayn, 2014).

Thus, Omsk is at risk of becoming one of the most prone to social tension agglomerations

[1] Significant problems in the development of Russian regions. Available at: https://fom.ru/Obraz-zhizni/12465 (accessed 05.15.19).

[2] Socio-economic and political tensions in the Russian regions for 2017. Available at: https://komitetgi.ru/analytics/3493/ (accessed: 05.15.19).

instead of a megalopolis of the future. In this regard, the relevant aim of the study is a periodic comprehensive analysis of social tension level and factors causing the tension, which includes the list of tasks: firstly, the preliminary assessment of the current situation and trends; secondly, the causes of its nature; and finally, the search for possible ways to reduce social tension.

Theoretical framework:
Factors of social tension in the studies of Russian and foreign researchers

Social tension is not a synonym of a social conflict, since the latter characterizes only one specific form of it. Social tension always exists in a society and it is normal. The presence of social tension becomes evident when the conflict of interests becomes apparent, and it could develop and change its forms from a latent stage to a social conflict.

In the article "Social Tension" I.N. Rukavishnikov identified the following key features for the city (Rukavishnikov, 1990):

1. Dissatisfaction of citizens with the state of significant areas of city life.

2. The population distrust the work of officials, deny the prospect of future development, and the emotional background gets worse.

Consequently, social tension is the presence of problems both in the social, economic and political spheres of life. The tense situation is often associated with the deprivation in the field of social and economic problems than with the distrust of the authorities. However, these are precisely those dangerous points of social tension localization when its various causes appear simultaneously.

Thus, in most approaches, social tension is represented through its levels (Kinsbursky, Topalov, 2016) and stages (Baranova, Frolov, 2012). An important indicator in measuring social tension is social well-being. The level of political and social tension in a society is also measured by the index of social well-being (Golovakh, Panin, Gorbachik, 1998). The concept of "social well-being" intersects with the concepts of "quality of life", "standard of living", "social tension", "social mood", and "social health" (Krupets, 2003).

Most methods of calculating the social well-being index are based on the estimation of the population satisfaction level with various aspects of their life. Through the estimation of various aspects of the respondents' life, scientists can find out the areas associated with the problems and contradictions.

For example, the Russian Public Opinion Research Centre (VCIOM) calculates the index of social mood, which is based on several indicators: satisfaction with life; social optimism; financial situation; economic situation in the country; political situation; the general vector of the country's development. The indexes are calculated on the basis of monthly express surveys conducted by VCIOM on a representative Russian sample[3]. They use the index construction method to analyse and visualise the charts that reflect the dynamics of the data obtained during the research. The Private Index of the n-th indicator is equal to the sum of positive and the sum of average ratings minus the sum of negative ratings. However, VCIOM does not provide the data on the method of deriving estimates.

One of the advantages of this method is the possibility to obtain negative values (when negative moods prevail), which will be "critical points" of the particular indexes of the method. This technique allows creating a "big picture", but to achieve this goal it is necessary to apply a more in-depth technique, which can identify factors of social tension.

A simpler assessment methodology is used by the Institute of Socio-Economic Development of Territories of the Russian Academy of Sciences. The index of social mood is based on the question about respondents' mood in recent days. During the calculation, the share of negative answers is subtracted from the share of positive answers, and then one hundred is added to the result to exclude negative values. The index varies from 0 to 200, and a value of 100 corresponds to a situation where the proportion of positive and negative answers coincides. Private indicators are based on the question "What could you say about your mood in recent

[3] Social indices. May 2015. VCIOM. Available at: https://wciom.ru/news/ratings/indeksy_socialnogo_samochuvstviya/ (accessed: 07.20.2019).

days?" This technique is a "thermometer" of the population's mood, which is an important aspect of identifying social tension. The disadvantage of this technique is the superficial character of the analysis based on one question that captures the respondent's mood in recent days; therefore, it is not possible to identify factors of social tension, as in the case with the previously described method.

Several methods have been developed in the field of assessing social security, which is a relatively new concept that has only been separated from national security in recent decades, but it is considered in close connection with the economy, urbanism, etc. In particular, specialised methods for assessing social security and risks are being developed to determine key factors in the perception of industrial enterprise employees (Kareeva, 2015).

A comprehensive estimation of social tension is possible with the use of the Scientific Center of the Federal Guard Service (FSO) methodology. The study using this technique to identify social tension factors in Russia and its regions was conducted in 2010-2011 (Baranova, Frolova, Kondrashin, 2011). As a result, a set of indicators characterising social tension (at the federal level) was proposed. At the first stage of the study, an expert survey was conducted to identify the factors that have a significant impact on social tension in Russia.

29 priority social tension factors were identified (listed in order of importance): per capita income, price increase, dissatisfaction with the local government, salary, level of social protection, dissatisfaction with the President of the Russian Federation activities, crime rate, dissatisfaction with the federal government and law-enforcement authorities activities, unemployment, distrust in local authorities, corruption, the work of health care authorities, housing issue, the work of public transport, the environmental situation, higher education accessibility and quality, private business development, media activities, secondary education quality and accessibility, general morbidity rate, birth rate, mortality rate, agricultural development, preschool education accessibility and quality, ethnic contradictions, activities of political parties, utilities problems, problems of culture, youth leisure and ethics.

Despite the fact that these methods of social mood measuring allows to determine its level and identify critical points in significant indicators of social well-being that indicate the way the society feels, which, in its turn, is the index of social tension (Abramovich, 2012), these methods do not allow to estimate the influence of various factors on the level of social tension in cities.

The key factors, which have the most significant influence on the level of social tension in the city, introduced in the FSO study are:

- per capita income;
- rising prices;
- dissatisfaction with the local authorities;
- salaries;
- crime rate;
- unemployment rate.

"Per capita income" is the most important among the factors presented. According to the study, the influence of the factors "rising prices for public utilities" and "unemployment rate" on the growth of social tension in the city has been increasing since 2010.

The results are partially confirmed by foreign studies. Thus, in large EU megalopolises the most significant influence on the level of dissatisfaction is exerted by the factors of income (Ranci, 2011). Some authors think that the presence of social tension is a natural condition for a city functioning (Netto, 2016). Basically, increasing social tension is the result of the more open urban political system (Eisinger, 1973), which creates conditions for open expression and spread of opinions. In particular, not finding a response to their initiatives from local authorities, urban activists themselves become a source of spreading social tension. Researchers note the presence of informal territories improvement practices that duplicate or replace the activities of local authorities. In this way, urban communities are trying to compensate for the existing gaps in state institutions, including saving transaction costs during the interaction of authorities with the population, and increasing the effectiveness of social control mechanisms (Kapoguzov, Chupin, 2016).

Thus, the most comprehensive methodology is that of Scientific Center of the Federal Guard Service (FSO), which follows from social tension measurement and estimation approaches review. However, it is necessary to localize the social tension factors to the development conditions of a particular city or a group of cities.

Design: the methodology of analyzing social tension factors and information basis of research

Based on the review it is possible to point out the key factor groups which influence the level of social tension which are divided into respondents' characteristics, social and economic factors and political factors. To obtain comprehensive characteristics of social tension factors, it is necessary to consider the factor groups in accordance with the blocks in Fig. 1.

The study used sociological study data (March-April 2018 survey), which was carried out by the Omsk Regional Center on Public Relations and Dostoevsky Omsk State University. The general aggregate: the adult population of Omsk in 2018 (residents of the Sovetsky Administrative District, Central Administrative District, Leninsky Administrative District, Octiabrsky Administrative District and Kirovsky Administrative District of Omsk, total 1,172,000 people). The sample aggregate in administrative districts was 975 people; its structure is shown in Table 1. The dataset was obtained using a questionnaire (apartment survey).

Taking the available information into account, it is necessary determine the analysis methods (statistics characterising the factor groups are presented in the results section in more detail). The selected groups of factors in the information basis of the research are measured by ordinal and nominal scales. The study of connection for nonmetric scales is carried out with the use of frequency analysis and con-

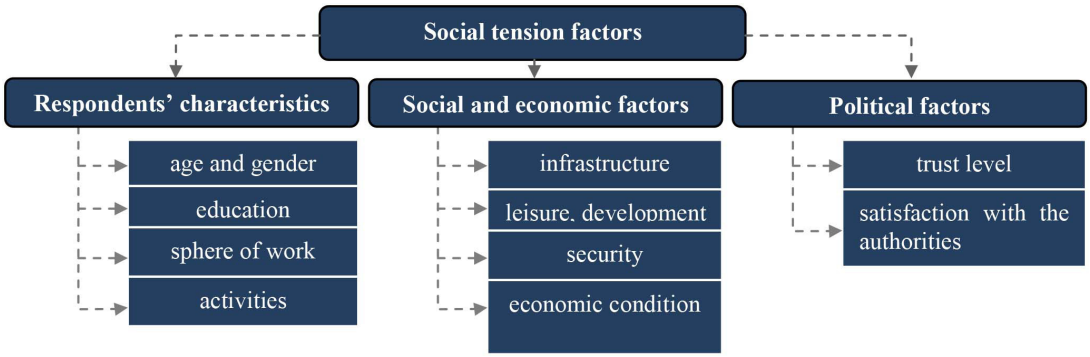

Fig. 1. Key blocks of social tension factors

Table 1. Sample structure by the administrative districts and age and gender characteristics

Sample distribution by administrative districts	
Administrative districts in Omsk	Number of respondents
Kirovsky District	217
Leninsky District	170
Oktiabrsky District	146
Sovetski District	202
Central District	239
total	975

Sample distribution by age and gender			
Age group, years	total espondents	including men	including women
18-29	238	432	544
30-44	271	119	119
45-59/45-54	199	131	140
≥60/ ≥55	268	109	90
total	975	432	544

tingency tables. The tools for the analysis are extremely limited in such conditions; however, the chi-square and Cramer's V criteria allow evaluating the significance and essentiality of the differences, respectively. Thus, it is necessary to analyse each block of the social tension factors taking into account suitable methods.

Results of estimating significant tension factors in Omsk

A statistically significant effect among the variables of gender, age, education district was exerted by the variables of age and education (Table 2).

The significance of age, gender, education and district factors on the dissatisfaction with the situation in the region based on the chi-square criterion showed that education and age have the most significant effect. At the same time, this criterion does not allow estimating the strength of influence. Therefore, the Cramer's V coefficient was calculated; its value shows that the age factor is the most essential. The contingency tables are presented only for significant factors. According to the estimates, the respondents with secondary or higher education are more often dissatisfied with the situation in the region, while dissatisfaction is mainly expressed by the age category from 30 to 44. At the same time, respondents from the first educational group are rarely discontent, whereas 69% of women in the second and third age groups feel dissatisfaction and 76% of women who do not have higher education are dissatisfied with the situation.

After obtaining a brief description of the respondents' characteristics effect, it is necessary to determine the issues that are significant from the respondents' point of view. In order to estimate the most serious problems, frequency analysis was used. The frequency distribution of the most disturbing issues (top five by significance) is presented in the Table 3.

According to the distribution of significance for citizens and frequency, a list of key factors was formed; the top ten are colored

Table 2. Estimation of the significance and essentiality based on the chi-square and Cramer's V criteria, contingency tables for significant factors

Significance of factors			
Variable	Chi-square (Cramer's V)	Degrees of freedom	Asymptotic significance
Gender	0.178(0.014)	2	0.915
Education	17.903 (0.097)	4	0.001
District	10.982 (0.076)	8	0.203
Age group	29.599 (0.125)	6	0.000

Contingency tables for significant factors

Question and answer options		Education				Age group				
		1	2	3	Total	1	2	3	4	Total
Are you dissatisfied with the situation in the city?	**Yes**	85	254	199	538	122	164	130	122	538
		15.8%	*47.2%*	*37.0%*	*100%*	22.7%	30.5%	24.2%	22.7%	*100%*
	No	87	132	124	343	97	80	49	117	343
		25.4%	*38.5%*	*36.2%*	*100%*	28.3%	23.3%	14.3%	34.1%	*100%*
	Difficult to answer	13	38	17	68	11	20	14	23	68
		19.1%	55.9%	25.0%	100%	16.2%	29.4%	20.6%	33.8%	100%
In total		185	424	340	949	230	264	193	262	949
		19.5%	*44.7%*	*35.8%*	*100%*	24.2%	27.8%	20.3%	27.6%	100%

Note: Education: "1" – secondary general education or lower (school), "2" – vocational education (vocational school, college, technical school), "3" – higher education;
Age group: "1" – 18-29; "2" – 30-44, "3" – 45-59 (male), 45-54 (female); "4" – 60 or older (male), 55 or older (female).

Table 3. The most disturbing issues for the population (frequency distribution)

Issue	1	2	3	4	5	Frequency
Expensive property (purchase, construction), land allocation for private housing	86	31	33	32	17	199
Conditions for children's development (playgrounds, clubs, sports facilities)	48	35	33	28	17	161
Bureaucracy, corruption in authorities and law-enforcement agencies	38	64	53	49	34	238
Quality of medical services, lack of medical facilities and medical staff	45	78	72	67	46	308
Cost of medical services	60	44	61	49	32	246
Low salaries	96	81	78	78	70	403
Low pensions	31	61	64	49	44	239
Unemployment, bankruptcy	25	44	57	61	65	252
Cultural leisure activities of young people and adults (recreation centers, stadiums, gyms, libraries, theaters, etc.)	26	15	24	23	15	100
The price of modern conveniences (electricity, gas, water, heating)	79	89	66	92	63	389
Street lighting (absence, shortage)	21	22	19	20	21	103
Badly maintained houses	14	31	29	25	31	130
Alcoholism	53	26	25	18	25	147
Drug addiction	41	42	25	31	37	176
Rising prices for food, clothing, medicines	60	46	77	59	70	312
Crime, criminal situation	5	6	11	8	11	41
Lack of kindergartens and schools (lack of places) and poor material support	41	15	14	15	8	93
Public transport, fares	35	32	18	24	12	121
State of roads and pedestrian zones	93	77	55	53	45	323
Ecology, garbage collection, landfills	44	83	66	48	46	287

blue in the table. The leading positions are occupied by such issues as "Low salaries", "The price of conveniences (electricity, gas, water, heating)", "State of roads and pedestrian zones", "Rising prices for clothes, food, medicines", "Quality of medical services", "Ecology", "Unemployment, bankruptcy", "Cost of medical services", "Low pensions", "Bureaucracy, corruption".

In order to estimate the political factors of social tension, firstly, a frequency analysis of the population trust to the local authorities was carried out. It was revealed that citizens found this question difficult to answer. Nevertheless, the "trusting group" prevails in assessing the level of trust to the Mayor of the city, but the "distrusting group" prevails in assessing the level of trust to such local authorities as the Omsk City Council and the City Administration of Omsk (Table 4).

As a part of the following analysis block, a frequency analysis of the protest potential of citizens was carried out. The results of measuring the protest potential are shown in Fig. 2.

If we enlarge the groups according to the values of variables, we will see that 53.2% are neutral towards the authorities, 21.9% are opposed to the authorities, 12.8% found it difficult to answer, 11.1% support the authorities. As a result, the protest potential seems to be at

Table 4. Trust in local authorities (frequency distribution)

The object of trust	*Absolutely trust*	*Partially trust*	*Difficult to answer*	*Partialy distrust*	*Absolutely distrust*
City council	119	121	469	107	155
	12.3%	12.5%	48.4%	11%	16%
Mayor of Omsk	217	147	465	63	78
	22.4%	15.2%	47.8%	6.5%	8.1%
Government of the Omsk oblast	123	146	407	149	147
	12.7%	15.0%	41.8%	15.4%	15.1%
Governor of the Omsk oblast	239	161	439	53	81
	24.6%	16.5%	45.1%	5.4%	8.3%

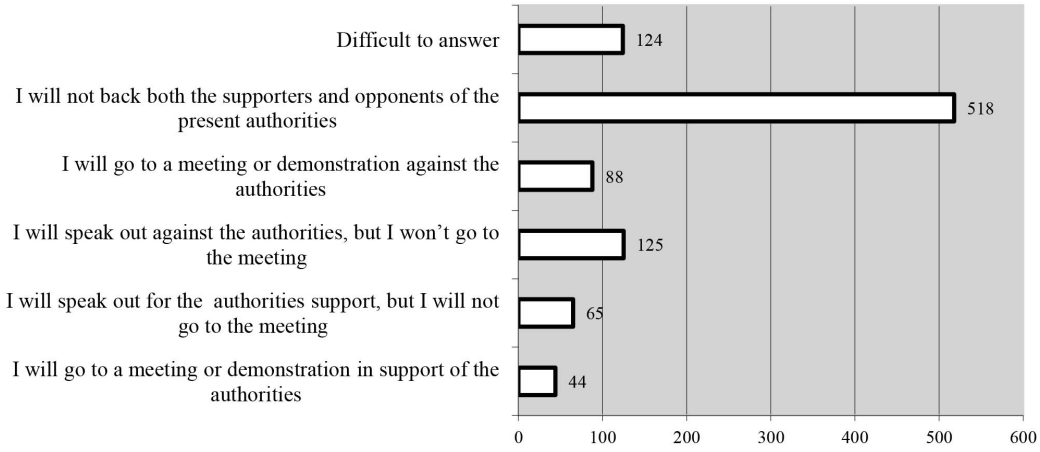

Fig. 2. The distribution of answers to the question "What will you do if a public rally or demonstrations of the current government opponents and its supporters take place in the near future?"

a low level, most of the respondents are neutral towards the government. However, the mood against the government prevails, while the share of supporters is minimal.

These factors determine a low level of social tension, however, taking into account the level of migration, the population has been rapidly declining in the recent years mainly due to negative migration[4] (according to Omskstat data on demographic processes of January 1, 2019). Consequently, the most dissatisfied with the authorities actors immigrate to other regions and spread protest mood.

The frequency analysis of the dissatisfaction degree with the local authorities' activities, as well as satisfaction with the administrative district head and the work of Administration are presented in the following table (Table 5).

The mode of the presented variables characterising satisfaction is "2 – rather bad". Thus, the population is more dissatisfied than satisfied with the local authorities' activity. Almost 50% found it difficult to estimate their degree of satisfaction. The majority of the respondents are satisfied with the work of the Mayor, while they feel low satisfaction with the work of the city council and Administration. Hence the citizens distrust and are

[4] Population. Omskstat 2019. Available at: http://omsk.gks.ru/wps/wcm/connect/rosstat_ts/omsk/ru/statistics/population/ (accessed: 06.20.19).

Table 5. Satisfaction with the work of local government (frequency distribution)

How do you assess the local Government's work?						
Satisfaction	**Municipality Administration**		**Municipal council**		**Head of District**	
	Frequency	***Percent***	***Frequency***	***Percent***	***Frequency***	***Percentage***
Good	258	26.5	185	19.0	189	19.4
Poor	344	35.3	348	35.7	289	29.7
Difficult to answer	369	37.9	436	44.8	491	50.4

Local Government Assessment in administrative districts						
Satisfaction	**Administrative districts**					**Total**
	Kirovsky	**Leninsky**	**Oktiabrsky**	**Sovetsky**	**Central**	
Good	38	25	43	38	45	189
Poor	66	50	32	80	62	290
Difficult to answer	113	95	70	82	131	491
Total	217	170	145	200	238	970

dissatisfied with the work of the city council and Administration based on the estimation of the level of trust. At the same time, the Sovetsky District inhabitants are the most dissatisfied with the work of its head and Administration. This is the industrial zone of the city with the "poorest areas" as well as the one with a large number of institutes and students.

Conclusion

In order to take measures that compensate or eliminate the negative effects of social tension, it is extremely important to ensure operational monitoring and analysis of its factors. Otherwise, inaction can lead to a social "explosion", that is, a transition from the state itself to actions, to open protest actions in particular, which could threaten the safety of the inhabitants living at a "critical local point".

Prevention of such consequences allows the authorities to eliminate or mitigate the growing conflict situation; it should include the analysis of the information received, development of elimination strategies, or response in addition to collecting general information about the current situation. For an early response it is necessary to clearly understand and monitor the factors contributing to the growth of social tension, which allow predicting its development from a latent level to a critical one.

Among the most significant social and economic problems, the respondents noted low wages, rising prices for utilities, the condition of roads, rising prices for clothes and food, the quality and cost of medical services, and the environment conditions. The estimation of trust in local authorities demonstrated that most people somewhat trust the authorities; the majority of the population would have reacted neutrally to a public rally or demonstration without backing either supporters or opponents of the present government. However, the mood against the government prevails, while only 11% support the government and a fifth would support the opposition or would declaim against the current government. Regarding satisfaction with the work of local authorities, the population gives an assessment of "rather bad" on average.

Thus, the social tension in Omsk is caused by a number of social and economic problems and dissatisfaction with the work of local authorities. However, as a hypothesis, social tension in Omsk can be attributed to the latent stage.

It is worth noting that there are some deep problems of collecting and processing information of the survey developed by the

Omsk Regional Center on Public Relations. The database contains a large number of omissions about the most significant issues. The authors of the present paper faced difficulties asking respondents to rank "significant problems" where they had to select five issues from the list of twenty and mark them in order of importance. Most respondents did not mark the required number of important issues. The results are also distorted by the fact that this question is preceded by its open version, where some respondents started listing problems without relying on the list, while others selected problems from the list and supplemented their own variants. First of all, the information that was collected by the open question cannot be structured or correlated with the proposed list. But the main difficulty is that the respondents often think that the problem has already been identified and do not mention it in the following questions, where they need to select problems from the list. If they mention the problem in an open question, which is close in meaning to the one on the list, they do not repeat it. In addition to that, the respondents' attention is scattered with a large number of options, and a respondent rather notes the last remembered options for significant issues than those that follow in the ranking order.

During the analysis of such data, a considerable part of the information becomes useless, since it cannot be structured due to the indicated problems. Nonmetric scales of variables are uninformative, since they are represented by a narrow list of possible values. This severely limits the definition of order relationships. As a result, using the base under consideration, a short list of questions can be studied using a narrow list of analysis methods, which leads to the need for additional collection of primary data.

Further research area is the estimation of the social tension stage. It is necessary to develop a survey toolkit that includes a scale of importance in order to identify the degree of satisfaction and dissatisfaction with the factors affecting social tension from the respondents' point of view. The scale of importance and satisfaction will determine the "weight" of each factor in the final value of the social tension indicator. This dataset will allow deriving the social tension index, which reflects the stage of social tension.

References

Abramovich, Ye.S. (2012). Matematiko-statisticheskie metody analiza sotsial'noi napriazhennosti v rossiiskom obshchestve [Mathematical and Statistical Methods for Analysing Social Tension in Russian Society]. In *Uchet i statistika* [*Accounting and Statistics*], 1 (25), 85-89.

Baranova, G.V., Frolov, V.A. (2012). Metodologiia i metodika izmereniia sotsial'noi napriazhennosti [Methods and Techniques for Measuring Social Tension]. In *Sotsiologicheskiie issledovaniia* [*Sociological Studies*], 3, 50-65.

Baranova, G.V., Frolova, D.N., Kondrashin, A.V. (2011). Osobennosti sotsial'noi napriazhennosti v regionakh Rossii [Features of Social Tension in the Regions of Russia]. In *Sotsiologicheskiie issledovaniia* [*Sociological Studies*], 6, 48-54.

Bibri, S.E., Krogstie, J. (2017). On the Social Shaping Dimensions of Smart Sustainable Cities: A Study in Science, Technology, and Society. In *Sustainable Cities and Society,* 29, 219-246.

Buffel, T., Phillipson, C. (2016). Can Global Cities Be 'Age-Friendly Cities'? Urban Development and Ageing Populations. In *Cities*, *55,* 94-100.

Eisinger, P.K. (1973). The Conditions of Protest Behavior in American Cities. In *American Political Science Review*, 1 (67), 11-28.

Golovakha, Ye.I., Panina, N.V., Gorbachik, A.P. (1998). Izmerenie sotsial'nogo samochuvstviia: test IISS [Measurement of Social Well-Being: The IISS Test]. In *Sotsiologiia: metodologiia, metody, matematicheskoe modelirovanie (4M)* [*Sociology: Methodology, Methods, Mathematical Modeling (4M)*], 10, 45-71.

Hollands, R.G. (2015). Critical Interventions into the Corporate Smart City. In *Cambridge Journal of Regions, Economy and Society*, *8*(1), 61-77.

Kapoguzov, Ye.A., Chupin, R.I. (2016). Sotsial'nyi kontrol' kachestva gosudarstvennykh uslug: neoinstitutsional'nyi podkhod [Social Control Over the Quality of Public Services: A Neo-Institutional Approach]. In *Ars Administrandi*, 3, 41-51.

Kareeva, A.P. (2015). Perception of Social Security by the Employees of a Large Industrial Enterprise from the Perspective of Post-Nonclassical Sociology. In *Journal of Siberian Federal University. Humanities & Social Sciences*, 8(9), 1886-1892.

Kinsbursky, A.V., Topalov, M.N. (2016). Sotsial'naia napriazhonnost' i massovye aktsii protesta (k voprosu o mekhanizme deistviia) [Social Tension and Mass Protests (On the Issue of the Mechanism of Action)]. In *Sotsiologicheskaia nauka i sotsial'naia praktika* [*Sociological Science and Social Practice*], 1, 20-34.

Krupets, Ya.N. (2003). Sotsial'noe samochuvstvie kak integral'nyi pokazatel' adaptirovannosti [Social Well-Being as an Integral Indicator of Adaptability]. In *Sotsiologicheskie issledovaniia* [*Sociological Studies*], 4, 143-144.

Lezhnina, Yu.P. (2016). Sotsial'no-ekonomicheskii krizis na prostranstve Rossii: problemy naseleniia i «ochagi bespokoistva» [Socio-Economic Crisis in Russia: Problems of the Population And "Centers of Concern"]. In *Sotsiologicheskie issledovaniia* [*Sociological Studies*], 10, 54-65.

Netto, V.M. (2016). *The Social Fabric of Cities*. Routledge.

Ovodova, S.N., Chupin, R.I., Zhigunov, A.Yu. (2018). Urbanisticheskii diskurs o blagoustroistve goroda v gorode: ot narrativov k institutam [Urban Discourse on the Improvement of the City in the City: From Narratives to Institutions]. In *Journal of Institutional Studies*, 3 (10), 123-138.

Ranci, C. (2011). Competitiveness and Social Cohesion in Western European cities. In *Urban Studies*, 13 (48), 2789-2804.

Rukavishnikov, V.O. (1990). Sotsial'naia napriazhennost' [Social Tension]. In *Dialog* [*Dialogue*], 8, 12.

Tadiar, N.X. (2016). City Everywhere. In *Theory, Culture & Society*, *33* (7-8), 57-83.

Vakhshtayn, V.S. (2014). Peresborka goroda: mezhdu yazykom i prostranstvom [Reassembly of The City: Between Language and Space]. In *Sotsiologiia vlasti* [*Sociology of Power*], 2, 9-38.

Факторы социальной напряженности: проблемы оценки и анализа (на примере города Омска)

Е.А. Капогузов[а], Р.И. Чупин[б], М.С. Харламова[в], А.В. Плигунова[а]

[а]Омский государственный университет им. Ф.М. Достоевского
Российская Федерация, Омск
[б]Институт экономики и организации промышленного производства СО РАН
Российская Федерация, Новосибирск
[в]Омский научный центр СО РАН
Российская Федерация, Омск

Аннотация. Статья посвящена проблемам оценки факторов социальной напряженности в крупных городских агломерациях, а также ее фактического состояния в городе Омске. В основу статьи легли данные социологического исследования, проведенного Региональным центром по связям с общественностью Омска при участии кафедры социологии ОмГУ им. Ф.М. Достоевского. В ходе проведения анкетирования опрошены 975 человек, проживающих на территории пяти административных округов города Омска. Анализ данных проведен с применением методов частотного анализа и таблиц сопряженности. Оценку значимости и существенности различий производили с использованием критериев хи-квадрат и V-Крамера. В результате было выявлено, что наиболее значимое влияние среди рассматриваемых характеристик респондентов оказывают возраст и образование: респонденты, имеющие среднее или высшее образование, чаще отмечают недовольство ситуацией в регионе, тогда как недовольство в основном испытывает возрастная категория от 30 до 44 лет. На основе частотного анализа проведено ранжирование проблем, волнующих население в наибольшей степени. Лидирующие позиции занимают социально-экономические проблемы оплаты труда, цен на потребительские товары, инфраструктуры города и ЖКХ, а также бюрократизм местных властей. Исходя из измерения протестного потенциала граждан города Омска сделан вывод о низком уровне удовлетворенности жителей местной властью. Однако при этом протестный потенциал оценен как низкий, что может быть частично объяснено нарастающим отрицательным миграционным сальдо. В результате на основе проведенного исследования разработаны рекомендации по совершенствованию мониторинга и анализа факторов социальной напряженности в городе.

Ключевые слова: социальная напряженность, оценка социальной напряженности, факторы социальной напряженности, социальное самочувствие, протестный потенциал, доверие органам власти.

Работа выполнена по государственному заданию ОНЦ СО РАН в соответствии с Программой ФНИ ГАН на 2013-2020 годы (№ гос. рег. АААА-А17-117041210229-2).

Научная специальность: 22.00.00 – социологические науки.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 529–537

DOI: 10.17516/1997-1370-0586
УДК 330.15

Introducing Norwegian Oil and Gas Model in Russia: Institutional Challenges

Valeriy A. Kryukov*[a] and Andrey K. Krivorotov[b]
[a]*Institute of Economics and Industrial Engineering of SB RAS*
Novosibirsk, Russian Federation
[b]*Odintsovo branch, Moscow State Institute of International Relations*
(MGIMO University)
Odintsovo, Moscow District, Russian Federation

Received 12.03.2020, received in revised form 06.04.2020, accepted 13.04.2020

Abstract. While the Norwegian oil and gas model is a popular reference case in Russia, one should realize that it has developed over time within a specific national, historical and institutional context. The core role in this model belongs to the Norwegian state in terms of resource management, establishing the regulatory framework, massive taxation, and actual involvement in the business, first of all through the national petroleum company Statoil/Equinor. Equinor has evolved since 1972 from a modest carried partner to a large streamlined corporation, operating in 35 countries and focusing heavily on global technological leadership. All investors, either state-owned or private, are put under the same public scrutiny and stimulated with non-fiscal incentives, such as political stability, predictable regulations and abundant geological information. This large scale government intervention relies on proactive, professional and incorrupt bureaucracy enjoying broad powers.
Much of this practice is not common and may not be introduced directly in Russia, which tends to limit the role of public servants and rely on big state corporations. However, the Norwegian experience seems very relevant for the urgently needed overhaul of the Russian energy policies, both offshore and in Western Siberia.

Keywords: Norway, oil and gas industry, governance, state-owned company, innovations.

The article was written with financial support of the Russian Science Foundation (grant No. 19–18–00170).

Research area: economics; world economy.

Citation: Kryukov, V.A., Krivorotov, A.K. (2020). Introducing Norwegian oil and gas model in Russia: institutional challenges. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 529-537. DOI: 10.17516/1997-1370-0586.

* Corresponding author E-mail address: kryukov@ieie.nsc.ru, krivorotov@starlink.ru
ORCID: 0000-0002-7315-6044 (Kryukov); 0000-0001-8983-5378 (Krivorotov)

References to the positive Norwegian experience are very common in the domestic Russian debate on oil and gas policies. Characteristically enough, this experience is praised by politicians of both the right and the left wings, who tend each to single out some specific features.

The recent initiatives by Deputy Prime Minister Yury Trutnev are a good example. In a letter sent to President Vladimir Putin in October 2019, he called for a more active development of the Russian Arctic shelf, which under the present Russian law is only allowed to government-owned companies with no less than five years of experience in continental shelf operations. This legal clause essentially limits the access to the Arctic shelf to merely two state companies, Gazprom and Rosneft, which already hold licenses for some 85 per cent of its total area. Mr. Trutnev advocated the use of the Norwegian model, claiming that the national oil company gets only 30 per cent of each project there, while the rest belongs to private Norwegian and foreign companies (Podobedova, Dergachev, 2019).

It is clear, however, that any national business environment has developed within a given economic, social and institutional framework, which is often country specific and may not be transferred efficiently piece by piece into other countries. Russia has experienced this repeatedly, most recently by introducing liberal monetarism inspired by the IMF and Western consultants.

This article aims to give a general outline of the Norwegian petroleum model against a broader historical background, from the viewpoint of its applicability in the respective Russian context.

Evolution of the Norwegian model

First of all, the Norwegian petroleum model is not static. It has been developing over nearly six decades, together with the industry itself, and has gone through several distinct stages where it faced shifting policy goals.

Its history started in late 1962, when Phillips Petroleum, an American oil company, requested a monopoly right to explore and develop the Norwegian continental shelf. This application represented a major challenge to Norway which possessed zero experience in the industry, while it still remained unclear whether or not there were any resources there. However, within a short time range, the Norwegian authorities managed to make several principal decisions laying the cornerstones of their future oil and gas model. In 1963, the state was declared the owner of all seabed resources, with the aim of using these for the benefit of the whole people. Norway joined swiftly the 1959 Hague Convention on Continental Shelf and agreed on delimitation of the North Sea shelf south of 62ºN. Exploration and development were allowed in the whole of this area in 1965, when several dozen blocks were licensed for the first time to a handful of global companies.

From the early days, the Norwegian authorities pursued a cautious approach to shelf development and relied on strong national control. Among others, they rejected the idea of introducing license auctions (like in the UK shelf) to avoid speculative investments (Gøthe, 1988).

The unique Ekofisk oilfield was discovered in late December 1969 and commissioned in 1971. Just four years later Norway already turned into a net exporter of oil. The authorities realized that the process was creating both new opportunities and new risks.

The turning point came in 1972, when Norway first charted its oil and gas policy, established a 100% state-owned oil company, Statoil, and the key government agency, the Norwegian Petroleum Directorate. The subsequent period through the end of the 20th century was marked by a rapid buildup of national petroleum extraction and service capabilities, supported by deliberate protectionist policies by the government. The administrative mechanism was being shaped in parallel, which resulted in 1985 and 1996 in the adoption of the first and the second (still valid) editions of the basic Petroleum Act, respectively. The oil and gas production was growing rapidly, by the early 1980s they already stood for over one half of the national commodity exports. Norway turned into a major supplier of fossil fuels to the European market and the leading producer of gravity based concrete offshore platforms. The

trade balance and public revenues improved dramatically and the nation witnessed, for the first time ever, a lasting budgetary surplus.

The government set a political aim of maintaining the petroleum production within 90 million tons oil equivalent (mtoe), although it turned out difficult due to the many 'pro-drilling' interests involved.

Meanwhile, the petroleum industry still consisted of a limited number of players exploiting predominantly the national resource base, first and foremost in the southern part of the North Sea, which became increasingly depleted. The industry moved northwards slowly, exploratory drilling in the Norwegian Sea started in 1981 and in the Barents Sea in 1987.

In the early 2000s, Norwegian petroleum policies underwent major changes. The government had serious concerns that upstream production in Norway was about to peak, so it set the dual policy goal of extending the nation's oil age and expanding its worldwide operations. While in the 20th century the consecutive Norwegian governments tried to limit the petroleum production, now they do their utmost to maintain it by enhancing competition, development of marginal fields and increasing oil recovery ratios. This policy remains true also today, despite the very strong climatic focus on low carbon transition and renewable energy.

The key feature of active government

The Norwegian oil and gas model operates in a specific institutional context, which includes strong communal traditions of solidarity and mutual support, Lutheran respect to hard work, a powerful and transparent public administration, and an influential civil society.

This system includes several key elements, which are closely interrelated and should be regarded as a whole. These include, among other:

• public property right for all resources of the Norwegian continental shelf, which are supposed to benefit the whole nation;

• a flexible administrative licensing system, whereby a license is issued to a group of investors by the competent public authority (the Norwegian Petroleum Directorate), while license holders are entitled to sell their stake to another companies later on,

• prequalification of investors who are willing to work in the Norwegian continental shelf, which serves as a filter against non-serious profit seekers,

• a national petroleum company (Statoil, renamed Equinor in 2018) receiving majority stakes in all blocks ever since it was established in 1972,

• stringent health, safety and environment (HSE) regulations, which are pursued rigorously by the respective government agencies,

• a non-discriminatory, but high taxation of oil companies,

• a deliberate policy to develop the domestic research, education and industry base to serve the oil and gas complex, thus creating a diversified nationwide cluster,

• a sovereign wealth fund to accumulate and sterilize the public oil revenues (which became the sole piece of the Norwegian experience to be introduced in Russia in full, when the Stabilization Fund was established).

This list demonstrates the core role played by the Norwegian state, in several capacities.

First, as a public power representing the national interest, it is in charge of resource management, including notably regional geological surveys, resource appraisals, licensing and supervising the companies' compliance. The key powers, like enacting petroleum legislation, opening new shelf areas for exploration and development, and approving the Plans for Development and Operation for each oil and gas field, are reserved for the Storting (Parliament), as the supreme elected representative body.

Second, the government sets the regulatory framework, both for the petroleum industry and the related supply businesses. Norway has always welcomed foreign investments, but subject to tight public control to ensure budgetary revenues, technology transfer, development of national capabilities both off- and on-shore, and high HSE standards.

Third, as a fiscal authority, the state captures a large portion of the oil rental revenues. The government take has always been extremely high, up to 85% (now 78%) of net corporate income. This is well in line with the Norwegian social democratic traditions of a powerful pa-

ternalist state, which redistributes some 60% of the GDP through the state budget.

Fourth, the Norwegian state is also involved in the oil business as such through the state-owned enterprises.

It is noteworthy that such approach is in strict contradiction to the liberal economic model pursued by the Russian governments ever since the breakup of the Soviet Union and the start of the economic reforms in early 1992.

State petroleum company:
up the steep learning curve

Statoil was established as a key tool for developing national petroleum competence. To the favor of the Norwegians, they acknowledged from the outset that they had to master a brand new business, and they have always been willing to acquire new knowledge and experience. Thus, the history of Statoil/Equinor may be roughly summed up as follows:

1972-1985 – learning the basics of oil and gas business with a strong governmental backing. The principal method was 'learning by doing'. Statoil received 50% or more of stakes in all offshore licenses granted, but it acted as a so-called *carried partner*: its portion of investments was covered by the license partners, while it received its share of any revenues. In this respect, Statoil enjoyed preferential treatment even compared to Norsk Hydro, a large fertilizer and aluminum producer, which also entered the oil business in the 1960s. The state held nearly 50% of its shares, but it had to do everything at its own cost and risk. (Skjeldal, Berge, 2009).

1985-2001 – raising to the national champion. During the period, Statoil, as well as Hydro, acquired high-level competence in petroleum geology, exploration, development, and operations, with a strong focus on Norwegian continental shelf. The companies got unmatched practical experience in offshore operations under harsh climatic conditions and started their first, rather modest, international operations.

2001-around 2015 – consolidating national oil business, learning international management, pioneering Arctic offshore operations. Statoil was partly privatized, starting with 2001, and entered listings at the New York and Oslo Stock Exchanges, to make its operations more market-minded.

In 2007, it merged with (although, in practical terms, rather acquired) Hydro's oil business. Soon before the merger, Hydro and Statoil had delivered strategic field developments (Ormen Lange and Snøhvit) positioning themselves in the forefront of seabed completion globally. Snøhvit, despite its numerous problems, was of special importance as the first-ever development offshore Barents Sea and the only LNG plant in Europe, which applied a unique, proprietary liquefaction technology (the Statoil-Linde process).

The united company also rapidly expanded its international portfolio and has now exploration and production assets in 35 countries around the globe. The growing public exposure and overseas operations dramatically transformed Statoil into a streamlined corporation with little bureaucracy. It became compatible to international majors in terms of corporate governance, project management, and financial engineering.

2015-now – transforming towards a diversified energy company, assuring global technological leadership in northern and Arctic offshore operations, pioneering low-carbon transition, transferring petroleum technologies and skills to other businesses.

Under the present day climate agenda, oil and gas are no longer 'trendy' in Norway. Characteristically, Statoil itself asked its shareholders to rename it into Equinor in 2018, getting rid of connotations with both petroleum and the state. Indeed, the company remains committed to oil and gas business and has completed a number of cutting-edge projects, both in the North Sea and the Arctic shelf, like Aasta Hansteen-Polarled (2018), Johan Sverdrup (2020) or Johan Castberg (to be launched in 2024). However, the main public focus today is made on cutting the carbon footprint of the oil and gas projects and developing clean energy solutions like wind and solar power. In the renewables, Equinor is also counting on innovations and technological leadership.

For natural reasons, this 'learning curve' of Statoil/Equinor correlates closely with the

above-mentioned evolution of the Norwegian oil and gas model as a whole.

The government has also been involved in a continuous learning process as a responsible owner of Statoil. The overall trend has been to allow the company an ever growing independence and market orientation. Since 2004, its CEOs (Helge Lund and Eldar Sætre) have not been former Labor Party functionaries, but skilled managers appointed for their professional merits.

There is an ongoing discussion in Norway, like in Russia, to which extend Equinor, the by far dominant national company, obeys instructions of the government or pursues its own interest (Krivorotov, Finger, 2019). However, the Norwegian state has always made a clear distinction between its roles as the owner of subsoil petroleum resources and the oil company owner. Although Statoil/Equinor enjoys preferential treatment in the license awards, it is also subject to a close public scrutiny in terms of compliance with license conditions, HSE requirements, local content performance etc. Both the company and the government itself came under a harsh criticism from various agencies and NGOs in 2010-2013 for the failed project within carbon capture and storage, which had received heavy budgetary subsidizing as a flagship effort in the Norwegian climate policy. The company's position is also challenged by competitors, which are deliberately encouraged by the government. This differs the Norwegian case from contemporary Russia, where the state seemingly trusts state-owned companies to run whole industries.

Characteristically enough, the above initiatives by Deputy Prime Minister Yury Trutnev on introducing the Norwegian model in the Russian Arctic have resulted in a draft law on State Corporation Rosshelf, tabled for discussion in the very end of 2019. According to the draft, this new institution is going to issue licenses in the Arctic and Far Eastern shelf, to monitor the implementation, as well as to participate with 30% stakes in all licenses as a commercial entity (Draft Federal Law…, 2019). It would thus be responsible both for the resource management and the use of resources, essentially supervising itself. This is unthinkable in Norway, where the two functions are divided strictly between the Petroleum Directorate and Equinor.

Private investors and active government: striking a balance of interests

International oil giants, who tend to follow their own rules all over the world, discovered early on that in Norway they could not ignore (or simply bribe) the authorities and lobby their decisions freely. The Norwegians have for decades demonstrated a strong political will and pursued long-term strategic goals, which have generally stretched beyond the industry as such.

Meanwhile, the Norwegian state has avoided arbitrary behavior, but instead practiced a broad outreach to investors: the legal and policy framework is tough, but not too stringent to make Norway unattractive. The Scandinavian tradition of mutual respect and fair compromises has definitely played an important role in framing the national petroleum investment regime.

In a slightly simplistic way, one may say that an investor evaluates any project, first of all, by comparing the expected return on investments, usually the IRR, and the related risks. If this ratio is marginal (which is very often the case in Norwegian, as well as in Russian petroleum industry), the government may stimulate investments in two principal ways. The first one is to increase the investor's return through subsidizing, tax reliefs, etc., while maintaining the level of business risks. The other one is not to use financial levers, but in turn reduce the investor's risks by enhancing the investment climate, spreading information, developing the infrastructure, etc.

In Norway, the authorities have traditionally stuck to the second option. The exceedingly high government take is compensated by the nation's political stability, transparent predictable legislation, massive geological surveys (done among other by government agencies), strong law enforcement, and short distances to European markets.

There are also several channels and contact spots facilitating regular interaction between the government and companies. For ex-

ample, in 2001, the Ministry of Oil and Energy initiated a joint discussion forum, Oil and gas for the 21st century (OG21) involving government agencies, business and researchers. OG21 develops technology strategies which are updated once every five years (last time in 2016).

The broad national consensus on petroleum policies has also contributed to making Norway attractive for international companies. Indeed, there are lasting 'hot political potatoes' like the scope of public involvement in the oil business or the 2001 moratorium on petroleum exploration off the fish-rich Lofoten and Vesterålen islands. In general, however, Norwegian politicians tend to think long-term and seek compromises across the party lines on issues of national importance, especially those involving foreign relations. Thanks to that, the numerous cabinet shifts over the decades were not affecting the oil companies' operating conditions significantly.

The principles of the Norwegian petroleum taxation are universal and non-discriminatory. No individual tax reliefs have ever been granted, except for the above mentioned groundbreaking Snøhvit project. The case of Norway thus stands in a sharp contrast to the popular Russian belief that investors, either foreign or domestic, need tax incentives to invest in marginal fields. Unlike in Russia or the UK, oil companies in Norway did not plea to have their tax burden reduced even after the dramatic oil price falls in 2008 and 2014.

Such impartial tax enforcement has also strong practical effects on the state company's behavior. If Statoil/Equinor faces a complicated field, it would increase its R&D efforts to make it viable. The big Johan Castberg oilfield offshore Barents Sea is a good example: once Statoil was appointed its operator, it changed the technical concept and managed to cut the development costs by half and the breakeven oil price from $80/barrel to $35/barrel within a few years (Statoil 2017). In Russia, a large petroleum company (be it state-owned Rosneft, Gazprom, or private Novatek) would in a similar situation apply to the government for earmarked tax reliefs. As a result, Equinor is an acknowledged technological leader in the Norwegian shelf and globally, creating strong ripple effects for the national supply industry as well. Meanwhile, the Russian mineral resources complex, including notably oil and gas industry as its backbone component, lags behind other Russian industries in innovative activities, while Russia underperforms as a whole, compared to other nations (Kryukov, Tokarev, 2019).

Trust to civil servants as a macroeconomic asset

By acquiring an active regulatory role, the Norwegian state has also undertaken heavy administrative duties. Indeed, it is much easier to charge the Russian petroleum extraction tax at a flat rate than to define a fair oil price for each field on a quarterly basis, like the Norwegian Petroleum Price Board does to calculate taxable operating income. A Norwegian licensing round, whereby each license is split by the Petroleum Directorate according to the companies' proposals and potential, is a much more sophisticated (and subjective) procedure than a simple lease auction.

This implies an active and creative role of the civil servants – unlike Russia, where public employees are, for obvious reasons, regarded as potentially corrupt, and the human factor in administrative procedures is deliberately reduced.

Characteristic features of the Norwegian petroleum bureaucracy include high qualification, willingness to learn, patriotism and virtually zero corruption. The latter tradition, founded in the very early days of the country's oil policy by Jens Evensen, its main architect, is of crucial importance, as it gives the necessary confidence to the state, the investors and the broad public. For example, despite the closed-door nature of the licensing rounds, companies have never challenged their results, as they trust the impartial award procedure.

The high professionalism of the civil servants has also allowed the public decision makers to implement various policies without amending the formal rules. In accordance with the valid political guidelines, state agencies could either restrict or ease up the access of smaller companies to the continental shelf, either limit or stimulate upstream production.

The large public stake in each license (either directly or through Equinor) is equally not stipulated in law. There is no doubt that such system is much more flexible and adaptable than the one based on heavy, impersonalized procedures and very detailed legislation, which has to be amended every time.

Why just the shelf?

It is also noteworthy, that while Norway has offshore oil resources only, its experience is equally relevant to the Russian onshore, as well. For example, the North Sea has a number of common features with Western Siberia, as both provinces have entered into the maturity stage. They are well developed, with lots of infrastructure in place and well known regional geology. However, many of the existing fields are now heavily depleted, new big finds being unlikely. Both provinces require badly an influx of new technological and organizational innovations in order to extend the life cycles of the fields, enhance the oil recovery ratios and eventually develop non-conventional resources.

The Norwegian authorities reacted to this challenge by adjusting their policies to promote competition and diversity of actors. Since 2000, a total of 122 domestic and foreign oil companies have been prequalified by the Petroleum Directorate to work and operate offshore fields, therein 30 in the boom years 2006 and 2007. Many of these were small or medium-sized high-tech startups (so-called *mosquitoes*), willing to develop small reservoirs or mature fields in the tail phase, which are of less interest for the big players. The government introduced a simplified fast-track procedure to issue clearances for development of minor deposits, often done by subsea tie-backs to the existing infrastructure.

Statoil disapproved publicly of this development. Helge Lund, the then CEO, criticized the authorities harshly in 2008, stating that the 'mosquitoes' could not maintain production and geological exploration under crisis, as they did not possess necessary financial strength. Nevertheless, the smaller companies did play an important role in reversing the fall in petroleum production. They helped monetize or extend life cycles of several fields making NCS more competitive. Lundin Norway, a Swedish medium-size independent producer, even outclassed Statoil by making a major find in a North Sea block Statoil had abandoned.

The massive development and introduction of new technologies has helped to revert the fate of many old fields in the Norwegian sector of the North Sea. Their actual production profiles are well above the planned curves, with the average nationwide oil recovery ratio exceeding 50%. Challenged by the smaller competitors, Statoil surprisingly decided not to abandon the famous Ekofisk field and to extend its lifecycle beyond its present license term of 2028.

A diversity of actors is equally badly needed in Russia. With the oil recovery ratio in new Russian fields not exceeding 30%, the country has an enormous potential of increasing the domestic oil production in the mature areas, making an efficient use of the existing infrastructure. The state-owned majors alone lack the required incentives to introduce innovations. A variety of big, medium-sized and small businesses, each one with its own technological profile and strengths, would help utilize the resources better, introducing advanced oilfield technologies and giving rise to R&D efforts and new service industries (Shafranik, Kryukov, 2016).

Conclusion

As our analysis shows, the high efficiency of the Norwegian model is based on a number of principles, which are rather alien to contemporary Russia. These include a massive governmental intervention, predominant use of non-fiscal incentives, a vigorous bureaucracy, the government's 'trust but verify' relation to the state oil company, active industrial policies in regard of both the petroleum industry and the supply branches, etc.

Attempts to acquire certain pieces of the Norwegian model ignoring this context may bring about opposite effects. For example, the proposed Rosshelf corporation, a monopolist free for any public supervision, would easily tend to become a mere subsoil rentier, holding minority positions in all offshore projects,

cashing in revenues and having little motivation to learn the business or improve its performance.

This being said, the Norwegian experience is definitely interesting and highly relevant for Russia, given a number of similar challenges and common traditions. The Russian energy policies require a major overhaul badly in order to harmonize public and private interests, to facilitate a massive modernization of the industry, and to spur innovations generating major spin-offs for national research and engineering. A thorough study of the Norwegian model may bring about very useful inputs in this regard, and presumably not that much in terms of specific institutions but of fundamental policy features, subject to necessary adaptation. These include among other long term planning, selective protectionism combined with strong incentives for innovation, stimulating R&D and advanced technologies, promoting diversity and competition, and much stronger involvement of public opinion (business and research communities, local authorities, NGOs, etc.)

References

Draft Federal Law... (2019). Available at: https://regulation.gov.ru/projects#npa=98535 (accessed 28 February 2020).

Gøthe, O.Chr. (1988). Ærlig talt! Om industriskandaler, statsråder og annet [*Frankly speaking! On industry scandals, ministers, etc,*]. Oslo, Tiden Norsk Forlag, 216 p.

Krivorotov, A., Finger, M. (2019). State-Owned Enterprises in the Arctic. In *Global Arctic Handbook*. DOI: 10.1007/978-3-319-91995-9_4.

Kryukov, V.A., Tokarev, A.N. (2019). Contemporary Features of Innovative Development of the Russian Mineral Resource Complex. In *J. Sib. Fed. Univ. Humanit. Soc. Sci*., 12(12), 2193–2208. DOI: 10.17516/1997–1370–0518.

Podobedova, L., Dergachev, V. (2019). Trutnev predlozhil dopustit' inostrantsev na shel'f po norvezhskoy modeli [Trutnev propose allowing foreigners to enter the shelf applying Norwegian model]. In *RBC daily*, August 19.

Skjeldal, G., Berge, U. (2009). *Feber. Historia om norsk olje og gass* [*The Rush. Norwegian Oil and Gas History*]. Oslo, Cappelen Damm, 326 p.

Shafranik, Yu.K., Kryukov, V.A. (2016). *Neftegazoviy sektor Rossii: trudniy put' k mnogoobraziyu* [*Russia's oil and gas sector: the hard path to diversity*]. Moscow, Novosibirsk, Pero, 272 p.

Statoil (2017) Available at: https://www.statoil.com/en/magazine/achieving-lower-breakeven.html (accessed 28 February 2020).

Внедрение норвежской модели организации нефтегазовой отрасли в России: институциональные вызовы

В.А. Крюков[а], А.К. Криворотов[б]
[а]*Институт экономики*
и организации промышленного производства СО РАН
Российская Федерация, Новосибирск
[б]*Одинцовский филиал Московского государственного института*
международных отношений (университета)
Российская Федерация, Московская область, Одинцово

Аннотация. Хотя норвежская нефтегазовая модель является популярным примером успешной организации отрасли, которую многие воспринимают как один из возможных эталонов для внедрения в России, следует понимать, что она развивалась с течением времени в рамках конкретного национального, исторического и институционального контекстов. Ключевая роль в этой модели принадлежит Норвежскому государству с точки зрения управления ресурсами, создания нормативной базы, налогообложения и фактического участия в бизнесе в первую очередь через национальную нефтяную компанию Statoil/Equinor. С 1972 года Equinor превратилась из скромного партнера в крупную корпорацию, работающую в 35 странах и уделяющую большое внимание мировому технологическому лидерству. Все инвесторы, как государственные, так и частные, подконтрольны обществу и стимулируются нефискальными стимулами, такими как политическая стабильность, предсказуемое регулирование и изобилие геологической информации. Такое широкомасштабное государственное вмешательство опирается на активную, профессиональную и неподкупную бюрократию, обладающую широкими полномочиями.
Большая часть этой практики не распространена и не может быть внедрена непосредственно в России, которая, как правило, ограничивает роль государственных служащих и опирается на крупные государственные корпорации. Однако норвежский опыт представляется весьма актуальным для срочного пересмотра российской энергетической политики как на шельфе, так и на Востоке России.

Ключевые слова: Норвегия, нефтегазовая промышленность, управление, государственная компания, инновации.

Статья подготовлена при финансовой поддержке Российского научного фонда (грант № 19–18–00170).

Научная специальность: 08.00.00 – экономические науки; 08.00.14 – мировая экономика.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 538–546

DOI: 10.17516/1997-1370-0587
УДК 332.1

Russian Economy as a Pyramid of Wealth Enclaves: Political Economy Approach

Sergey N. Levin and Kirill S. Sablin*
Kemerovo State University
Kemerovo, Russian Federation

Received 28.11.2019, received in revised form 03.03.2020, accepted 10.04.2020

Abstract. The article highlights the resource-industrial and institutional conditions causing the fragmentation of the economic space in Russia. In these conditions, the integration of the economy and society is ensured through the integrated political-administrative market of the centralized type. As a result, the functioning and development of the Russian economy are described as a complicated interweaving of the horizontal added value chains and the vertical chains of value redistribution. This created the pyramid of wealth enclaves in the Russian economy. The interaction between the actors controlling these enclaves occurs mainly on the political-administrative market, connected with the vertical redistribution of added value. The theoretical basis of the study is J. Stiglitz's model of dual enclave economy and the modified tools of the concept of global value chains (GVC). The study operates such qualitative research methods as conceptualization and comprehensive analysis. The study revealed that in the Russian economy the economic market fragmentation situation is persistently present. The pyramid of wealth enclaves linked with the vertical chains of value redistribution does not create incentives for the integrated development of the national economy.

Keywords: enclaves of wealth, economic market, political-administrative market, horizontal added value chains, vertical chains of value redistribution.

This research is supported by the Russian Foundation for Basic Research (RFBR), Grant No. 19-010-00244 "Institutional setup of the labour market in resource-type regions".

Research area: economics.

Citation: Levin, S.N., Sablin, K.S. (2020). Russian economy as a pyramid of wealth enclaves: political economy approach. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 538-546. DOI: 10.17516/1997-1370-0587.

* Corresponding author E-mail address: sablin_ks@mail.ru
ORCID: 0000-0002-5478-7481 (Sablin)

Introduction

The problem of the enclaves of wealth hardly connected with the rest of the national economy was introduced by J. Stiglitz as a part of the dual enclave economy concept (Stiglitz, 2002). He noted that incorporation of the emerging market countries into the global economy did not result in their integrated development, but caused the emergence of the enclaves of wealth. These enclaves of wealth were mainly represented by the export enterprises controlled by foreign capital and privileged local business entities, practically disconnected from the rest of the economy. As a rule, these enclaves of wealth are represented by the resource exporting sector (mainly natural and mineral resources). The author emphasized the fact that these enclaves of wealth do not create incentives for the modernization of the other sectors of the national economy, but they serve as a source of financial resources for the public programs for implementation of the projects intended to develop other sectors of the economy and invest in human capital and social infrastructure. At the same time, the question about the methods and results of attracting and using these financial resources by the state remains open.

The distinctive feature of modern Russia making it different from the other countries with emerging markets is in the following:

1. Enclaves of wealth are controlled by the national state-owned companies, private companies and business groups affiliated with the state, but not by multinationals (Pappe, 2000; Pappe, Galukhina, 2009). This fact makes a direct impact on the employed ways of collecting and using the resources for the implementation of the development project initiated by the state.

2. The resource exporting enclaves of wealth are incorporated into a specific system distinguished with a complicated interweaving of the horizontal added value chains and the vertical chains of value redistribution. The centralized redistribution of financial resources creates some additional enclaves of wealth, defined as secondary and tertiary concerning the primary resource exporting enclaves of wealth.

This article discusses the institutional foundations of the system built in the context of the economic fragmentation and political-administrative centralization. As a result, the Russian economy does not emerge as an integrated market economy but appears as a fragmented economic space. The central element of a fragmented economic space is the pyramid of primary, secondary and tertiary enclaves of wealth. At the same time, the rest of the economy operates in the survival mode, having no sufficient economic and/or political resources to support its competitiveness and sustainable development capacity.

Theoretical framework

The study develops the approaches that formed the basics of the J. Stiglitz concept of enclave dual economy. The approaches of J. Stiglitz are integrated with the models based on the new political economy. In contrast to the basic models of the public choice theory (Buchanan, Brennan, 2008), the political markets are studied in the broad sense, and various discrete structural alternatives of their organization are highlighted (Williamson, 1991; Levin, 2014; Levin, Sablin, 2018). From our point of view, considering the institutional system of Russia from the position of an inextricable relationship between economic and political institutions, a spectrum of discrete structural alternatives should be also taken into account. The factors determining the choice between these discrete structural alternatives are set by the fact of previous historical development (path dependence). The widely recognized features of the existing institutional system of Russia are the following: the coalescence of economy and politics; limited political and economic competition; the key role of state-owned companies and private business groups and companies affiliated with the state in the economy; vertical power structure with the federal centre enforcing the political and economic control over the regions.

In this regard, the question that arises is the objective economic foundations of the existing institutional system of Russia, its main elements, limitations and development prospects. From our point of view, this

system is based on a historically determined relationship between the resource-industrial structure of the economy and the institutional organization of the economy and society. This means that the existing institutional system of Russia implies a certain type of relationship between the economy and the politics, the coalescence and limited real autonomy of these subsystems of society. The path dependence (Arthur, 1994; David, 2007) is revealed in the formed system of interactions between the resource-industrial and the political-economic structures of Russian society. This system forms the basic parameters of the institutional organization and creates a set of constraints for implementation of the economic modernization projects. Moreover, these constraints are quite strict. This means that, if the objective constraints are not taken into account when implementing any institutional projects, the lock-in effect is clearly revealed, returning the institutional system to the historically given development path. This fact was obvious during the post-Soviet economic and social development. The institutional project, implemented since the early 1990-s, was focused on the separation of economy and politics, development of economic and political competition, as well as shaping a market-type institution system in the economy and creating political democracy. However, it resulted in the transformation of the Soviet system of administrative markets (Kordonskiy, 2006) into the system based on the dominance of the hybrid political-administrative market. Within this system, the coalescence of economy and politics was revived in a new form, and instead of separating private and public property, a hybrid system of real residual property rights was made up (Grossman and Hart, 1986; Levin, Sablin, Kagan, 2017).

Statement of the problem

The pyramid of the enclaves of wealth is formed as the Russian economy and society are developing between the poles of economic fragmentation and political-administrative centralization. Combined, the transformation of the domestic market and the integration of the economy into global markets caused the competitiveness of a narrow group of industries and companies within the resource exporting sector. This resulted in the lack of a domestic integrated and self-regulatory system of competitive markets for resources, goods and services in modern Russia. Therefore, the economic markets in Russia are disintegrated. Russian companies and business-groups compete on segregated global and domestic markets.

In these conditions, the economy and society in the country are integrated by the political-administrative market. In Russia, an integrated political-administrative market of centralized type has developed, with the ruling group being the ultimate source of the political resource. At the same time, within the framework of the unified vertical of power, some administrative, and, to a lesser extent, political bargaining takes place. The domestic business is incorporated into various levels of this vertical of power. As a result, the disintegrated economic markets in Russia are interwoven with the centralized and integrated political-administrative market. The relationship between the actors of these markets develops in two ways. Firstly, the availability of an individual political resource within the vertical of power is a factor for access to the most significant economic resources that determine the competitiveness of Russian companies, both on domestic and global economic markets. Secondly, in many cases, the actors of the political-administrative market either substitute the actors of the economic markets acting as the main "consumers" of goods and services of the domestic companies directly, or they determine the range of solvent "consumers" through the mechanisms of redistribution and centralization of revenues in favour of certain social groups and territories. Based on the position in this system, the authors of the article identify primary, secondary and tertiary enclaves of wealth.

Methods

To identify and characterize the enclaves of wealth, the tools of the global value chains (GVC) concept (Humphrey, Schmitz, 2001; Gereffi, Humphrey, Sturgeon, 2005) are used.

This approach is adjusted to the presence of the centralized vertical chains of value redistribution within the vertical of power besides the horizontal value chains. In the context of this approach, Russian entrepreneurs are seen as actors that bring their interests into practice in the interwoven political-administrative and economic markets. At the same time, the political resource provided by the access to the political-administrative market, on the one hand, acts as a source of competitive advantages in economic markets, and, on the other hand, involves entrepreneurs taking a wide range of quasi-public obligations in the form of quasi-fiscal payments including quasi-tax fees and organized sponsorship (Levin, Kurbatova, 2011).

The authors also use a qualitative approach that involves conceptualization and comprehensive analysis of the problems of the formation and development of the enclaves of wealth in today's Russian economy.

Discussion

The basis of the Russian economy is formed by the resource exporting sector, which is the key source of revenues scraped from the global economic markets. As a result, Russian business groups and companies of this sector are the ones to form the primary enclaves of wealth. In this case, the access to the political-administrative market and availability of individual political resource allows them to monopolize the access to natural and mineral resources and establish favourable (preferable) individual conditions for the use of such. They sell their raw material products on the global economic markets being an important source of technologies and financial resources, especially in the context of today's sanctions.

The primary enclaves of wealth are enterprises, competitive on the global economic markets, representing mineral extraction and production industries manufacturing unfinished goods, controlled by the state-owned companies and state-affiliated private companies holding the significant political resources. These enclaves of wealth form the flows of income being the main source of profits for large businesses, as well as a source of fiscal and quasi-fiscal payments for the state. At the same time, the owners of these business groups take on quasi-public obligations to finance development projects in exchange for the political resource. At the moment, it is the financing system for national projects. The companies directly controlled by the state carry out most of the quasi-public obligations. For instance, in the year 2018, "Rosneft" Russian oil company implemented an extensive set of social programs including housing and mortgage lending, private pension programs, as well as improvement of the working and leisure conditions (Rosneft Annual Report, 2018). Taking up additional quasi-public obligations, "Rosneft" enjoys additional benefits from the state for the development of new hydrocarbon deposits in the shelf of the Arctic, Far Eastern and Southern Seas of Russia (*Shel' fovye proekty*, 2019), therefore increasing the commercial efficiency of "Rosneft".

Thus, the specificity of the position occupied by the domestic business groups that control the primary enclaves of wealth is a combination of exclusive advantages obtained due to their high position within the vertical of power with a rather strong competitive pressure within the global economy. In many cases, this creates quite powerful incentives for the modernization of the export-oriented resource industry. An example of such is a serious success in the technological modernization of the metallurgical (Gorbunov, 2013) and coal industries. Assessing the situation in the coal industry in Kuzbass, the head of one of the regional administration departments comments on it as follows: "*Let's take the coal industry. In recent years, labour productivity in the coal industry of our country has significantly increased. You know that many coal industry enterprises are closing down today, and others are opening and modernizing. Compared to the Soviet years, the number of people employed in the coal industry has dropped by three times. At the same time, for example, the volume of 211 million tons was mined last year. In Soviet times, they dreamed of achieving the milestone of 160 million tons with a much larger number of employees. Now, the lion's share of this coal*

is being refined. In this sense, productivity inevitably increases" (Levin, Sablin, 2017: 43).

Business groups that control the primary enclaves of wealth do not only carry quasi-public obligations but also centralize revenues, redistributing them in favour of the central regions, primarily Moscow and St. Petersburg. It results in the development of high-margin consumer markets, serving as the economic basis for the emergence of the secondary (industrial) enclaves of wealth. At the same time, public funds are also concentrated in the centre. In this sense, we can speak of two interwoven chains of vertical value redistribution in favour of political-administrative and economic actors that occupy higher positions in the vertical of power.

The secondary (industrial) enclaves of wealth are sets of "semi-knocked down" (SKD) enterprises that serve as high-margin demand actors, generating their revenues due to the high status (direct or indirect) in the vertical of power. The high status opens access to the redistribution of value, created within the primary enclaves of wealth.

The most vivid example of a secondary industrial enclave of wealth is the development of the Kaluga regional economy. It became the benchmark of the region, whose authorities managed to build a balanced system of developmental institutions that ensured the implementation of large-scale investment projects in the manufacturing industry. At the first stage, the most significant success was associated with attracting foreign investments in the car assembly plants ("poorly diversified SKD"). In the future, it became possible to significantly diversify the sectoral structure of investments and increase the role of domestic investors (Skorobogaty, 2016). However, this enclave of wealth is still dependent on the injections of foreign technologies and investments. This makes it vulnerable in the face of the sanctions' pressure on the Russian economy.

The employment of political resources in the formation of such enclaves of wealth is closest to the practices of other foreign countries with emerging markets. The use of such new industrial policy tools may be demonstrated with the case of the Kaluga Oblast. Based on the incentives for car assembly plants initiated at the federal level, the regional authorities agreed with large foreign (and domestic) companies to implement a development project on transferring a part of the global horizontal value chain of the automotive industry to the region. The individual political resource of the regional authorities was used to gain support for this project from the federal authorities and developmental institutions. The enterprises included in this enclave of wealth mainly operate in the competitive domestic consumer markets. At the same time, the dynamics of demand in these markets depends on the state of the primary enclaves of wealth and the effect of vertical chains of value redistribution.

Having been put into practice, the public programs aimed at stimulating the development of innovations (*Strategiia innovatsionnogo razvitiia RF…*, 2011) and reforming the scientific and educational complex of the Russian Federation (*Proekt povysheniia konkurentosposobnosti…,* 2012) caused the emergence of the tertiary (innovation and scientific-educational) enclaves of wealth. The most vivid examples are Skolkovo Research and Technology Centre and the Higher School of Economics (HSE). In this regard, it is necessary to highlight the paradox of the innovation development policy in modern Russia. Innovations were declared to be the main way of avoiding the resource exporting dependence and transiting to the "knowledge economy". However, the analysis shows that such structures as Skolkovo and HSE are the enclaves of wealth that are the most dependent on political-administrative market and the least focused on gaining competitive advantages in economic markets (at the level of real actions, not public declarations). The tertiary enclaves of wealth are dependent on the vertical chains of value redistribution in two ways.

Firstly, the establishment of such required large injections of public funds to give them access to the necessary resources including human capital. For example, in the years 2013-2015 Skolkovo Research and Technology Centre spent on its activities 65.5 billion roubles from the state budget (*O rezul'tatakh kontrol'nogo…*, 2016). HSE received an addi-

tional investment of 860 956 thousand roubles according to the Order of the Government of the Russian Federation in the year 2019 under the "Program 5-100" (*Rasporiazhenie Pravitel'stva Rossiyskoy…*, 2019).

Secondly, it is the state that acts as the main "consumer" of the R&D, educational and expert services these structures create. They act mainly as suppliers of innovation, scientific and educational "semi-finished products" for the global innovation and scientific-educational sector (i.e. subcontractors of global innovative companies, undergraduates and doctoral students for universities in Europe and the USA, junior partners in international scientific networks).

At the same time, the preservation of even such competitive positions on the global economic markets seems to be very problematic without constant injections of public funds. The senior managers of these structures are well aware of this fact. In this regard, the assessment of the situation given by V. Kasamara, the HSE Vice-Rector, is a vivid example. Commenting on the statements about the need to preserve the university's autonomy from the state, she clearly expressed the position of the HSE leadership: "*You know, to me, it seems to be somewhat childish to say that, keeping in mind that the HSE is a university under the Government of the Russian Federation and the Government is the founder of the HSE. We work with the Government and for the Government, and we are one of the consultants of the Government, but we are also the consultants for the other executive bodies and the Presidential Administration. It is very strange to oppose us*" (*Kasamara o slovakh Egora Zhukova pro sviaz…*, 2019). These statements are true to life. HSE is funded not by hypothetical taxpayers acting in an ideal contract state (Buchanan, 1975), but by the ruling group. At the same time, being the top of the vertical chains of the value redistribution, the tertiary enclaves of wealth crown this pyramid.

Conclusion

The study confirms the hypothesis that there is no integrated system of autonomous and self-regulating economic markets in today's Russia. Economic markets are fragmented, and the conditions for their functioning are determined by the constraints of the integrated political-administrative market of centralized type.

As a result, the functioning and development of the Russian economy are determined by the complicated interweaving of the horizontal added value chains and the vertical chains of value redistribution. The core of the modern Russian economy is formed by the pyramid of enclaves of wealth: primary (resource exporting), secondary (industrial) and tertiary (innovation and scientific-educational). Competitiveness of the actors of these enclaves of wealth is based on the relationship between economic and political resources.

The political resource is the key factor for monopolizing access to the natural and mineral resources in the primary enclaves of wealth, and value is created in the competition on the global economic markets. The secondary industrial enclaves of wealth are focused on high-marginal domestic consumer markets. Their relationship with the primary enclaves of wealth is determined by the availability of a mechanism for the vertical redistribution of revenues in the favour of social groups and territories holding a high status in the vertical of power. The most paradoxical is the situation with the tertiary enclaves of wealth. According to the declared goals, the development of innovation and scientific-educational sectors was to decrease the degree the resource exporting dependence. However, these enclaves of wealth are based not on the added value creation, but mainly on the redistribution of value within the vertical of power. The state acts both as a source of financial resources and as the main "consumer" of their services.

References

Arthur, W. (1994). *Increasing Returns and Path Dependence in the Economy.* Ann Arbor: University of Michigan Press.

Buchanan, J. (1975). *The Limits of Liberty: Between Anarchy and Leviathan*. Chicago: University of Chicago Press.

Buchanan, J., Brennan, G. (2008). *The Reason of Rules: Constitutional Political Economy*. Cambridge: Cambridge University Press.

David, P. (2007). Path Dependence: A Foundational Concept for Historical Social Science. In *Cliometrica*, 1(2), 91-114.

Gereffi, G., Humphrey, J., Sturgeon, T. (2005). The Governance of Global Value Chains. In *Review of International Political Economy*, 12(1), 78-104.

Gorbunov, A. (2013). Truby bez komissii [Pipes Without Commission]. In *Expert*, 25(856).

Grossman, S.J., Hart, O.D. (1986). The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration. In *Journal of Political Economy*, 4, 691-719.

Humphrey, J., Schmitz, H. (2001). Governance in Global Value Chains. In *IDS Bulletin*, 32(3), 19-29.

Kasamara o slovakh Egora Zhukova pro sviaz' VShE s gosudarstvom: eto po-detski [*Kasamara about the Words of Yegor Zhukov about the Relationship of HSE with the State: It's Childish*] (2019). Available at: https://russian.rt.com/russia/news/696719-kasamara-zhukov-vshe (accessed 24 February 2020).

Kordonskiy, S.G. (2006). *Rynki vlasti. Administrativnye rynki SSSR i Rossii* [*Markets of Power. Administrative Markets of the USSR and Russia*]. Moscow: OGI.

Levin, S.N. (2014). Rynki vlasti, rezhimy prav sobstvennosti i politicheskiy resurs predprinimateley v sovremennoy Rossii [Markets of Power, Property Rights Regimes and Political Resource of Entrepreneurs in the Modern Russia]. In *Mir Rossii* [*Universe of Russia*], 23(4), 35-58.

Levin, S.N., Kurbatova, M.V. (2011). Setevye vzaimodeystviia rossiyskogo biznesa: delovaia korruptsiia i organicheskiy institut real'noy modeli institutsional'noy organizatsii rossiyskoy ekonomiki [Network Relationships of the Russian Business: Business Corruption and the Organic Institute of the Real Model of Institutional Organization of the Russian Economy]. In *Journal of Institutional Studies*, 3(2), 39-58.

Levin, S.N., Sablin, K.S. (2017). "Politicized" Bureaucrats as Agents of Economic Development in Resource-Rich Regions. In *Social Sciences*, 48(1), 35-47. DOI: 10.21557/SSC.48463650

Levin, S.N., Sablin, K.S. (2018). Kontseptsiia rynkov vlasti kak metodologiia issledovaniia institutsional'noy organizatsii sovremennoy rossiyskoy ekonomiki i obshchestva [The Concept of the Power Markets as a Methodology to Study Modern Russian Economy and Society Institutional Organization]. In *Journal of Institutional Studies*, 10(4), 97-111. DOI: 10.17835/2076-6297.2018.10.4.097-111

Levin, S.N., Sablin, K.S., Kagan, E.S. (2017). Za predelami stekliannogo kolpaka: innovatsionnoe predprinimatel'stvo v regionakh resursnogo tipa v Rossii [Beyond Bell Jar: Innovative Entrepreneurship in Resource-Type Regions of Russia]. In *Journal of Institutional Studies*, 9(3), 119-132. DOI: 10.17835/2076-6297.2017.9.3.119-132

O rezul'tatakh kontrol'nogo meropriiatiia "Proverka ispol'zovaniia sredstv federal'nogo biudzheta, napravlennykh na realizatsiiu meropriiatiy, sviazannykh s sozdaniem i obespecheniem funktsionirovaniia innovatsionnogo tsentra "Skolkovo" v 2013-2015 godakh» (*sovmestno s Federal'noy sluzhboy bezopasnosti Rossiyskoy Federatsii* [*About the Results of the Control Event "Verification of the Use of Federal Budget Funds aimed at Implementing Measures Related to the Creation and Maintenance of Skolkovo Innovation Centre in 2013-2015" (in cooperation with the Federal Security Service of the Russian Federation)*] (2016). Available at: http://audit.gov.ru/upload/iblock/1e6/1e665e7c4e51f8357188a9508f7cc847.pdf (accessed 20 February 2020).

Pappe, Y.Sh., Galukhina, Y.S. (2009). *Rossiiskiy krupnyy biznes: pervye 15 let. Ekonomicheskie khroniki 1993-2008* [*Russian Big Business: First 15 years. Economic Chronicles 1993-2008*]. Moscow: Publishing House of the Higher School of Economics.

Pappe, Y.Sh. (2000). *"Oligarkhi". Ekonomicheskaia khronika 1992-2000 ["Oligarchs". Economic Chronicles 1992-2000*]. Moscow: Publishing House of the Higher School of Economics.

Proekt povysheniia konkurentosposobnosti vedushchikh rossiyskikh universitetov sredi vedushchikh mirovykh nauchno-obrazovatel'nykh tsentrov "5-100" [*Project of Increasing the Competitiveness of the Top Russian Universities among the World's Leading Research and Educational Centres*

"5-100"] (2012). Available at: https://www.5top100.ru/documents/regulations/97332/ (accessed 20 February 2020).

Rasporiazhenie Pravitel'stva Rossiyskoy Federatsii ot 9 fevralia 2019 g. № 179-r o raspredelenii subsidiy vedushchim universitetam v tseliah povysheniia ikh mezhdunarodnoy konkurentosposobnosti [*Order of the Government of the Russian Federation No. 179-r on the Distribution of Subsidies to the Leading Universities in Order to Increase their International Competitiveness*] (2019). Available at: https://www.5top100.ru/documents/regulations/97332/, accessed 20 February 2020.

Rosneft Annual Report 2018. Technologies Shaping the Future (2018). Available at: https://www.rosneft.com/Investors/Reports_and_presentations/ (accessed 18 February 2020).

Shel' fovye proekty [*Shelf Projects*] (2019). Available at: https://www.rosneft.ru/business/Upstream/offshore/ (accessed 17 February 2020).

Skorobogaty, P. (2016). Kaluga: ot avtosborki k klasternoy diversifikatsii [Kaluga: from Automotive Assembly to Cluster Diversification]. In *Expert*, 24(991).

Stiglitz, J. (2002). *Globalization and Its Discontents*. New York: W.W. Norton & Co.

Strategiia innovatsionnogo razvitiia RF na period do 2020 goda [*Strategy of the Innovative Development of the RF till 2020*] (2011). Available at: http://government.ru/docs/9282/ (accessed 20 February 2020).

Williamson, O. (1991). Comparative Economic Organization: The Analysis of Discrete Structural Alternatives. In *Administrative Science Quarterly,* 36, 269-296.

Российская экономика как пирамида анклавов богатства: политико-экономический подход

С.Н. Левин, К.С. Саблин
Кемеровский государственный университет
Российская Федерация, Кемерово

Аннотация. В исследовании рассматриваются ресурсно-отраслевые и институциональные условия, ведущие к фрагментации экономического пространства России. В этих условиях интеграция экономики и социума обеспечивается политико-административным рынком централизованного типа. В результате функционирование и развитие российской экономики характеризуются сложным переплетением горизонтальных цепочек создания стоимости и вертикальных цепочек ее перераспределения. Это привело к появлению в российской экономике пирамиды анклавов богатства. Взаимодействие между субъектами, контролирующими эти анклавы, осуществляется преимущественно на политико-административном рынке и связано с вертикальным перераспределением стоимости. Теоретической основой исследования является модель анклавной двойственной экономики Дж. Стиглица и модифицированный инструментарий концепции глобальных цепочек создания стоимости. В работе используются качественные методы исследования – концептуализация и комплексный анализ. Проведенное исследование показало, что в экономике России устойчиво сохраняется ситуация фрагментации экономических рынков, а связанная цепочками перераспределения стоимости пирамида анклавов богатства не создает стимулов для целостного развития национальной экономики.

Ключевые слова: анклавы богатства, экономический рынок, политико-административный рынок, горизонтальные цепочки создания стоимости, вертикальные цепочки перераспределения стоимости.

Грант РФФИ № 19-010-00244 «Институциональная организация рынка труда в регионах ресурсного типа».

Научная специальность: 08.00.00 – экономические науки.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 547–559

DOI: 10.17516/1997-1370-0588
УДК 336.2

Assessment of the Sustainability of Budget Revenues in the Regions of the Russian Federation

Marina Yu. Malkina*
Lobachevsky State University of Nizhny Novgorod
Nizhny Novgorod, Russian Federation

Received 11.11.2019, received in revised form 03.03.2020, accepted 13.04.2020

Abstract. The paper proposes new approaches to assessing the sustainability of budget revenues in a region, which have been tested on the example of 83 subjects of the Russian Federation in 2010-2017. The sustainability of budget revenues is estimated on the basis of time series of two indicators: the ratio of sub-federal budget revenues to GRP and real income of sub-federal budgets per capita. To exclude economies of scale and eliminate system-wide risk, both indicators are calculated as a ratio to average Russian values. Using the construction of temporary linear regressions, a steady growth rate, absolute risk and relative risk of budget revenues are determined. For a comprehensive assessment of the sustainability of budget revenues in a region, we proposed the Arrow-Pratt function with the incorporated risk aversion parameter of 1.5.
Using the proposed technique, we evaluated the absolute and relative risk, as well as the sustainability of budget revenues in the Russian regions. Assessments based on the two alternative indicators showed a high correlation. Our study revealed that the least stable budget systems are typical for some border regions, including the backward North Caucasian republics and Far Eastern regions with an unstable economy, and Tyumen Oblast, which is quite developed, but depends on the world market. At the same time, some extractive regions (Republic of Sakha), on the contrary, showed a high stability of budget revenues.

Keywords: fiscal sustainability, region, sub-federal budget, budget revenue, risk and return of the budget system.

The reported study was funded by RFBR according to the research project No. 19-010-00716 “Development of methodology and non-traditional methods for assessing financial instability”.

Research area: economics.

Citation: Malkina, M.Yu. (2020). Assessment of the sustainability of budget revenues in the regions of the Russian Federation. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 547-559. DOI: 10.17516/1997-1370-0588.

* Corresponding author E-mail address: mmuri@yandex.ru
ORCID: 0000-0002-3152-3934

Introduction

The fiscal sustainability of a country or region is a guarantee of timely and uninterrupted supply of public goods to the population, which, in turn, affects the growth of labor productivity and improving people's living standards. It also affects the long-term stability of the public debt. Fiscal sustainability of a particular territorial entity depends on the characteristics of its fiscal policy and the quality of administration of budget revenues and expenditures, as well as on the sectoral structure of economy, the degree of economic openness, etc.

The sustainability of regional budget revenues, which is the subject of this paper, is an essential component of overall fiscal sustainability. *The purpose of this research* is to clarify the concept of sustainability of regional budget revenues, improve approaches to its assessment and test them on data from Russian regions.

Literature Review

Economists do not have a unanimous opinion on what fiscal sustainability of a country or region is. Most scientists believe that fiscal sustainability is the ability of the public sector to meet its financial obligations (Bohn, 2008). Some of them suggest that the concept of fiscal sustainability cover two areas: budget balance and accumulated debt (Andryakov, 2017: 35). Others (Klimanov, Kazakova, Mikhaylova, 2018) analyze different approaches to determining the sustainability of territorial entities and the factors that ensure it. Meanwhile, all researchers recognize that budget revenues are a key component of overall fiscal sustainability.

Our research is based on two groups of studies related to our topic.

The first group embraces works devoted to assessment of the overall sustainability of regional economies. Various scholars proposed a number of methods for calculating the composite index of sustainable development, based on arithmetic, geometric or entropy generalizations (Rahma et al., 2019). A team of Russian scientists (Klimanov, Kazakova, Mikhaylova, 2019) developed an integrated index of regional resilience, which is the arithmetic mean of 6 specific indicators normalized to their standard deviation. In their study they confirmed the interconnection of budgetary and socio-economic sustainability of Russian regions in 2007-2016. Another researcher (Sheremeta, 2020) proposed a comprehensive evaluation of the fiscal sustainability of Russian regions based on various components of budget revenues and expenditures, as well as public debt. The author applied the k-means method to cluster Russian regions by the level of fiscal sustainability.

It should be noted that the above works are based on a resource approach and use static analysis methods. In our study, we do not follow a static, but a dynamic approach to determining fiscal sustainability, which is based on identification of fluctuations in budget returns relative to some systemic trend. This approach also has a number of adherents.

For example, (Smetana et al., 2015) proposed to combine the resource assessment in regions with the study of the cyclicality of complex systems. Other authors (Ivanov, Sakhapova, 2014) involved a dynamic approach for a comprehensive assessment of the financial instability of Russian regions and distinguished three methods for measuring the volatility of individual indicators: standard deviation, coefficient of variation, and Value at Risk (VaR). In another paper (Gambarov, Musayeva, Krupkina, 2017), the scholars compared alternative techniques of building a composite index of financial stress: variance-equal weighting method, portfolio theoretic aggregation method and principal component analysis.

The second group of relevant studies covers works devoted to factors of fiscal sustainability of Russian regions. They emphasize the high degree of differentiation of the socio-economic conditions of Russian regions and the problems of redistribution of budget resources between the levels of the budget system (Di Bella, Dynnikova, Grigoli, 2018; Bozhechkova et al., 2018). These studies are useful in explaining the budget instability of some regional economies.

Finally, our current research relies on a number of our own studies that examined the financial instability of the Russian regions economies. In these works, we applied a portfolio approach to decompose financial instability by industry (Malkina, 2018a, b) and proposed

methods for managing it through optimization of the sectoral structures of regional economies (Malkina, 2019).

In this study, we develop the theory and methodology of fiscal sustainability in some aspects. First, we examine two indicators of the regional budget sphere, namely, the ratio of budget revenue to GRP and real budget revenue per capita. Secondly, we determine the ratio of each indicator in the region to its country level in order to eliminate systemic risk. Thirdly, we separate the volatility of relative indicators from their trends by construction of linear regressions and thereby achieve the stationarity of time series. Fourth, we use the Arrow-Pratt function, which is well known in investment analysis, to assess the overall sustainability of regional budget revenues. This allows us to synthesize the volatility of budget revenues and their steady growth rates on a new basis.

Data and Methods

We used data on revenues of consolidated budgets of 83 subjects of the Russian Federation in 2010-2017, provided by the Federal Treasury of the Russian Federation. We also applied statistics from the Federal State Statistics Service of the Russian Federation on GRP, average population, cost of the fixed consumer basket in the regions and in the country.

The choice of indicators for assessing the risk of budget revenues was based on their compliance with the requirement of stationarity of time series.

One of the indicators that can satisfy stationary property, is the ratio of budget revenues in the i-th region (B_i) to the GRP of this region (Y_i) (hereinafter referred to as *budget return*):

$$b_{I\,i} = B_i / Y_i. \quad (1)$$

We can also consider the ratio of budget revenues to population. Indeed, budget revenues are used to provide residents of a certain territory with public goods. In this case, we should take into account two important features of the budget process.

Firstly, budget expenditures consist of a fixed part (depending on parameters other than the population, such as area, and infrastructure costs are an example of this) and a variable part (depending on the number of inhabitants in the region). Due to the fixed part, budget expenditures per capita in small regions with a large territory are objectively higher. That is why Chukotka Autonomous Okrug, the region with the highest level of per capita budget revenues, meanwhile, is subsidized from the federal budget.

Secondly, the cost of living and price level differ in the regions. This affects the cost of production of public goods in them. To eliminate the inflationary component of income, we calculate the *real budget revenue per capita*:

$$b_{II\,i} = B_i / I_i / N_i, \quad (2)$$

where $I_i = CL_i / \bar{CL}_i$ is the index of the relative cost of living in the region, which is the ratio of the cost of a fixed consumer basket in the i-th region to the cost of the same basket in the country on average. N_i is the average population of the i-th region in the corresponding period.

In further calculations, we use both relative indicators, $b_{I\,i}$ and $b_{II\,i}$.

Although relative indicators better meet the stationarity requirement, they can still have a pronounced tendency. Since the economy develops cyclically, the dynamics of budget return in each particular region reflects the influence of both systemic risk and the specific risk characteristic of this region. To eliminate the systematic risk, we calculate the ratio of the regional budget return to the average return of the regional budgets in the country:

$$r_i = b_i / \bar{b}_i. \quad (3)$$

To separate the volatility from the trend in the time series of this indicator, we construct for each i-th region its linear dependence on time:

$$r_{it} = \underbrace{\alpha_0 + \alpha_1 \cdot t}_{\hat{r}_{it}} + e_{it}, \quad (4)$$

where α_0 and α_1 are the estimated regression coefficients, $\hat{r}_{it}$ are the budget return estimates, e_{it} are regression residuals.

Based on regression estimates, we determine the main budget parameters:

- *average relative budget return* in the region: $\mu_r = \frac{1}{T}\sum_{t=1}^{T} r_{it} = \frac{1}{T}\sum_{t=1}^{T} \hat{r}_{it}$. If this parameter is greater than or equal to 1, the state of the regional budget should be assessed positively, otherwise it should be assessed negatively;

- *absolute budget risk* is calculated as the standard deviation of the regression residuals: $\sigma_e = \sqrt{Var(e_{it})} = \sqrt{Var(r_{it}) - Var(\hat{r}_{it})}$. This parameter characterizes a non-systemic (specific) budget risk;

- *relative budget risk*, representing the ratio of absolute risk to average actual or estimated relative budget return: $\upsilon_r = \frac{\sigma_e}{\mu_r}$. Assuming a direct relationship between return and risk, we can argue that the relative indicator better reflects the state of sustainability of the public sector;

- *steady growth rate of relative budget return* is evaluated by trend line slope, α_1. The positive value of this parameter is evaluated positively, and vice versa.

A *general assessment of the sustainability of regional budget revenues* should combine both steady growth rates of relative budget return and its volatility, that is, relative budget risk. For this purpose, we can use *the Arrow-Pratt function*, which in our case takes the form:

$$f = \alpha_1 - \frac{\beta}{2} \cdot \upsilon_r, \quad (5)$$

where β is the risk aversion coefficient. Following the recommendations of the portfolio approach, we can accept its value equal to 1.5.

Results and their analysis

First of all, we computed the relative return of sub-federal budgets of all 83 subjects of the Russian Federation under review in dynamics for 8 years (2010-2017).

In the framework of the first approach, we assessed the budget return as the ratio of sub-federal budget revenues to GRP. The maximum deviations of this indicator from the average Russian level were found in the lagging republics of the North Caucasus and some border regions of the Siberian and Southern federal districts. For instance, in Republic of Ingushetia, the ratio of budget return to country level (b_{Ii}) amounted to 5.77, in Chechen Republic – 5.07, in Republic of Tuva – 3.18, in Altai Republic – 3.08, in Republic of Kalmykia – 2.23. This is due to both the low level of GRP in these regions and the high level of inter-budgetary transfers to them from the federal budget.

Highly developed extractive regions and the capital city, on the contrary, showed the lowest values of relative budget returns. In particular, the average annual relative return of sub-federal budgets in Nenets Autonomous Okrug was only 0.31, in Khanty-Mansi Autonomous Okrug – 0.38, in Yamal-Nenets Autonomous Okrug – 0.56, in Moscow – 0.61. This can be explained by the high level of GRP in these regions and their role as donors of budgetary resources for other regions.

In the framework of the second approach, we assessed the relative real revenue of sub-federal budgets per capita. Unlike the first approach, the maximum budget return turned out to be in the extractive regions. For example, in Chukotka Autonomous Okrug, the regional level of budget return was 4.15 times higher than the country level. In Nenets Autonomous Okrug this ratio was 3.95, in Yamalo-Nenets Autonomous Okrug – 3.12, in Sakhalin Oblast – 2.73, in Republic of Sakha (Yakutia) – 2.15, and in Magadan Oblast – 2.12. The excess of real budget revenues per capita over the national average in the Far Eastern regions is partly due to a higher level of their prices, the influence of which is not completely eliminated when using the adopted income deflation procedure.

At the same time, the lowest level of budget return, according to the second approach, was marked in some regions of Southern and North Caucasian federal districts. Specifically, real budget revenue per capita in Stavropol Krai was only 0.54 of the Russian level, in Republic of Dagestan – 0.55, in Kabardino-Balkarian Republic – 0.63, in Rostov Oblast – 0.64, and in Republic of North Ossetia-Alanya – 0.65. Low values of this indicator also appeared in some lagging regions of Central and Volga Feder-

al Districts: Ivanovo Oblast (0.62), Volgograd Oblast (0.64), and Vladimir Oblast (0.65).

Next, we present the results of regression estimations (4) obtained within two alternative approaches. Fig. 1 shows the assessments of absolute risk of sub-federal budgets in accordance with *the first approach*. Among the most risky regions in terms of the volatility of relative budget revenues to GRP, we again find the backward republics of southern Russia, as well as some subjects of Far Eastern Federal District. It is noteworthy that almost all of them are border regions. Thus, in Republic of Ingushetia, the absolute risk of the sub-federal budget reaches 47.9%, while the average relative budget return in this republic is 576.6%. This region is followed by Altai Republic (with absolute risk of 27.7%), Chechen Republic (26.8%), Sakhalin Oblast (22.5%), Jewish Autonomous Oblast (20.5%), and Republic of Tyva (20.1%).

The least risky, according to the first approach, are the sub-federal budgets of the Saratov Oblast (1.1%), Perm Krai (1.4%) and Sverdlovsk Oblast (1.6%). It should be noted that these regions are characterized by a rather diversified sectoral structure of the economy.

Further analysis revealed a fairly pronounced direct correlation between the average value of the relative return of the sub-federal budgets in the regions and their risk level (Fig. 2). This dependency is consistent with the theoretical relationship between risk and return.

The results of calculation of the relative risk of sub-federal budgets for all regions are shown in column 1 of the Table. Since relative risk takes into account the level of return around which fluctuations occur, the positions of the regions have changed somewhat. Now the leaders in the risk of sub-federal budgets

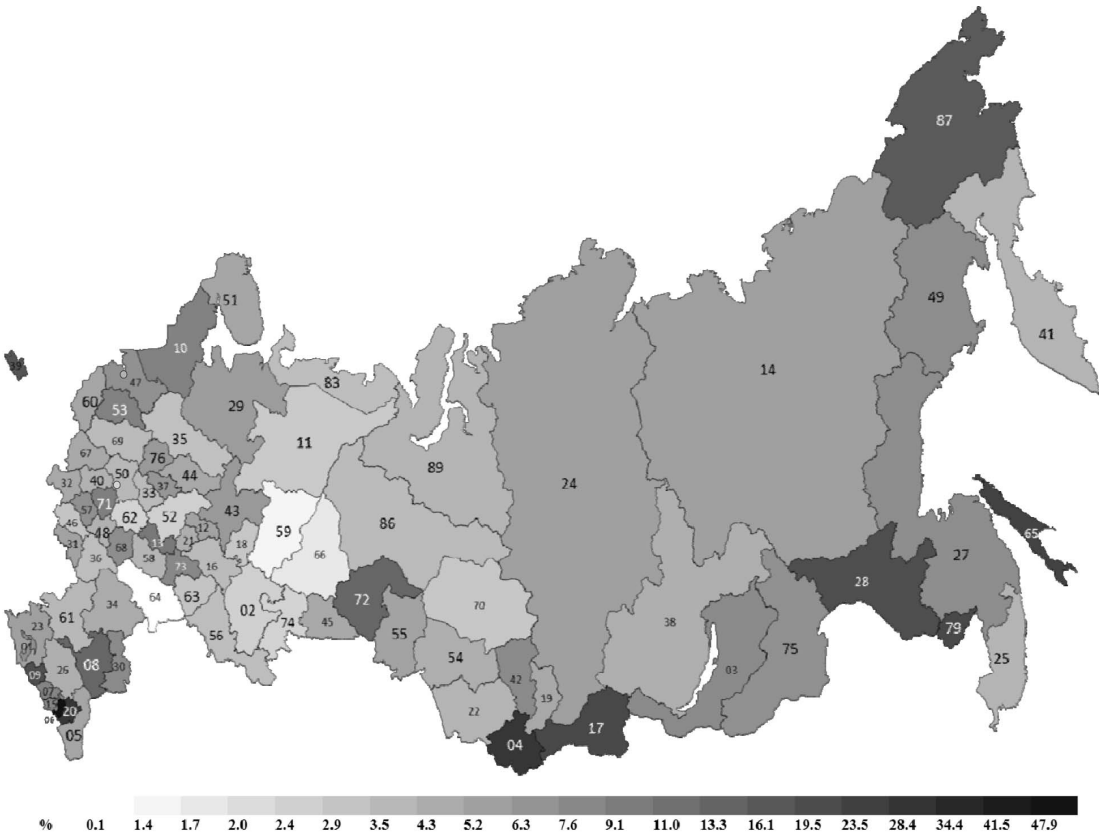

Fig. 1. Absolute risk of sub-federal budgets (measured on the basis of the ratio of budget revenues to GDP), %.

Note. Hereinafter, the region codes are decrypted in the Table

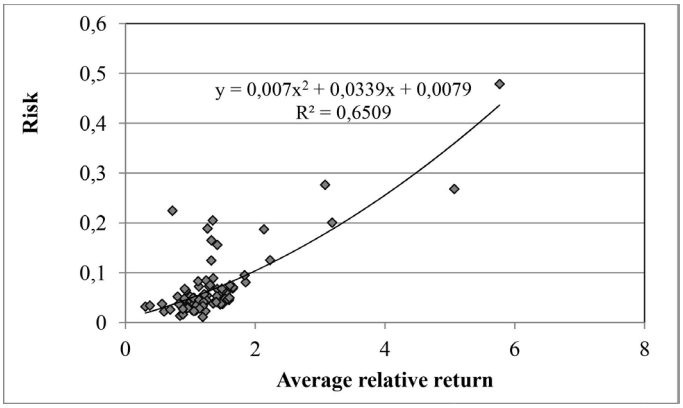

Fig. 2. The relationship between budget return and risk in Russian regions, according to the 1st approach

Table. Assessments of parameters of sustainability of budget revenues in Russian regions

Subjects of the Russian Federation	Adm. code of region	1st approach			2nd approach		
		Relative risk	Growth of return	Arrow-Pratt Function	Relative risk	Growth of return	Arrow-Pratt Function
		1	2	3	4	5	6
Altai Krai	22	0.025	-0.018	-0.037	0.024	-0.006	-0.025
Amurskaya Oblast	28	0.149	-0.044	-0.156	0.151	-0.032	-0.145
Arhangelsk Oblast	29	0.043	-0.021	-0.054	0.043	-0.007	-0.040
Astrakhan Oblast	30	0.057	-0.012	-0.055	0.056	-0.007	-0.050
Belgorod Oblast	31	0.047	-0.025	-0.060	0.048	-0.027	-0.063
Bryansk Oblast	32	0.029	0.038	0.017	0.028	0.023	0.001
Vladimir Oblast	33	0.031	-0.003	-0.026	0.030	0.002	-0.021
Volgograd Oblast	34	0.043	-0.007	-0.040	0.043	-0.002	-0.034
Vologda Oblast	35	0.032	-0.004	-0.027	0.032	-0.001	-0.025
Voronezh Oblast	36	0.027	0.003	-0.017	0.027	0.002	-0.019
Moscow city	77	0.037	0.006	-0.022	0.041	-0.003	-0.034
St. Petersburg	78	0.035	-0.011	-0.038	0.037	-0.032	-0.060
Jewish Autonomous Oblast	79	0.153	-0.045	-0.159	0.151	-0.021	-0.135
Transbaikal Krai	75	0.044	-0.029	-0.061	0.043	-0.013	-0.045
Ivanovo Oblast	37	0.039	-0.036	-0.065	0.039	-0.011	-0.040
Irkutsk Oblast	38	0.037	0.003	-0.024	0.037	0.004	-0.023
Kabardino-Balkarian Republic	07	0.044	-0.028	-0.061	0.044	-0.010	-0.043
Kaliningrad Oblast	39	0.125	0.103	0.010	0.121	0.071	-0.019
Kaluga Oblast	40	0.028	0.013	-0.009	0.029	0.008	-0.013
Kamchatka Krai	41	0.025	0.012	-0.006	0.025	0.021	0.002
Karachay-Cherkess Republic	09	0.088	0.018	-0.048	0.088	0.008	-0.058
Kemerovo Oblast	42	0.064	-0.023	-0.071	0.064	-0.017	-0.065

Continued Table

Subjects of the Russian Federation	Adm. code of region	1st approach			2nd approach		
		Relative risk	Growth of return	Arrow-Pratt Function	Relative risk	Growth of return	Arrow-Pratt Function
		1	2	3	4	5	6
Kirov Oblast	43	0.040	-0.040	-0.070	0.038	-0.016	-0.044
Kostroma Oblast	44	0.036	-0.024	-0.051	0.036	-0.010	-0.037
Krasnodar Krai	23	0.052	-0.003	-0.042	0.054	-0.009	-0.050
Krasnoyarsk Krai	24	0.065	-0.014	-0.063	0.065	-0.023	-0.072
Kurgan Oblast	45	0.031	-0.037	-0.060	0.029	-0.011	-0.033
Kursk Oblast	46	0.025	-0.001	-0.020	0.025	0.000	-0.019
Leningrad Oblast	47	0.069	0.035	-0.017	0.069	0.030	-0.022
Lipetsk Oblast	48	0.039	0.017	-0.012	0.038	0.016	-0.013
Magadan Oblast	49	0.048	0.010	-0.026	0.047	0.042	0.007
Moscow Oblast	50	0.034	0.018	-0.008	0.044	0.010	-0.023
Murmansk Oblast	51	0.053	-0.008	-0.048	0.052	-0.001	-0.040
Nenets Autonomous Okrug	83	0.104	-0.001	-0.079	0.104	-0.038	-0.116
Nizhny Novgorod Oblast	52	0.024	0.003	-0.015	0.023	0.004	-0.013
Novgorod Oblast	53	0.074	-0.022	-0.078	0.074	-0.012	-0.067
Novosibirsk Oblast	54	0.034	-0.007	-0.032	0.034	-0.010	-0.035
Omsk Oblast	55	0.047	-0.012	-0.047	0.048	-0.008	-0.044
Orenburg Oblast	56	0.033	-0.018	-0.043	0.034	-0.012	-0.038
Oryol Oblast	57	0.043	-0.012	-0.044	0.043	-0.001	-0.033
Penza Oblast	58	0.026	-0.038	-0.057	0.026	-0.014	-0.034
Perm Krai	59	0.016	-0.010	-0.022	0.016	-0.008	-0.021
Primorsky Krai	25	0.045	-0.025	-0.059	0.045	-0.021	-0.055
Pskov Oblast	60	0.031	-0.041	-0.064	0.032	-0.014	-0.038
Republic of Adygea	01	0.041	-0.007	-0.038	0.041	-0.006	-0.037
Altai Republic	04	0.090	-0.058	-0.125	0.089	-0.033	-0.100
Republic of Bashkortostan	02	0.022	0.016	-0.001	0.022	0.011	-0.005
Republic of Buryatia	03	0.043	-0.028	-0.060	0.044	-0.017	-0.049
Republic of Dagestan	05	0.030	0.015	-0.007	0.031	0.001	-0.022
Republic of Ingushetia	06	0.083	0.065	0.003	0.076	-0.011	-0.068
Republic of Kalmykia	08	0.056	-0.043	-0.085	0.056	-0.009	-0.051
Republic of Karelia	10	0.068	-0.038	-0.089	0.067	-0.023	-0.074
Komi Republic	11	0.038	-0.003	-0.031	0.038	0.006	-0.022
Mari El Republic	12	0.031	0.000	-0.024	0.031	0.002	-0.022
Republic of Mordovia	13	0.052	-0.049	-0.088	0.054	-0.020	-0.060
Republic of Sakha (Yakutia)	14	0.038	0.044	0.016	0.039	0.065	0.036
Republic of North Ossetia – Alania	15	0.047	-0.001	-0.036	0.048	0.001	-0.035
Republic of Tatarstan	16	0.029	0.006	-0.016	0.029	0.001	-0.021

Continued Table

Subjects of the Russian Federation	Adm. code of region	1st approach			2nd approach		
		Relative risk	Growth of return	Arrow-Pratt Function	Relative risk	Growth of return	Arrow-Pratt Function
		1	2	3	4	5	6
Tyva Republic	17	0.063	0.014	-0.033	0.064	-0.001	-0.049
Republic of Khakassia	19	0.038	-0.001	-0.030	0.038	-0.002	-0.031
Rostov Oblast	61	0.032	0.005	-0.018	0.032	0.004	-0.020
Ryazan Oblast	62	0.019	0.000	-0.014	0.018	0.003	-0.011
Samara Oblast	63	0.031	-0.005	-0.028	0.030	-0.003	-0.026
Saratov Oblast	64	0.010	-0.011	-0.018	0.009	-0.004	-0.011
Sakhalin Oblast	65	0.310	0.078	-0.154	0.313	0.302	0.067
Sverdlovsk Oblast	66	0.019	0.000	-0.014	0.019	-0.001	-0.015
Smolensk Oblast	67	0.040	-0.007	-0.037	0.040	0.000	-0.030
Stavropol Krai	26	0.034	-0.012	-0.038	0.035	-0.006	-0.032
Tambov Oblast	68	0.046	-0.003	-0.037	0.045	0.004	-0.030
Tver Oblast	69	0.028	-0.012	-0.033	0.027	-0.002	-0.023
Tomsk Oblast	70	0.031	-0.003	-0.027	0.029	-0.008	-0.030
Tula Oblast	71	0.066	0.035	-0.014	0.066	0.025	-0.024
Tyumen Oblast	72	0.094	-0.096	-0.166	0.097	-0.172	-0.245
Udmurt republic	18	0.025	0.020	0.002	0.025	0.014	-0.005
Ulyanovsk Oblast	73	0.058	0.006	-0.037	0.057	0.007	-0.036
Khabarovsk Krai	27	0.074	-0.015	-0.070	0.074	-0.013	-0.069
Khanty-Mansi Autonomous Okrug	86	0.091	-0.004	-0.072	0.089	-0.036	-0.102
Chelyabinsk Oblast	74	0.022	0.006	-0.010	0.022	0.003	-0.013
Chechen Republic	20	0.053	-0.269	-0.309	0.055	-0.071	-0.113
Chuvash Republic	21	0.030	-0.004	-0.026	0.030	0.000	-0.023
Chukotka Autonomous Okrug	87	0.110	0.080	-0.003	0.111	0.248	0.165
Yamal-Nenets Autonomous Okrug	89	0.067	-0.005	-0.055	0.063	-0.034	-0.081
Yaroslavskaya oblast	76	0.047	-0.020	-0.055	0.047	-0.014	-0.048

are the majority of subjects of Far Eastern Federal District: first of all, Sakhalin Oblast (υ_r = 0.310), followed by Jewish Autonomous Oblast (0.153), Amur Oblast (0.149), and Chukotka Autonomous Okrug (0.110). Among the regions with a higher level of sub-federal budget relative risk (0.125), we also find Kaliningrad Oblast, which is the westernmost subject of the Russian Federation. It is noteworthy that the most risky are again the border areas. In addition, the main extracting regions and the underdeveloped southern republics also show an increased relative risk of sub-federal budgets, but its assessments turned out to be slightly lower.

The most stable are still the sub-federal budgets of Saratov Oblast (υ_r = 0.010), Perm Krai (0.016) and Sverdlovsk Oblast (0.019). A

low relative risk of the sub-federal budget is also observed in Ryazan Oblast (0.019).

As we noted in the methodological part of this paper, for sub-federal budgets, not only the stability of returns, but also their steady growth rates are important. According to column 2 of the Table, only 27 out of 83 regions showed positive dynamics in the relative return of sub-federal budgets. Moreover, the leaders here are the regions previously marked as the most unstable, namely Kaliningrad and Sakhalin Oblasts, Chukotka AO, as well as Republic of Ingushetia. Obviously, this property should improve the position of these regions when assessing the sustainability of budget systems based on the Arrow-Pratt function.

At the same time, Chechen Republic has the largest negative dynamics in relative budget return ($\alpha_1 = -0.269$). It is followed by Tyumen Oblast (-0.096) and Altai Republic (-0.058) with a wide margin.

According to the Pearson linear coefficient, the correlation between relative risk and steady growth rate of relative return of sub-federal budgets is very low and unstable ($R = 0.162$). Therefore, we cannot unambiguously predict a change in the position of the regions, given both parameters in the selected utility function.

The obtained assessments of the Arrow-Pratt function are presented in column 3 of the Table. They indicate that Bryansk Oblast ($f = 0.017$), Republic of Sakha-Yakutia (0.016) and Kaliningrad Oblast (0.010) have the most efficient budget systems. At the same time, the ratings of Chechen Republic ($f = -0.309$), Tyumen Oblast (-0.166), Jewish AO (-0.159), Amur Oblast (-0.156) and Sakhalin Oblast (-0.154) are the lowest among all. In these regions (except the last), the increased risk of relative budget returns is also accompanied by the negative dynamics of this indicator.

Now we present the results of the estimation of functions (4) within *the second approach*. Fig. 3 shows the evaluation of absolute risk of sub-federal budgets calculated for relative real per capita budget revenues. Among the most risky by this indicator are Sakhalin Oblast (here the absolute risk is 85.4% with a relative budget return of 272.9%), Chukotka Autonomous Okrug (with risk of 46.1%, and return of 415.0%), Nenets Autonomous Okrug (41.1%, and 395.3%). All these regions specialize in the mining industry, so their budget revenues are highly dependent on the global environment in the energy markets.

The least risky in terms of volatility of relative real budget revenue per capita are Saratov Oblast (which risk is 0.6%, and relative return is 68%), Perm Krai (1.2% and 75.4%), Ryazan Oblast (1.3% and 73.3%), and Sverdlovsk Oblast (1.5% and 81.4%). All of them are located in the European part of Russia or at the junction of Europe and Asia.

For the second approach, we also found a positive relationship between the average level of relative budget return and its risk (Fig. 4). The outlier in the figure is presented by Sakhalin Oblast, which demonstrates an abnormally high level of budget risk. Since the relative return indicators involved in the 1st and 2nd approaches differ in content, the correlation of their absolute risk assessments is low (R=0.361). Meanwhile, both indicators in the numerator have sub-federal budget revenues; therefore, the relationship between risk assessments turned out to be positive, although weak in strength.

Relative risk, calculated as the ratio of absolute risk to average relative budget return under the second approach, is presented in column 4 of the Table. The highest relative risk is observed in Sakhalin Oblast (0.313), Amur Oblast (0.151), Jewish AO (0.151), Chukotka Autonomous Okrug (0.111) and Kaliningrad Oblast (0.121). These are the same regions that were identified as the most risky in the first approach. The lowest relative risk was again obtained in Saratov Oblast (0.009), Perm Krai (0.016), Ryazan Oblast (0.018) and Sverdlovsk Oblast (0.019). In general, the correlation of the relative risk assessments received on the basis of the two approaches turned out to be very high (R=0.999).

The dynamics of the relative real budget revenues per capita (column 5 of the Table) also showed a close relationship with the dynamics of relative budget revenues to GRP in the re-

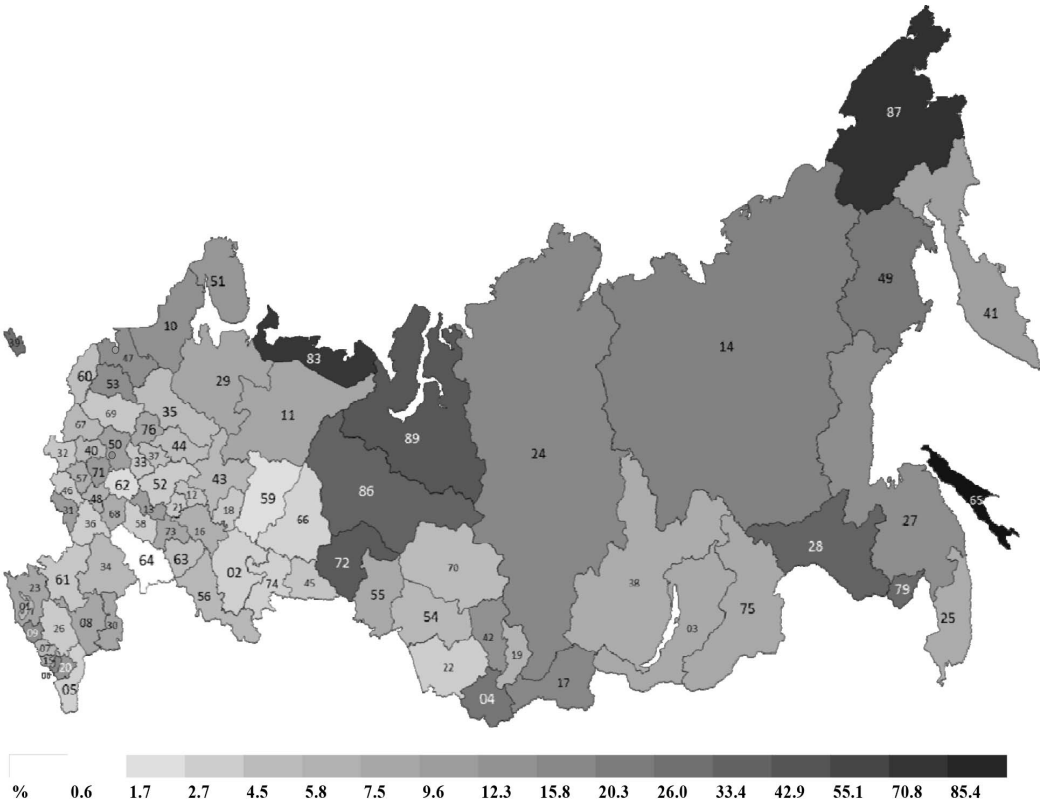

Fig. 3. Absolute risk of sub-federal budgets
(measured on the basis of real budget revenue per capita), %

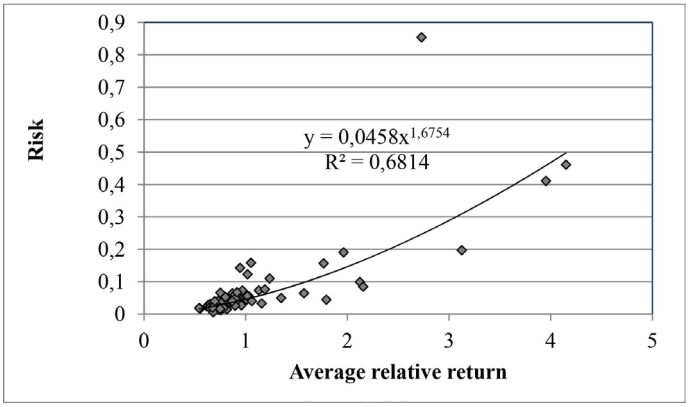

Fig. 4. The relationship between budget return and risk
in Russian regions, according to the 2nd approach

gions (column 2). Their linear correlation coefficient is R=0.622. At the same time, according to the 2nd approach, the number of regions with positive dynamics of relative budget return is somewhat larger (30 versus 27, according to the 1st approach).

The assessments of the Arrow-Pratt function obtained by the 2nd approach are presented

in column 6 of the Table. For most regions, we do not find any significant discrepancies with the results of the 1st approach. The linear correlation coefficient of the two assessments of the Arrow-Pratt function is 0.609. Meanwhile, for some regions, assessments of A-P functions vary greatly. First of all, we mean Sakhalin Oblast, which demonstrates one of the worst values of the Arrow-Pratt function (79th out of 83th) according to the first approach and takes 2nd place in the second approach. In Republic of Ingushetia, the situation is the opposite. According to the Arrow-Pratt function, estimated on the basis of the relative budget income to GRP, the republic is one of the leaders and takes the 4th place, and it is one of the most lagging (72th), when the A-P function is based on real income per capita. The calculation of the average rank of budget sustainability (as the arithmetic mean of the ranks obtained for the two A-P functions) shows that the leaders in this indicator are Republic of Sakha (rank 2.5), Bryansk Oblast (3.5) and Chukotka Autonomous Okrug (4). The lowest financial sustainability is demonstrated by Tyumen Oblast (whose rank is 82.5), Amur Oblast, Jewish AO and Chechen Republic (with an average rank of 81 each).

Conclusion

This study is devoted to the development of the concept and methodology for assessing the sustainability of budget revenues of territorial entities. By sustainability we mean both stability (low volatility) and a steady growth rate of real budget revenues relative to GRP and per capita compared with the average country indicators, which allows to eliminate the system-wide risk. For a comprehensive assessment of budget revenues sustainability, we proposed using the Arrow-Pratt function. Based on this methodology, we calculated the absolute and relative risk and steady growth rates of relative budget returns, as well as the level of sustainability of budget revenues in 83 Russian regions. Assessments obtained for the two alternative indicators turned out to be highly correlated, with some outstanding exceptions.

The results are consistent with the logic of economic processes. We found that the most vulnerable are the budget systems of either underdeveloped regions or regions whose incomes depend on the global situation. The spatial location of such regions is also noteworthy. Almost all of them are located on the outskirts of the Russian Federation and are border territories. At the same time, some inland mining areas, by contrast, may exhibit increased sustainability. Republic of Sakha is a good example of such a region, while Tyumen Oblast is a typical exception. A deeper understanding of the origin of fiscal instability in certain regions requires its decomposition by industry or revenue component, which may be the subject of future analysis.

References

Andryakov, A.D. (2017). Sbalansirovannost' i ustoichivost' regional'nykh biudzhetov v 2008–2016 gg. [Balance and Sustainability of Regional Budgets in 2008–2016]. In *Finansovyi zhurnal* [*Financial Journal*], 6, 25-39.

Bohn, H. (2008). The sustainability of fiscal policy in the United States. In R. Neck, & J. Sturm (Eds.), *Sustainability of public debt. MIT Press*, 15–49.

Bozhechkova, A.V., Mamedov, A.A., Sinelnikov-Murylev, S.G., Turuntseva M.Yu. (2018). Stabilizatsionnye svoistva transfertov, vydeliaemykh regionam Rossii iz federal'nogo biudzheta [Stabilization Properties of Federal Fiscal Transfers to Russian Regions]. In *ZHurnal Novoi ekonomicheskoi assotsiatsii* [*Journal of the New Economic Association*], 4 (40), 61–83. DOI: 10.31737/2221-2264-2018-40-4-3.

Di Bella, G., Dynnikova, O., Grigoli, F. (2018). Fiscal federalism and regional performance in Russia. In *Russian Journal of Economics*, 4, 108–132. DOI: 10.3897/j.ruje.4.27741.

Gambarov, G., Musayeva, M., Krupkina, A. (2017). Indikator riskov rossiiskogo finansovogo rynka [Russian Financial Market Risk Index]. In *Money and Credit* [*Den'gi i kredit*], 6, 29-38.

Ivanov, P.A., Sakhapova, G.R. (2014). Finansovaia nestabil'nost' regiona: metody otsenki i instrumenty eliminirovaniia [Financial instability in the region: assessment methods and elimination tools]. In *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz* [*Economic and social changes: facts, trends, forecast*], 6 (36), 183-198. DOI: 10.15838/esc/2014.6.36.14.

Klimanov, V.V., Kazakova, S.M., Mikhaylova, A.A. (2019). Retrospektivnyi analiz ustoichivosti regionov Rossii kak sotsial'no-ekonomicheskikh sistem [Retrospective analysis of the resilience of Russian regions as socio-economic systems]. In *Voprosy Ekonomiki*, 5, 46-64. DOI: 10.32609/0042-8736-2019-5-46-64.

Klimanov, V.V., Kazakova, S.M., Mikhaylova, A.A. (2018). Regional'naia rezilientnost': teoreticheskie osnovy postanovki voprosa [Regional Resilience: Theoretical Basics of the Question]. In *Ekonomicheskaya politika* [*Economic Policy*], 13 (6), 164–187. DOI: 10.18288/1994-5124-2018-6-164-187.

Malkina, M.Yu. (2018a). Nestabil'nost' finansovoi dokhodnosti regional'nykh ehkonomik i ee determinanty [Instability of financial return of regional economies and its determinants]. In *Prostranstvennaya ehkonomika* [*Spatial Economics*], 3, 88-114. DOI: 10.14530/se.2018.3.088-114.

Malkina, M.Yu. (2018b). Vklad regionov i otraslei v finansovuiu nestabil'nost' rossiiskoi ekonomiki [Contribution of regions and their sectors to the financial instability of the Russian economy]. In *Terra Economicus*, 16 (3), 118-130. DOI: 10.23683/2073-6606-2018-16-3-118-130.

Malkina, M.Yu. (2019). How change in industry mix can improve the financial performance of regional economies: evidence from the portfolio approach. In *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 67 (6), 1561-1575. DOI: 10.11118/actaun201967061561.

Rahma, H., Fauzi, A., Juanda, B., Widjojanto, B. (2019). Development of a Composite Measure of Regional Sustainable Development in Indonesia. In *Sustainability*, 11, 5861. DOI:10.3390/su11205861.

Sheremeta, S.V. (2020). Analiz regional'nykh finansov Rossii i ustoichivost' dolga regionov [Russian regional finances analysis and regional debt sustainability]. In *Voprosy Ekonomiki*, 2, 30-58. DOI: 10.32609/0042-8736-2020-2-30-58.

Smetana, S. Tamásy, C. Mathys, A. Heinz, V. (2015). Sustainability and regions: sustainability assessment in regional perspective. In *Regional Science Policy and Practice*, 7 (4), 163-186. DOI: 10.1111/rsp3.12068.

Оценка устойчивости бюджетных доходов регионов Российской Федерации

М.Ю. Малкина
Нижегородский государственный университет им. Н.И. Лобачевского
Российская Федерация, Нижний Новгород

Аннотация. В статье предложены новые подходы к оценке устойчивости бюджетных доходов региона, которые апробированы на примере 83 субъектов Российской Федерации в 2010-2017 годах. Устойчивость доходов бюджета оценивается на основе временных рядов двух показателей: отношения доходов субфедеральных бюджетов к ВРП региона и реальных доходов субфедеральных бюджетов в расчете на душу населения. Для исключения эффекта масштаба и устранения общесистемного риска оба показателя рассчитываются как отношение к среднероссийским значениям. С помощью построения временных линейных регрессий определяются устойчивый темп роста, абсолютный риск и относительный риск бюджетных доходов. Для комплексной оценки устойчивости доходов бюджета в регионе мы предложили использовать функцию Эрроу-Пратта с включенным параметром неприятия риска 1,5.
С использованием предложенной методики мы оценили абсолютный и относительный риск, а также устойчивость доходов бюджета в российских регионах. Оценки, полученные на основе двух альтернативных показателей, продемонстрировали высокую корреляцию. Наше исследование выявило, что наименее устойчивые бюджетные системы характерны как для некоторых приграничных регионов, включая отсталые республики Северного Кавказа и регионы Дальнего Востока с нестабильной экономикой, так и для достаточно развитой, но зависящей от мировой конъюнктуры Тюменской области. В то же время некоторые добывающие регионы (Республика Саха), напротив, продемонстрировали высокую устойчивость бюджетных поступлений.

Ключевые слова: финансовая устойчивость, регион, субфедеральный бюджет, доходы бюджета, риск и доходность бюджетной системы.

Работа выполнена при финансовой поддержке РФФИ в рамках реализации проекта № 19-010-00716 «Разработка методологии и нетрадиционных методов оценки финансовой нестабильности».

Научная специальность: 08.00.00 – экономические науки.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 560–570

DOI: 10.17516/1997-1370-0589
УДК 338

Experience in Evaluating the Project on Research Infrastructure of the Center for Collective Use for the Production of Catalysts

Tatyana S. Novikova[a,b], Aleksandr O. Baranov[a,b] and Maria V. Korolkova[b]*
[a]*Institute of Economics and Industrial Engineering of SB RAS*
Novosibirsk, Russian Federation
[b]*Novosibirsk State University*
Novosibirsk, Russian Federation

Received 18.11.2019, received in revised form 31.03.2020, accepted 13.04.2020

Abstract. The infrastructural component of Russia's scientific and technological development requires a significant update of the methodology for evaluating the relevant investment projects. The article covers the issue of simultaneous assessment of financial and economic efficiency of research infrastructure projects and justification of the need for government participation for successful implementation of such projects. The suggested methods and models are based on the transition from financial to economic indicators of the project through the adjustment of cash flows, identification of public effects significant for such projects (social, environmental, indirect, price, tax), and allocation of synergistic effects in their composition. These methods and models were tested for the innovative project of the Center for Collective Use "Experimental Catalyst Production", which was proposed by the Institute of Catalysis in 2018 within the framework of the Novosibirsk regional programme "Akademgorodok 2.0". The results show that the stimulation of investment in research infrastructure is justified by a significant excess of the project economic efficiency compared to its financial efficiency and it significantly depends on the choice of an adequate mechanism for government support.

Keywords: public-private partnership, financial and economic efficiency, budgetary efficiency, synergistic effects, innovative project, research infrastructure.

The paper is part of the SB RAS Basic Research Programme, Project XI.170-2 "Formation of the foundations of the theory of innovative economics: operational definitions, measurements, models, scientific and technological forecasts and programme", No. AAAA-A17-117022250128-5.

Research area: economics.

* Corresponding author E-mail address: tsnovikova@mail.ru
ORCID: 0000-0001-8636-5219 (Novikova); 0000-0001-8597-9788 (Baranov); 0000-0002-6459-6427 (Korolkova)

Citation: Novikova, T.S., Baranov, A.O., Korolkova, M.V. (2020). Experience in evaluating the project on research infrastructure of the center for collective use for the production of catalysts. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 560-570. DOI: 10.17516/1997-1370-0589.

1. Problem Statement

In the conditions of modern scientific and technological development, the interdependence of the participants in the investment activities is sharply increasing, and new types of relationships between them are being formed on the basis of research infrastructure. Institutions for coordination of the activities between the representatives of science, education and business are being established on the bases of the principle of partnership in the form of network infrastructures, centers for collective use and engineering centers formation as well as in the form of sharing unique scientific installations, primarily national and international mega-science ones (*Infrastruktura…*, 2016).

Relevant investment projects require adequate methods of evaluating the efficiency and making decisions on the mechanisms for their implementation. Two interrelated problems are characteristic of research infrastructure projects: simultaneous assessment of financial and economic efficiency and justification of the need for the government support of their successful implementation. Financial (commercial) efficiency is regarded as the comparison of project benefits and costs from a perspective of its private participants. Economic (public) efficiency, in its tern, implies a perspective of the society as a whole (*Methodical Recommendations for Evaluation…*, 2000; Novikova, 2018). As a rule, implementation of such projects is impossible without the government support because of their extremely low (often even negative) level of financial efficiency. The greater the gap between relatively low financial efficiency and high economic efficiency is, the greater the share of the government in the project is. According to the report of the European Commission Directorate-General for Research and Innovation, "public-private partnerships offer an opportunity to translate research into products and to close the gap between academic and industrial research" (Public, 2013: 3).

At first glance, a wide variety of methods for evaluating infrastructure projects, including government support, were created both in Russia and abroad, and they were analyzed in relevant reviews (for example, (Public, 2017; Novikova, 2018: 63-81)). However, in practice, there is an imbalance between the approaches applied in this field. Real methods of evaluating such projects are limited to the analysis of either financial efficiency at the micro level, or economic efficiency at the macro- and mesolevels (Suslov, Buzulutskov, 2014; Malov et al., 2016). For example, the leading Russian Methodology for evaluating the efficiency of a public-private partnership project, a municipal-private partnership project and for determining their comparative advantage[1] does not contain any requirement for evaluating the economic efficiency (contrary to the provisions of the basic official methodology for the investment projects evaluation (*Methodical Recommendations for Evaluation…*, 2000)). Instead, the term of socio-economic efficiency was introduced, which was based on qualitative methods only or calculation of particular components that are non-comparable with the results of financial analysis (for example, job creation). This raises serious objections both from theoretical and practical points of view, the reason being the lack of a comprehensive assessment of comparable performance indicators in monetary terms (typical for modern project analysis). This paper introduces the models and methods for simultaneous assessment of financial and economic efficiency of the research infrastructure projects and for quantitative assessment of changes in financial efficiency as a result of various forms of government participation in the project.

Assessment of economic efficiency in accordance with international practice corresponds to the cost-benefit analysis (CBA)

[1] The methodology was approved by the order of the Ministry of economic development of the Russian Federation No. 894 dated November 30, 2015.

designed for the evaluation of public sector projects, including infrastructure projects (Boardman et al., 2018). In the middle of the last century, the economic aspect of project analysis involved the CBA methods for evaluating private projects in their combination with the financial analysis. This approach was initially developed by international organizations, primarily UNIDO (Dasgupta et al., 1972), the World Bank (Squire et al., 1975; Ward et al., 1991). In Russia, the economic aspect corresponds to the analysis of public efficiency and forms one of the two directions in the project analysis along with the analysis of financial (commercial) efficiency (*Methodical Recommendations for Evaluation*..., 2000; Novikova, 2018).

In the context of modern scientific and technological development, a number of new methods for economic, social and environmental analysis have appeared in their combination with the financial analysis within government organizations (*Guide to Social*…, 2012), Structural funds of the European Community (Guide, 2015), international development banks: the European Investment Bank (Economic Appraisal, 2013), the Asian Development Bank (Guidelines, 2017) – and independent funds (*Reference Case*…, 2019).

Research infrastructure projects are a type of project requiring updated assessment methods and characterized by a combination of low financial and high economic efficiency (Florio et al., 2016). Among the effects of such projects, both direct technological and secondary effects of knowledge diffusion are of particular importance. Their study began in the last century (Grossman et al., 1992) and continued as part of the research of the diffusion of innovations and their associated side effects, as well as indirect and external effects (Llerna et al., 2011). Much of this work has been carried out in the framework of theoretical and empirical studies of spatial economics (Carboni, 2017). In this area, the traditional approach is developing in the context of productivity growth through innovative products and technologies (Gilbert et al., 2018).

2. Methods for evaluating the projects of research infrastructure

The financial and economic model of a specific infrastructure project is the key tool for calculations. It facilitates both simultaneous assessment of its financial and economic efficiency at the microeconomic level and detailing the application of various methods for evaluating public effects for different projects (Novikova, 2018). The financial model is typical for evaluating a project from the perspective of private participants. It reflects the relationship between variables, assumptions, and business development factors in the process of project implementation.

The economic model is based on the transition from financial to economic efficiency by adjusting the discount rate and cash flows, depending on the consideration of various factors and calculations of relevant effects. The corresponding relationship of equations for financial and economic cash flows with the characteristic components of infrastructure projects can be presented as follows:

$$CFE^{rt} = CFF^{rt} + V^{rt} + W^{rt} - \\ - E^{rt} + P^{rt} + T^{rt}, t = 1, \dots, T. \quad (1)$$

Notations of cash flows arising from the project implementation in the *r-th* region in the *t* period:

CFE^{rt} – cash flow balances for the economic analysis;

CFF^{rt} – cash flow balances for the financial analysis;

V^{rt} – cash flows for calculating indirect effects (the result of productivity growth due to technological changes through the use of project products);

W^{rt} and E^{rt} – cash flows for calculating positive external and environmental effects (the result of knowledge diffusion and impact on the environment);

P^{rt} and T^{rt} – cash flows for calculating price and tax effects (with the allocation of financial and economic components in these effects).

It should be noted that among negative externalities these are the most important ecological costs that are taken into consideration. Yet, if the project is aimed at improving the

environment (for example, utilization of associated petroleum gases), the corresponding component is taken into account in its positive sign.

The level of detailing and the methods of calculating individual effects for various types of infrastructure projects are significantly different. For example, the projects of catalysts implementation are characterized by significant effects already at the first stages of their use, and indirect effects for them can be calculated as an increase in quality and quantity of products in oil refining and petrochemicals in direct dependence on the catalysts implementation. For large-scale projects with complex and significant chains of product cycles, it is necessary to determine indirect and price effects endogenously while using more complex tools of input-output, multiregional, and econometric models.

The suggested model can be used not only to determine the project efficiency, but also to form a financial mechanism for its implementation. The level of financial efficiency can be changed as a result of government support.

The qualitative and quantitative analysis of the consequences of government participation in project implementation is based on the analysis of changes in cash flows and corresponding changes in net present values.

$$CFF^{rt} = CFFG^{rt} - \Delta T^{rt} - \Delta L^{rt} - \Delta I^{rt}, \quad (2)$$

CFF^{rt} and $CFFG^{rt}$– cash flows with and without government participation;

ΔT^{rt} и ΔL_{rt}– changes in tax payments and liquidation value in the case of government participation;

ΔI^{rt} – investments in the creation of research infrastructure facilities and other budget funded investments.

This formula comprises the components of a possible increase in the project financial efficiency through the investment incentives, including changes in taxes, liquidation value, and private investment. Implementation of each project involves a specific financial mechanism and appropriate reallocation of results among the participants, government participation being taken into account.

3. Results of evaluating the efficiency of the Center for Collective Use "Experimental Catalyst Production" project

The project on the Center for Collective Use "Experimental Catalyst Production" creation was initiated in 2018 by the Institute of Catalysis of the Siberian Branch of the Russian Academy of Sciences within the framework of the Novosibirsk regional programme "Akademgorodok 2.0". The project is aimed at solving the problem of a technological gap the Russian catalyst production faces.

To achieve the world class developments in the field of catalysts creation and their industrial implementation, as well as their constant improvement and development of the next generations to maintain their long-term competitiveness there is a need in modern experimental and technological base. The creation of such a base is envisaged in a project of pilot catalysts production with flexible structure. The project provides construction of two buildings for R&D on the pilot production of various catalysts and their debugging with high-pressure installations.

The total amount of investment in the project for the 2019-2030 period are 3692.8 million rubles. Implementation of the project will increase the production of new materials and catalysts in Russia: the total sales volume for the 2023-2030 period, calculated in 2018 prices (including VAT), is estimated at 40,785 million rubles, including hydro-processing catalysts (15,857 million rubles), titanium-magnesium catalysts for olefin polymerization (8,417 million rubles), aluminum hydroxide (2,015 million rubles), catalysts of dehydrogenation of propane to propylene (14,496 million rubles). However, the main results of the project are achieved through the use of catalysts in the oil refining and petrochemical complex of Russia: the increase in sales for the 2023 – 2030 period, calculated in 2018 prices (including VAT and excise taxes), is envisaged in the amount of 471,783 million rubles, including 70% increase in the output of diesel fuel containing domestic hydrotreating and hydrocracking catalysts; 23% increase in sales of polyethylene and polypropylene due to TMK ("Pipe Metallurgical Co"); 6% – increase in sales of reforming gas-

Table 1. Project efficiency: net present value (NPV) in 2019-2030

	(r = 0%)		(r = 12%)	
	million rubles	%	million rubles	%
Financial efficiency	2,199.3	0.4%	-524.8	-0.3%
Tax effects	147,305.2	27.9%	56,082.4	28.4%
Indirect effects	378,145.1	71.7%	142,107.1	71.9%
Economic efficiency	527,649.7	100.0%	197,664.7	100.0%
Budget effici5ency	143,805.2	27.3%	53,779.7	27.2%

oline due to ball aluminum oxide and 1% – increase in sales of propylene due to dehydrogenation catalyst. The total sales of new catalysts and additional sales of products due to their introduction into production amounted to approximately 512,568 million rubles.

Thus, besides the initiator, there are two groups of participants that use the project results. These are enterprises producing new catalysts and enterprises in the petrochemical and oil refining industries.

The results of the project efficiency evaluation are shown in Table 1. They are based on a system of discounted indicators (in 2019 prices) and as a percentage of the economic NPV of the project.

The project features a combination of low financial efficiency and high economic efficiency and belongs to the group of socially significant projects requiring support. An important characteristic of the project is an exceptionally high level of economic efficiency. Thus, at a 12% discount rate, the company's net present value for the 2019-2030 period as a whole will amount to 197,664.7 million rubles.

As measured by net present value, financial efficiency of the project without budget funding will be negative and will amount to -524.8 million rubles at a 12% discount rate. As per the analysis of financial efficiency of the project without government support, the internal rate of return for this project is equal to 6,7%.

Fig. 1 presents the iceberg conception. In accordance with it, the results of the project implementation which are visible on the market surface, correspond to its financial efficiency. For the project under consideration, in a situation without government participation, private investors observe overall negative results of its implementation and are not interested in financing it. At the same time, a significant part of economic efficiency is "hidden underwater" and corresponds to the public effects listed above in the equation (1). In this project of developing and implementing the catalysts, the excess of economic efficiency over financial efficiency is mainly due to indirect and tax effects, which is typical for the research infrastructure. These effects are observed in the market, but they are not regarded as the project results by private participants and therefore not taken into account in making the decisions about its financing. The resulting gap between the project economic and financial efficiency is one of the most important demonstration of market failures which is typical for research infrastructure projects and considered as a basis for the government support.

Budget financing in the amount of 3,500 million rubles without discounting (or 2,303 million rubles at a 12% discount rate) results in a positive net present value of 1,777.9 million rubles at a 12% discount rate. Changes in the level of financial efficiency as a result of providing support allows private investors to get interested in providing their financial resources and accumulated experience for successful project implementation.

According to Table 1, the key factors that lead to the difference between the financial and economic efficiency of the project under consideration are related to tax and especially indirect effects (71.9% to the level of economic efficiency). Budget efficiency also remains high even after budget financing of investments

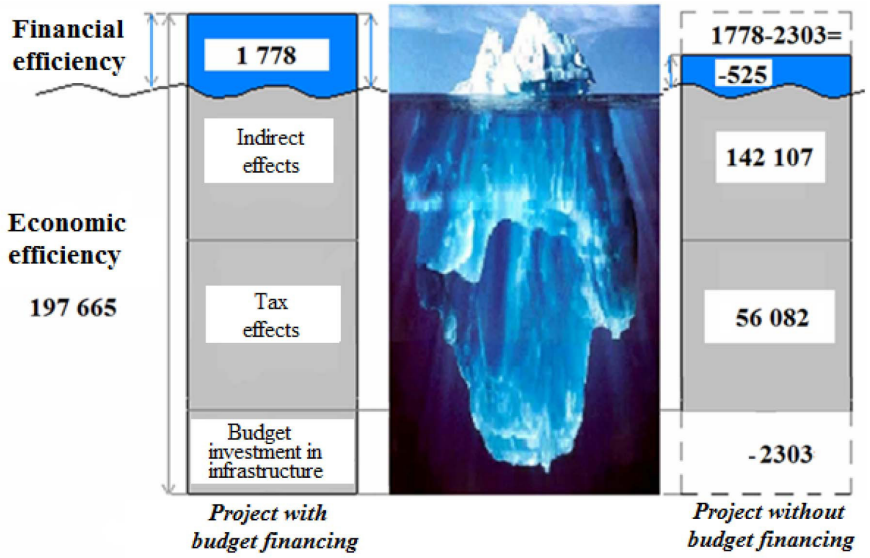

Fig. 1. Illustration of the budget financing impact on the financial efficiency of the Center for Collective Use project (NPV, 2019-2030, million rubles, r = 12%)

and is 27.2% of the economic efficiency level. Thus, the proposed PPP mechanism provides a mutually beneficial combination of various participants' interests.

For the 2019-2030 period the government receives net budget revenues in the amount of 53,779.7 million rubles at a 12% discount rate, or 143,805.19 million rubles at calculation without discounting. In other words, taking into account the indirect effects of the project, the investment of one ruble of public investment for the 2019-2030 period will bring 42 rubles of tax revenue to the budget at calculation without discounting and 24 rubles at a 12% discount rate. Thus, the budget efficiency indicator shows high efficiency of government participation in the project.

4. Evaluation of synergistic effects of the Center for Collective Use project

The project under consideration has a fairly complex structure, the structure being typical for research infrastructure. It can be presented by two subprojects.

1. "Creation of the pilot catalysts production" subproject envisages the construction of a building for the pilot catalysts production as well as its provision with the equipment for the production of pilot batches of a wide range of catalysts. R&D for the development of pilot production technologies, production of pilot batches of catalysts and small pilot batches will be the products of this subproject.

2. "Creation of a catalyst testing center" subproject envisages the construction of a building especially designed for high-pressure installations as well as its provision with the equipment for testing catalysts in high-pressure conditions. R&D on testing the catalysts and developing the processes that require the use of catalysts, creation of test equipment and specialized software, educational services, production of high-tech chemical products will be the products of this subproject.

The subprojects are closely interrelated. Yet, they can also be considered as autonomous projects. So, the task is to justify the need for their implementation in a complex. To do this, it is necessary to identify and evaluate the synergistic effects resulting from the simultaneous construction and operation of two buildings.

The effects are divided into the following groups: 1. Operational efficiency synergy (savings on administrative costs and the ability to use employees in both buildings). 2. Operational growth synergy (cost reduction by combin-

ing production and testing functions; revenue growth by creating a new product; the ability to test in the second building only other institutes developments in the case without the first building). 3. Investment synergy (savings in joint construction and equipment acquisition; acquisition of capital assets for joint use). 4. Market synergy (providing unique services for the Russian market and the possibility to apply special conditions, such as package offers of products from two projects). 5. Management synergy (use of shared experience or options for subprojects configuration).

The main sources of synergy are identified in the operational sphere, especially in the field of growth synergy, which leads to revenue growth. This is due to the fact that the production of certain types of products requires the implementation of both projects. All expected synergistic effects are taken into account in financial models. Potential sources of synergy in the investment sphere are also identified and taken into account. Potential sources of market and management synergy are determined, but their evaluation has not been carried out due to high uncertainty and inability to make sufficiently justified expert evaluations of their impact.

The calculations have proved the inexpediency of the second subproject implementation separately from the first one. The goal of the second subproject is to create facilities for testing the catalysts manufactured in the course of the first subproject and to develop production processes for their use, since only 10% of the tested catalysts will be provided by the third-party contractors. Since the second subproject has turned out to be complementary to the first one, all indicators of its efficiency in the absence of the first subproject are assumed to be zero.

The first subproject can be implemented separately from the second one, although the range of the catalysts produced and the technologies developed will become more limited, and testing of catalysts will be carried out at the third-party contractors.

Table 2 shows the evaluation of the synergistic impact on the project financial and economic efficiency. The NPV indicator is calculated at 0% and 12% discount rates.

The overall impact of synergy from joint implementation of the subprojects is positive and very significant. It is particularly evident for the economic efficiency – the positive effect of joint project implementation from the point of view of the society can generally amount to approximately 40 billion rubles.

Table 3 shows the distribution of the overall synergistic effect between the project participants. The project initiator (the Institute of Catalysis), the government, as well as enterprises engaged in industrial production of catalysts and production of final products based on them were regarded as participants. The NPV indicators were calculated at 12% discount rate.

From the total amount of the synergistic effect of 40 billion rubles the project initiator will receive only 2%, the government budget will get 13%, or 5.3 billion rubles, whereas the bulk of the total amount of the synergistic effect will be distributed between the third-party companies using innovative products.

Thus, the simultaneous construction and operation of two buildings by the Institute of Catalysis – those for the pilot production of catalysts and their testing – result in very significant positive synergistic effects. The efficiency of constructing a building for a pilot production only (without a testing building) is significantly lower, whereas constructing a catalyst testing building only is impractical at all. Synergy has

Table 2. The impact of the synergy between the two subprojects on the project efficiency

million rubles	Financial efficiency		Economic efficiency	
	r = 0%	r = 12%	r = 0%	r = 12%
NPV of the overall project	2,199	-525	527,650	197,665
NPV of subproject 1	-938	-1,317	437,614	157,841
Synergistic effect	3,137	793	90,036	39,823

Table 3. Distribution of synergistic effects among the project participants (r = 12%)

	Complex of projects		Project 1		Synergistic effect	
	NPV, million rubles	%	NPV, million rubles	%	NPV, million rubles	%
Efficiency for the Center for Collective Use "Experimental Catalyst Production"	1,778	0.9	985	0.6	793	2.0
Efficiency for the government	5,380	27.2	48,458	30.7	5,321	13.4
Efficiency for catalyst manufacturers	12,245	6.2	9,180	5.8	3,066	7.7
Efficiency for the enterprises of oil refining and petrochemistry	129,862	65.7	99,218	62.9	30,644	76.9
Total economic efficiency	197,665	100	157,841	100	39,823	100

a particularly significant positive impact on both the economic efficiency of the project and its budget efficiency.

5. Conclusion

Modern scientific and technological development requires significant changes in evaluating the research infrastructure projects. Thus, it takes into account the growing interdependence of the participants and the corresponding indirect, social, tax, and synergistic effects. As a rule, such projects face a significant gap between low financial efficiency and high economic efficiency. Successful implementation of such projects is possible only with an active participation of the government and the use of various options for public-private partnership mechanisms.

The suggested approach is based on a methodology for comparing the changes in cash flows and corresponding indicators of net present value in the framework of financial and economic analysis, evaluation of both the project efficiency and the efficiency of participation in the project being also taken into consideration. Similar methods can be applied to evaluate the synergistic effects of a complex of interrelated subprojects and to choose their most effective combination. At the same time, the synergistic effects generated by the subprojects are evaluated both in the context of the project financial and economic efficiency and in the context of the efficiency of participation in the project.

The developed methods and models were tested for an innovative project on the Center for Collective Use "Experimental Catalyst Production" creation. The reason for direct government incentives to invest in this research infrastructure in the form of budget funding is a significant difference between a relatively high economic efficiency and a relatively low financial efficiency compared to other projects. In a situation without budget funding this project in its any configuration is characterized by a negative financial efficiency. By providing various forms of support, the government can influence the level of the project financial efficiency and coordinate two types of efficiency. Experimental calculations on evaluating the project on creating the Catalysts Center for Collective Use show that the suggested mechanism of government participation in the project provides a mutually beneficial combination of various participants' interests.

6. Gratitude

The authors express their sincere gratitude to Prof. V.A. Yakovlev, Deputy Director of the Institute of Catalysis of the Siberian Branch of the Russian Academy of Science, and N.P. Anfimova, Head of the Department of Scientific-Technical and Innovative Programmes of the Institute of Catalysis of the Siberian Branch of the Russian Academy of Science, for their invaluable assistance in the preparation of this article.

References

Ansoff, I. (1999). *Novaia korporativnaia strategiia* [*New corporate strategy*]. St. Petersburg, Piter Kom Publishing, 416 p.

Boardman, A.E., Greenberg, D.H., Vining, A.R. and Weimer, D.L. (2018). *Cost-Benefit Analysis: Concepts and Practices.* Cambridge, Cambridge University Press, 558 p.

Carboni, O. (2017). The Effect of Public Support on Investment and R&D: An Empirical Evaluation on European Manufacturing Firms. In *Technological Forecasting and Social Change,* 117(C), 282-295.

Childs, P.D., Ott, S.H., Triantis, A.J. (1998). Capital Budgeting for Interrelated Projects: a Real Options Approach. In *Journal of Financial and Quantitative Analysis*, 33(3), 305-334.

Damodaran, A. (2005). *The Value of Synergy.* Available at: https://ssrn.com/ abstract=841486

Dasgupta, A.K., Maglin, S. and Sen, A. (1972). *Guidelines for Project Evaluation, Project Formulation and Evaluation Series no 2*. New York, United Nations, 383 p.

A Guide to Cost-Benefit Analysis of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2014-2020 (2015). Luxembourg, Publications Office of the European Union, 364 p.

Economic Appraisal of Investment Projects at the EIB (2013). European Investment Bank, 185 p.

Evans, F., Bishop, D. (2015). *Otsenka kompanii pri sliianiiah i pogloshcheniiakh. Sozdanie stoimosti v chastnykh kompaniiah* [*Valuation for M&A. Building Value in Private Companies*]. Moscow, Al'pina Publishing, 332 p.

Florio, M. and Sirtori, M. (2016). Social Benefits and Costs of Large-Scale Research Infrastructures. In *Techn. Forecasting & Social Change*, 112, 65-78.

Gilbert, P., Bobadilla, N., Gastaldi, L., Le Boulaire, M. and Lelebina, O. (2018). *Innovation, Research and Development Management.* London, Wiley, 230 p.

Grossman, G.M. and Helpman, E. (1992). *Innovation and Growth in the Global Economy.* Cambridge (MA), MIT Press, 359 p.

Guidelines for the Economic Analysis of Projects (2017). Mandaluyong City, Philippines, Asian Development Bank, 154 p.

Guide to Social Return on Investment (2012). The SROI Network. UK Cabinet Office. Available at: http://www.socialvalueuk.org/resources/sroi-guide

Gupta, D., Gerchak, Y. (2002). Quantifying Operational Synergies in a Merger/Acquisition. In *Management Science*, 48 (4), 517-533.

Infrastruktura issledovanii i razrabotok, bol'shaia nauka i mezhdunarodnoe nauchno-tehnologicheskoe sotrudnichestvo [*Research and development infrastructure, large science and international scientific-technological cooperation*] (2016). Moscow, Natsional'nyi issledovatel'skii universitet «Vysshaia shkola ekonomiki» [National Research University Higher School of Economics], 43 p.

Knoll, S. (2008). *Cross-Business Synergies: A Typology of Cross-Business Synergies and a Mid-Range Theory of Continuous Growth Synergy.* Gabler Verlag, 416 p.

Korolkova, M.V. (2019). Otsenka sinergicheskikh effektov, voznikaiushchikh v komplekse investitsionnykh proektov [Assessing the synergy effect arising in a set of investment projects]. In *Finansy i Kredit* [*Finances and Credit*], 25 (7), 1680-1698.

Llerna, P., Matt, M. and Trenti, S. (2011). Institutional Arrangement of Technology Policy and Management of Diversity: the Case of Digital Switching System in France and Italy. In *Innovation Policy in a Knowledge-Based Economy.* New York, Springer, 380 p.

Malov, V.Iu., Melent'ev, B.V., Ionova, V.D. (2016). Transportnyi kompleks v ekonomike strany: proektnyi podkhod [Transport complex in national economy: project approach]. In *Opyt i puti resheniia nauchnykh problem vodnogo transporta Sibiri i Dal'nego Vostoka* [*Experience and solutions of scientific problems of water transport of Siberia and the Far East*]. Novosibirsk, Izd-vo Sib. gos. un-ta vodnogo transporta, 35-56.

Methodical Recommendations for Evaluation of the Efficiency of Investment Projects (2000). Moscow, Economics, 422 p.

Nakagawa, M. (2007). Synergies and Investment Decisions. In *Economics Bulletin*, 7, 1-11.

Novikova, T.S. (2018). *Otsenka investitsionnykh proektov v usloviiakh sovremennogo NTR* [*Evaluation of Investment Projects in Conditions of Contemporary Science and Technology Development*]. Beau Bassin, LAP LAMBERT Academic Publishing RU, 572 p.

Public Private Partnership in Life Sciences Research and Innovation under Horizon 2020 (2013). Brussels, European Council, 58 p.

Public Private Partnerships Reference Guide. Version 3.0. (2017). World Bank Group, 232 p.

Reference Case Guidelines for Benefit-Cost Analysis in Global Health and Development (2019). Bill & Melinda Gates Foundation. Available at: https://sites.sph.harvard.edu/bcaguidelines/

Squire, L. and van der Tak, H.G. (1975). *Economic Analysis of Projects*. Baltimore, John Hopkins University Press, 153 p.

Suslov, N.I., Buzulutskov, V.F. (2014). Modelirovanie potentsial'nykh effektov ot utilizatsii teplovoi energii s ispol'zovaniem instrumentariia OMMM-TEK [Modeling of potential effects from utilization of thermal energy using the OMMM-TEK tools]. In *Vestnik Novosibirskogo gosudarstvennogo universiteta. Seriia: Sotsial'no-ekonomicheskie nauki* [*Bulletin of Novosibirsk State University. Series: Social and Economic Sciences*], 14 (4), 15-33.

Ward, W.A. and Deren, B.J. (1991). *The Economics of Project Analysis: A Practioner's Guide*. Washington DC, EDI, 310 p.

Yescombe, E.R. (2013). *Public-Private Partnerships: Principles of Policy and Finance*. Oxford, Elsevier Science, 190 p.

Опыт оценки проекта научно-исследовательской инфраструктуры ЦКП по производству катализаторов

Т.С. Новикова[а,б], А.О. Баранов[а,б], М.В. Королькова[б]

[а]Институт экономики и организации промышленного производства СО РАН
Российская Федерация, Новосибирск
[б]Новосибирский государственный университет
Российская Федерация, Новосибирск

Аннотация. Данная статья посвящена проблеме одновременной оценки финансовой и экономической эффективности проектов исследовательской инфраструктуры и обоснованию необходимости государственного участия для успешной реализации таких проектов. Предлагаемые методы и модели основаны на переходе от финансовых к экономическим показателям проекта на основе корректировки потоков денежных средств с выделением значимых для таких проектов общественных эффектов (косвенных, налоговых, эффектов перелива знаний, социальных, экологических, ценовых), а также выделения в их составе синергических эффектов. Предложенные методы и модели были апробированы для инновационного проекта Центра коллективного пользования «Опытное производство катализаторов», который был предложен Институтом катализа в 2018 году в рамках региональной программы «Новосибирский Академгородок 2.0». Полученные результаты показывают, что стимулирование инвестиций в исследовательскую инфраструктуру обосновано значительным превышением экономической эффективности проекта по сравнению с финансовой эффективностью и существенно зависит от выбора адекватного механизма государственного участия в проекте.

Ключевые слова: финансовая и экономическая эффективность, бюджетная эффективность, синергические эффекты, инновационный проект, научно-исследовательская инфраструктура.

Статья выполнена в рамках Программы фундаментальных научных исследований СО РАН, Проект XI.170-2 «Формирование основ теории инновационной экономики: операциональные определения, измерения, модели, научно-технологические прогнозы и программы», № АААА-А17-117022250128-5.

Научная специальность: 08.00.00 – экономические науки.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 571–581

DOI: 10.17516/1997-1370-0590
УДК 330.3:64.01(47+57)“19”

Households of Post-Soviet Russia (Institutional Analysis): 20 Years After

Rustem M. Nureev*
Financial University under the Government of the Russian Federation
Moscow, Russian Federation
National Research University Higher School of Economics
Moscow, Russian Federation

Received 27.11.2020, received in revised form 03.03.2020, accepted 10.04.2020

Abstract. The article discusses the development of views on households in neoclassical, Keynesian and institutional literature. It shows the advantages and disadvantages of each of these approaches. Neoclassicists do not distinguish between individuals and households. Keynesianism analyzed the investment and savings function of households, showed its role in the revenue and expenditure cycle. However, it did not rise to genuine political economy, since it failed to show the behavior of the main social groups and their inherent interests. Institutional economic theory takes a step forward by showing the dependence of households on the social environment. However, real households are limited in collecting and processing information. Moreover, given the differentiation of households, they possess these funds to varying degrees.
The population explosion in developing countries has exacerbated the problem of poverty and has drawn attention to household economies, whose life expectancy has increased in Asia, Africa and Latin America as a result of a sharp reduction in mortality and an increase in life expectancy.
A special section is devoted to the institutional change of households in post-Soviet Russia. It shows what succeeded and failed to achieve over the past thirty years.

Keywords: households, consumption and savings, household investment, transition economy, economic sanctions, investment and savings function of households.

The article was prepared based on the results of studies carried out at the expense of budget funds on a state assignment to the Financial University under the Government of the Russian Federation on the topic “Family households as an economic entity”.

Research area: economics.

Citation: Nureev, R.M. (2020). Households of post-Soviet Russia (institutional analysis): 20 years after. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 571-581. DOI: 10.17516/1997-1370-0590.

* Corresponding author E-mail address: nureev50@gmail.com
ORCID: 0000-0003-1407-2657

1. Neoclassical and Keynesian approaches to the analysis of household economics

The traditional neoclassical theory is characterized by insufficient attention to the problems of household economics. They appear only at the very beginning in the model of the circulation of economic goods. Households are considered as a source of four factors of production: labour, land, capital, and entrepreneurial ability. Households, supplying the necessary resources (labour, land, capital, entrepreneurial ability), receive cash income (wages, rents, interest, profits). Thus, the real flow of economic benefits is complemented by a counter cash flow of income and expenses. The model is usually concretized by including states, as well as leaks and injections.

However, in a number of works, the distinction between the household and the individual is usually not made: they are considered as synonyms. Neoclassical theory is a special case of the theory of rational choice, therefore it treats household as an economic entity that acts completely rationally. In addition, it is usually assumed that the household operates in conditions of complete certainty, that is, it can process any amount of information. It does not violate the rules of the game and norms prevailing in society.

In neoclassical literature, households appear in a section on consumer behaviour theory[1]. Each consumer has three questions: 1. What to buy? 2. How much does it cost? 3. Is there enough money to make a purchase?

To answer the first question, you need to find out the usefulness of the thing for the consumer, to answer the second one you need to examine the price, to solve the third question you need to determine the consumer's income. These three problems – utility, price, and income – constitute the content of the theory of consumer behaviour.

Already in the 19th century it was observed that with the growth of real consumer income, of secondary goods increased faster than consumption of goods of primary necessity. The first researcher to study the impact of changes in income on the structure of consumer spending was the German statistician Ernst Engel (1821–1896).

In accordance with the analysis of Engel's curves in the interpretation of Tornquist, first of all, there is saturation with food products, then with standard-quality manufactured goods and only later with high-quality goods and services. An interesting pattern was noted: even after the transition to the consumption of high-quality goods and services, there is a new surge in demand for standard-quality industrial goods that are used by the consumer for everyday needs.

Thus, all goods are divided into three categories: normal (expenses for which grow with income growth), high-quality (expenses for which are faster than income growth) and low-quality (expenses for which fall as income grows).

The main drawback of neoclassical theory is the lack of analysis of households as a whole, the relationships within them are not actually considered. Neoclassical models do not describe reality as it is. The national characteristics of households also fell outside the scope of neoclassicism. In fact, even if we speak of differences in household behaviour, these differences are perceived as differences of a quantitative type. Households in developed countries appear to be more developed than households in developing countries.

A definite step forward was made by John Maynard Keynes when he tried to consider not only statics, but also some dynamics of their development. This was done primarily in his main work, *The General Theory of Employment, Interest, and Money* (Keynes). In the book, Keynes introduces new categories of behavioural economics ("propensity to consume", "incentive to invest", "preference for liquidity"), marginal analysis ("marginal propensity to consume", "marginal propensity to save", "marginal efficiency of capital") and macroeconomics ("effective demand", "forced unemployment", "underemployment") (Keynes, 1978).

Keynes sees the main reason for the "economic difficulties" of the modern economic system in the behaviour of business entities, that is, in fact, households. Accord-

[1] For more details, see: (Hicks, 1988; Menger et al., 1992).

ing to Keynes, consumption is a function of income:

$$C = C(Y).$$

In this case, the marginal propensity to consume ($MPC = \Delta C / \Delta Y$) changes from zero to one:

$$0 < MPC < 1.$$

The marginal propensity to consume shows how consumption changes with an increase (decrease) in disposable personal income by one monetary unit (dollar, yen, franc, etc.). As income rises, marginal propensity to consume decreases. Of course, this position of Keynes does not apply to different groups of consumers to the same extent: to a greater extent it applies to people with low and middle incomes, and to a lesser extent it applies to the richest audience, whose basic needs are already fully satisfied. The change in income of this group of the population is not so strongly reflected in its propensity to consume.

The consumption function manifests itself differently during periods of crisis and during periods of recovery and depends on the general rate of economic development of society. Nevertheless, it is difficult to deny the legitimacy of the tendency observed by J.M. Keynes. Statistical checks carried out later by L. Klein and M. Friedman confirmed the validity of the assumption of J.M. Keynes. In particular, for the short-term period, the marginal propensity to consume turned out to be 0.57-0.60, and for a longer period it was noticeably higher – 0.82-0.839 (Stoleru, 1974).

"Effective demand" acts as the root cause of achieving economic equilibrium. Keynes formulates three ways to deal with inefficient demand:

– A more even distribution of national income is achieved through active fiscal policy;

– The policy of public works expands the possibilities of state enterprise;

– Monetary policy stimulates private investment.

Keynes specifically analyses the motives for refusing to spend money: a transaction motive, a precautionary motive, a speculative motive since accumulation and thriftiness reduce effective demand. Keynes emphasized the importance of the multiplier, which he borrowed from Richard Ferdinand Kahn (1905-1989), who investigated the impact of investment growth on employment. Keynes transformed this idea into an income multiplier showing how a small change in investment affects income change. According to Keynes, money is not just a veil over deals, but a source of energy that makes a market economy work. Relations between people and goods, expressed in monetary terms, acquire an independent existence and significance, which in a mixed economy can no longer be ignored, as classical economists did.

In *The General Theory of Employment, Interest, and Money* (1978), Keynes poses the problem of leaks and injections in the process of macroeconomic circulation of income-expenses. Later, the Nobel laureates M. Friedman (1957) with his concept of permanent income and F. Modigliani (1970) with his concept of a life cycle developed and elaborated this theory. Violation of the income-expenditure circle slows down the economic development of countries. Therefore, it is necessary to identify the causes of deviations between leaks and injections, the extent of these deviations and their consequences.

At the same time, B. Seligman believed that Keynes's economic theory failed to rise to the level of genuine political economy. This happened because Keynes theory considered the behaviour of people to be the driving force of the economic process. He defined economic relations as the result of relations between people and groups. Therefore, in order to change the behaviour of economically important groups, it is necessary to effectively use government policy. However, in his conception, none of these groups has ever shown its own social interests, inherent only to it. According to B. Seligman, Keynes's theory includes too many technical elements and does not investigate the social causes behind them. Keynes sees the main task in achieving economic equilibrium, being carried away by the quantitative side of economic processes, but not by their origin and functioning mechanism. Keynes's social philosophy is based on a belief in continuous

economic development, which, however, does not imply absolute equality (Seligman, 1968).

Unlike neoclassical theory, institutional theory distinguishes between individuals and households. The views of the latter are not equivalent to the views of individuals. Institutional theory understands that households are dependent on the social environment. This social environment is different in different societies, so households must take into account the uncertainty of external conditions that are constantly changing. This poses the problem of collecting the necessary information. However, real households are limited in collecting and processing information. It depends on the level of education and training of its members. In addition, the target setting to a certain extent depends on the availability of funds to achieve it. Naturally, in the conditions of differentiation of households, they possess these funds to varying degrees.

Neoclassic theory proceeded from the assumption of rational maximizing behaviour of individuals. The emphasis was made on the achieved equilibrium state or, in any case, movement towards it. For neoclassicism, the absence of chronic informational problems was typical. Meanwhile, complete rationality is the exception rather than the rule. In reality, limited rationality is more typical. In reality, individuals have rationality only to a limited extent. Intelligence is limited and, as a rule, there is a desire to save on it.

2. Institutional approach to the analysis of household economics

Already being traditional, institutionalism tried to take into account the mentality while studying a specific society: a system of values, goals, stereotypes and habits of behaviour, psychological types and religious beliefs. An attempt to take into account the historical aspect of a particular society at a specific time of its development made it possible to bring the analysis closer to understanding real processes. Table 1 shows a comparative description of theoretical ideas about the rationality of individuals.

When analysing households, J. Hodgson draws attention to such factors as the scale of information, its complexity and uncertainty (Hodgson, 2003). He draws attention to the fact that households in their behaviour are guided by: a) habits; b) cheerfulness; c) pleasure associated with limited rationality; d) routines; e) average opinion.

The significance of the influence of routines on the behaviour of organizations in general and households in particular was shown in (Nelson, Winter, 2002: 138-188). Household behaviour takes into account personal interests, is influenced by the crowd (or society), and is modified under the influence of opportunism.

Along with the general principles of the rational consumer's choice, there are features that are determined by the influence of tastes and preferences on him. An American econo-

Table 1. Comparative characteristics of theoretical ideas about the rationality of individuals

Feature	Economic man	Hybrid man	Institutional
1. Approach to economic theore	Neoclassical	by O. Williamson	Institutional
2. Purpose	Utility maximization	Minimization of transaction costs	Cultural knowledge
3. Knowledge and computational capabilities	Unrestricted	Restricted	Restricted
4. Wishes	Defined independently	Defined independently	Defined by culture
5. Dependence on the impact of social factors	Independent	Independent	Not strictly dependent
6. Rationality	Full	Restricted	Cultural
7. Opportunism	No deceit (cheat) and no coercion	There is deceit (cheat), but no coercion	There is deceit (cheat) and coercion

mist H. Leibenstein (1950) divides consumer demand into two large groups: functional and non-functional.

Functional demand is such a part of demand, which is conditioned by consumer properties inherent in the economic good itself (product or service).

Non-functional demand is such a part of the demand that is caused by factors that are not directly related to the qualities inherent in an economic good. In non-functional demand, with a certain degree of conditionality, social, speculative and irrational factors can be distinguished. The first is related to the attitude of customers to the product. Some seek to maintain a common style and buy what their ideals buy. Others strive to achieve exclusivity rather than go with the flow. Finally, still others have reached a standard of living whose important part is demonstrative consumption. Therefore, H. Leibenstein identifies three typical cases of mutual influence.

1. The bandwagon effect. The consumer, trying to keep up with others, acquires what others buy. He depends on the opinions of other consumers, and this dependence is direct.

2. The snob effect. In this case, the consumer is dominated by the desire to stand out from the crowd. And here, an individual consumer depends on the choice of others, but this dependence is reverse. Therefore, the snob effect refers to the effect of a change in demand due to the fact that other people consume this product. Usually the reaction is directed in the opposite direction with respect to the generally accepted one.

3. The Veblen effect. So that is what H. Leibenstein calls prestigious or demonstrative consumption, when goods or services are not used for their intended purpose, but in order to make an indelible impression (Veblen, 1983).

The population explosion in developing countries has exacerbated the problem of poverty and has drawn attention to household economies, whose life expectancy has increased as a result of a sharp reduction in mortality and an increase in life expectancy of the population. As a result, many scientists began to study household economies in the third world, and above all, ways and methods of narrowing the gap that exists in per capita consumption of the population of poor and rich countries.

The early work of A. Deaton touched upon the problem of consumption and its effectiveness (Deaton, 1992, 1997). In the context of the population explosion, millions of people in Asia, Africa and Latin America faced the problem of survival. Therefore, the question naturally arose of how effectively those funds are used that are spent on food by various categories of the population. S. Subramanian and A. Deaton set themselves the task of considering the relationship between the total costs of economic agents and the nutritional properties of the products they consume (Subramanian, Deaton, 1996)[2]. S. Subramanian and A. Deaton came to an unexpected conclusion, showing that the cost of acquiring the calories needed for daily activity is less than 5% of wages per day.

In 2013, his monograph *The Great Escape: Health, Wealth, and the Origins of Inequality* was published (Deaton, 2013). *The Great Escape* is a story about how mankind tried to get rid of material deprivation and early death. In it, the scientist notes that over the past 250 years, mankind has made a powerful leap in the development of health care and improving the well-being of people. And although not everyone was able to escape, and not everyone was ready to take advantage of the luck that had opened up for them, he speaks of the great progress that mankind has experienced over the past 50 years. We see that in recent years, scientists that are more interested in the problems of developing countries than developed ones have been engaged in household economies.

The works of the 2019 Nobel laureates A. Banerjee, E. Duflo (Banerjee, Duflo, 2011; Duflo, 2012) and M. Kremer (1993) took into account this experience, but are not limited to it and find new methods to increase the effectiveness of the fight against poverty. The focus of research on new Nobel laureates is not theory, but practice. To this end, they use a randomized approach. Since it is very difficult to set up a controlled experiment, scientists are forced to rely mainly on observations. To this end, they

[2] The materials of this article were later included in the 4th chapter of the monograph (Deaton, 1997: 200–222).

compare the results of the control sample with the sample in which the experiment takes place.

The focus of their attention is a study of the effectiveness of the assistance provided by international organizations to developing countries. In particular, the new Nobel laureates prove that the means to combat poverty must be sought together with the recipients of this assistance. This allows you to dramatically increase its effectiveness.

3. Institutional analysis of households in transition economy

A transition economy is a changing, "transforming" society. And household behaviour in a "changing society" includes:

A) Changes in the degree of rationality of behaviour;

B) Changes in the degree of pursuit of personal interests;

C) Changes in the degree of activity orientation to market relations.

The modern economy of Russian households is the result of the transition from a natural planned economy, on the one hand, to a market economy, on the other hand. However, the latter includes both legal and illegal economies. Under these conditions, an institutional analysis of household behaviour is extremely important because it not only takes into account the influence of the institutional space as a limiter on household actions, but also shows how this space is gradually changing under the influence of their actions. One of the first attempts at such a generalized analysis was made by A.N. Oleinik (2002, lecture No. 23).

Table 2. Institutional changes in households in post-Soviet Russia

Features	Source state in the USSR	Changes in Post-Soviet Russia			
		Expected by Radical Reforms	Actually occurred in the period of the 1990s.	Actually occurred in the 2000s.	Really happened in the 2010s.
Interpersonal trust	Relatively high	High	Low	Gradual return to the previous level	Slowed down
Type of employee	"Cog workers" – executive and non-initiative	Creative worker of the "American" type (mobile)	"Snail People", caring only about self-survival	Executive worker of the "Japanese" type (immobile), hesitating between paternalism and individualism	A slight increase in mobility
Consumer behavior	The pursuit of "deficit"	Creation of a "consumer society"	The contrast between prestigious consumption and forced asceticism	Gradual smoothing of contrasts, consumer boom	Deteriorating nutritional structure
Investment behavior	Almost absent	Development strategy	Survival strategy	Shift from "living within our means" to "debt lifestyle"	From fixtures to market development
Domestic corruption	Widespread	Absent	Very widespread	Tended to increase	Remained at the same level
Society structure	The predominance of the "Soviet" middle class	The dominance of the "market" middle class	The sharp polarization of society	The middle class in the proper sense of the word is small	No significant changes
Civil society	Absent	It plays the role of one of the basic institutions	Demand for self-government is deferred; civil society institutions are not trusted by either citizens or the state		

Compiled and supplemented by: (Economic entities..., 2010: 15).

National economic mentality (business culture) includes: 1) stereotypes of consumption; 2) norms and patterns of interaction; 3) organizational forms; 4) value-motivational attitude to work and wealth; 5) the degree of susceptibility (or immunity) to foreign experience.

The Russian mentality is characterized by communality and community that means considering man as part of the whole. The tendency to humility usually prevents the isolation of the individual as an autonomous agent. The processes of reciprocation and redistribution that existed in Russia played an important role in this. Hence is the absolutization of moral values as opposed to material ones, the low ranks of active-attaining values. Saving and ownership have traditionally been seen as negative values. A certain contribution to this was made by Russian Orthodoxy. From the point of view of a Russian, success is luck and the result of luck, as well as the result of personal connections. Hence is the naive belief in quick enrichment. Therefore, freedom was perceived by the average Russian as anarchy (not as independence, but the ability to do what one wants). Therefore, the reaction of a significant part of the population to the difficulties of transition to a market economy was not adaptation to it, but flight from it.

Depending on the adaptation to the market, a polarization of society took place. It broke up into those who adapted to the market economy, and those who were unable to adapt to it immediately. M.A. Shabanova divided the first group into two categories: progressive and regressive adaptants (Economic entities..., 2003, ch. 3).

Progressive adaptants rely on themselves; they value higher such rights as creating their own business, freedom of movement, and upholding their own views. On the contrary, those who failed to adapt to a market economy (nonadaptants) are much more likely to assess employment guarantees, income provided by the state, timely payment of wages, free education, and free medical care. Between them were those whom M.A. Shabanova calls regressive adaptants. They adapted to a market economy, but for this they had to make significant changes in their profession, work and lifestyle.

According to M.A. Shabanova, the gap between the declared, desired and realized freedom led to the fact that deviation from legal norms has become a kind of norm of behaviour, and following them is an exception. This caused the criminalization of society, the development of non-legal freedom, when the violation of new formal rules becomes a new informal rule. As a result, in the mid-1990s, Russian society was further away from Western institutional legal freedom than it had been on the eve of the reforms.

Yu.V. Latov proposed comparing institutional changes in households, firms, and the state in a tabular form (Economic Entities..., 2010). We continued his approach (see Table 2). The table shows that the situation in the 2010s did not change significantly compared to the 2000s. This can be seen from Table 3, which shows the distribution of cash incomes of the population from 1970 to 2018 (see Table 3).

Table 3. The distribution of cash incomes of the Russian population in 1970–2018

	1970	1980	1990	1995	2000	2010	2018
The 1st quintile (with the lowest income)	7.8	10.1	9.8	5.5	6.0	5,2	5,3
The 2nd	14.8	14.8	14.9	10.2	10.4	9,8	10,0
The 3rd	18.0	18.6	18.8	15.0	14.8	14,8	15,0
The 4th	22.6	23.1	23.8	22.4	21.2	22,5	22,6
The 5th (with the highest income)	36.8	33.4	32.7	46.9	47.6	47,7	47,1
Gini coefficient	…	…	…	0.381	0.399	0,421	0,413

Source: Federal State Statistics Service. Available at: https://www.gks.ru/folder/13397?print=1

In connection with the introduction of economic sanctions in the second half of this decade, there has been an increase in prices. The average consumer feels the burden of economic sanctions against Russia in the form of rising prices for consumer goods and nonessential goods (Nureev, 2019, ch. 4). As a result, the living costs level in the country rose sharply for the working-age population as a whole and for retired population in particular, since the cost of food accounted for about half the consumer basket value (see Fig. 1)

The increase in food prices caused by sanctions led to inflation (see Fig. 2). All this resulted in a decrease in real incomes in general and especially of the poorest 40% of the population (World Bank..., 2016: 23).

4. Conclusion

Two forecasts of the near future developments are possible from the point of

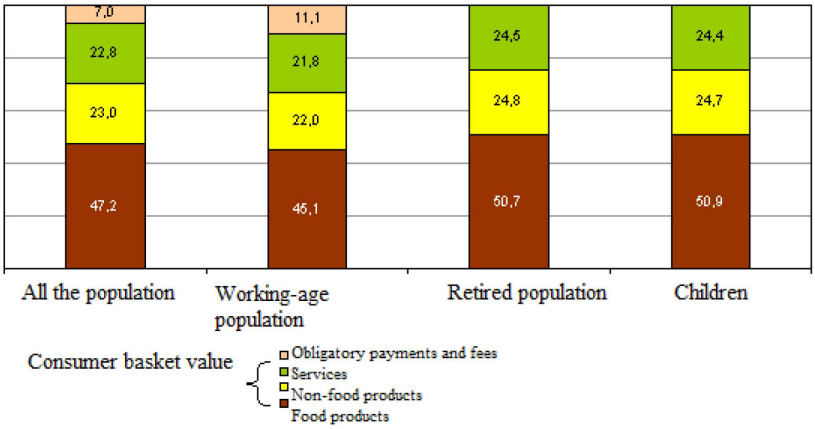

Fig. 1. The structure of the subsistence minimum by population groups in the the 1st quarter of 2015 (in %).
Available at: http://www.gks.ru/bgd/free/b04_03/IssWWW.exe/Stg/d05/image5115.gif

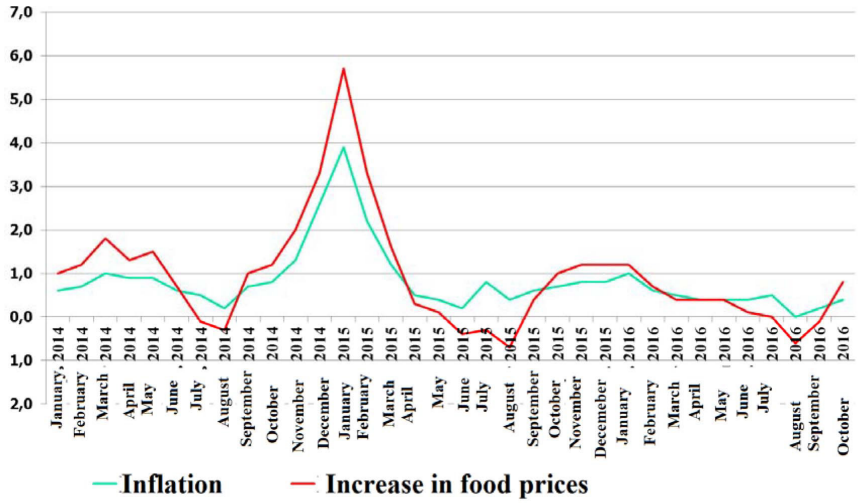

Fig. 2. The growth rate of food prices and inflation in 2014-2016 (% to the previous month).
Available at: http://www.cbr.ru/statistics/infl/Infl_01102016.pdf

view of the ordinary consumer: pessimistic and optimistic (for more details see Nureev, 2019: 138-139). The prerequisites for the development of a pessimistic forecast are the further strengthening of economic sanctions and the continued decline in oil prices. In this case, there will be a deepening of Russia's economic isolation from the world community. Sanctions may include the suspension of Visa and MasterCard in Russia and the further development of an alternative MIR system. Under these conditions, Russia will seek allies in the face of the BRICS countries and, above all, China. This will objectively create further prerequisites for the transition from a unipolar world to a multipolar one. Any steps in this direction can lead to consequences that many participants in the economic conflict in the short term are not even aware of.

The prerequisites for the development of an optimistic forecast are rising oil prices and the weakening of economic sanctions. This will lead to the strengthening of the Russian rubble, which will create great opportunities for increasing imports, as it will make it cheaper. The weakening of economic sanctions will restore relations with Western Europe and then there will be a shift from East to West, as the share of West European goods will increase in Russian imports. This will allow diversifying commodity flows and choosing as a partner those countries that provide the most favoured nation treatment for Russia. However, in this case, competition of imported goods with domestic ones will intensify.

References

Banerjee, A., Duflo, E. (2011). *Poor economics: a radical rethinking of the way to fight global poverty.* NY. Public Affairs.

Deaton, A. (1992). *Understanding Consumption.* Clarendon Press. Oxford.

Deaton, A. (1997). *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy.* Washington, D.C.

Deaton, A. (2005). *Data and Dogma: The Great Indian Poverty Debate.* The World Bank Research Observer.

Deaton, A. (2013). *The Great Escape: Health, Wealth, and the Origins of Inequality.* Princeton University Press.

Duflo, E. (2012). *Human values and the design of the fight against poverty.* Tanner Lectures. Available at: http://economics.mit.edu/files/7904

Economic entities of post-Soviet Russia (institutional analysis) (2003). Part I. Moscow, MONF.

Economic entities of post-Soviet Russia (institutional analysis): ten years after (2010). Part III. The Russian state. Moscow, MONF.

Federal State Statistics Service. Available at: https://www.gks.ru/folder/13397?print=1

Friedman, D. (1986). *Price Theory. An Intermediate Text.* South-Western Pub Co., ch. 3, 4, 36-98.

Friedman, M. (1957). *A Theory of the Consumption Function Princeton*: Princeton University Press.

Hicks, J.R. (1988). *Cost and capital.* Moscow, Progress, ch. I-III, 103-148.

Hodgson, J. (2003). *Economic theory and institutions.* Moscow, Delo.

Keynes, J.M. (1978). *The General Theory of Employment, Interest, and Money.* Moscow, Progress.

Kremer, M. (1993). The O-Ring Theory of Economic Development. In *Quarterly Journal of Economics,* 108 (3), 551–575.

Leibenstein, X. (2000). The effect of joining the majority, the snob effect and the Veblen effect in the theory of consumer demand. In *Theory of consumer behavior and demand Milestones of economic thought*. Saint-Petersburg, 1, 304-325.

Marshall, A. (1993). *Principles of economic science. Moscow,* Progress, vol. 1, book III, ch. 1-4, 145-182.

Menger, K., Böhm-Bawerk, E., Wieser, F. (1992). *The Austrian school in political economy.* Moscow, Economics.

Modern economic thought (1981). Moscow, Progress, ch. 12, 317–358.

Modigliani, F. (1970). *The life-cycle hypothesis of saving and inter-country differences in the saving ratio*. Oxford: Clarendon Press, 197-225.

Molenvo, E. (1985). *Lectures on microeconomic analysis.* Moscow, Nauka, ch. II, 23-51.

Nelson, R., Winter, S. (2002). *The evolutionary theory of economic change*. Moscow, Delo.

Nureev, R.M., ed. (2010). *Economic entities of post-Soviet Russia (institutional analysis).* 10 years later. Parts I, II, III. Moscow, MONF.

Nureev R.M., ed. (2019). *Economic sanctions against Russia: expectation and reality.* Moscow, KNORUS.

Nureev, R.M. (1995). *Money, Banks, and Monetary Policy: A Study Guide.* Moscow, Finstatinform.

Nureev, R.M. (2014). *The course of microeconomics.* 3rd ed. Moscow, Norma: INFRA-M.

Oleinik, A.N. (2002). *Institutional Economics.* Moscow.

Seligman, B. (1968). *The main trends of modern economy: economic thought.* Moscow, Progress.

Stoleru, L. (1974). *Equilibrium and economic growth: (principles of macroeconomic analysis.* Moscow, Statistics. 472 p.

Subramanian, S., Deaton, A. (1996). The Demand for Food and Calories. In *Journal of Political Economy,* 104 (1).

The theory of consumer behavior and demand. Milestones of economic thought (2000). Vol. 1, Saint-Petersburg.

Veblen, T. (1983). *Theory of the idle class*. Moscow, Progress.

Домохозяйства постсоветской России (институциональный анализ): 20 лет спустя

Р.М. Нуреев
Департамент «Экономическая теория»
Финансового университета при Правительстве РФ
Российская Федерация, Москва
Национальный исследовательский университет
«Высшая школа экономики»
Российская Федерация, Москва

Аннотация. В статье рассматривается развитие взглядов на домохозяйства в неоклассической, кейнсианской и институциональной литературе. Показываются достоинства и недостатки каждого из этих подходов. Неоклассики не проводят различия между индивидами и домашними хозяйствами. Кейнсианство проанализировало инвестиционно-сберегательную функцию домашних хозяйств, показало ее роль в кругообороте доходов и расходов. Однако оно не поднялось до подлинной политической экономии, поскольку не сумело показать особенности поведения основных социальных групп и присущих им интересов. Шаг вперед делает институциональная экономическая теория, показывая зависимость домашних хозяйств от социальной среды. Однако реальные домохозяйства ограничены в сборе и обработке информации. Тем более в условии дифференциации домашних хозяйств они обладают этими средствами в разной степени.
Демографический взрыв в развивающихся странах обострил проблему бедности и привлек внимание к экономике домашних хозяйств, продолжительность жизни которых увеличилась в странах Азии, Африки и Латинской Америки в результате резкого сокращения смертности и увеличения продолжительности жизни населения.
Специальный раздел посвящен институциональному изменению домашних хозяйств в постсоветской России. Показывается, чего удалось и чего не удалось достичь за последние тридцать лет.

Ключевые слова: домашние хозяйства, потребление и сбережения, инвестиции домашних хозяйств, переходная экономика, экономические санкции, инвестиционно-сберегательная функция домашних хозяйств.

Статья подготовлена по результатам исследований, выполненных за счет бюджетных средств по государственному заданию Финансового университета при Правительстве РФ по теме «Семейные домохозяйства как экономический субъект».

Научная специальность: 08.00.00 – экономические науки.

Journal of Siberian Federal University. Humanities & Social Sciences
2020 13(4): 582–590

DOI: 10.17516/1997-1370-0591
УДК 330.15

Sustainable Development of Single-Industry Towns in Siberia and the Russian Far East: What is the Price of Regional Economic Growth?

Yulia I. Pyzheva*
Siberian Federal University
Krasnoyarsk, Russian Federation

Received 21.11.2019, received in revised form 31.03.2020, accepted 10.04.2020

Abstract. One of the most well-known and relatively easy to compute integral indicators of sustainable development is the indicator of genuine savings. In the present article the emphasis is made on the modifications of the method of genuine savings calculation for the level of municipal units on the example of single-industry towns (monotowns) of Siberia and the Russian Far East. This choice of the object of the study is conditioned by the hypothesis that it is municipalities that experience most of the environmental and social consequences of economic growth in regions. The enterprises' reports gave rise to the database, which was then used to calculate the genuine savings values of Siberian and Far Eastern single-industry towns. The result is a new classification of single-industry towns, which includes four clusters allocated depending on the level of genuine savings, industry of specialization and population. The new approach to the classification of single-industry towns can be used by regional and municipal authorities to form a differentiated policy for the sustainable development. The analysis of the average genuine savings of different towns by region has shown that even if the region as a whole is characterized by quite high values of genuine savings, the towns, in which there are real enterprises that yield most of the gross domestic product of the country, experience negative values of genuine savings and are often on the verge of environmental or social disaster.

Keywords: sustainable development, genuine savings, indicators of sustainable development, single-industry towns, environmental and resource economics.

The reported study was funded by Russian Foundation for Basic Research according to the research project No. 19-010-00841.

Research area: economics and national economy.

Citation: Pyzheva, Yu.I. (2020). Sustainable development of single-industry towns in Siberia and the Russian Far East: what is the price of regional economic growth? J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 582-590. DOI: 10.17516/1997-1370-0591.

* Corresponding author E-mail address: ystartseva@sfu-kras.ru
ORCID: 0000-0003-0973-5073

Introduction

Currently, the world's leading countries are concerned about the transition to development trajectories that not only maximize economic growth, but also pay considerable attention to compensation for environmental degradation. At the same time, there is an urgent need for the search for adequate ways to jointly assess the dynamics of economic growth and its environmental consequences, and also the need for the study of the sustainability of the development of economic systems at various levels, including regions and municipalities.

In the decades since Brundtland's report (1987), dozens of tools for assessing sustainability have been developed and applied by various research teams and international organizations worldwide (Barrington-Leigh, Escande, 2018; Cobb et al., 1995; Costanza et al., 2014; Daly, Cobb, 1989).

One of the most common tools used to assess sustainability is the integral indicator, Genuine Savings (Pearce, Atkinson, 1993; Bolt et al., 2002). Sufficiently wide experience has been accumulated in assessing the sustainability of both Russia as a whole and its individual regions with the application of various tools (Bobylev, 2011; Belik, Pryakhin, 2013; Glazyrina et al., 2010; Zabelina, Klevakina, 2011; Ryumina, 2013). In particular, there are quite a few works to assess the genuine savings of individual regions or other sub-federal entities in Russia (Bobylev et al., 2011, 2012; Mekush, 2011; Korobitsyn, 2015). The purpose of our long-term work was to propose a modification of the method of genuine savings estimation for the level of Russian regions and municipal entities, which would enable increasing the accuracy of estimates and make them comparable in time. The method developed for calculating genuine savings for the regions is going to be introduced into the Russian statistical accounting system and can be used by both state and executive authorities. Proposals on introduction of the methodology of calculation of genuine savings of regions into the system of Russian statistics are enlisted in the recently published work (Pyzhev et al., 2019). This article focuses on modifications of the author's methodology developed for the level of municipalities on the example of single-industry towns of Siberia and the Far East. From our point of view, it is critically important to consider the economic systems of regions through the prism of municipal units which generate the bulk of gross value added and, as a consequence, it is the cities and towns that are experiencing most of the environmental impact. This is especially obvious for towns which manufacture mostly one type of products critical for the region, and it is the environmental and social policy of one particular enterprise that determines the quality of life of the population both in the single-industry towns and in the region as a whole.

Methodology

The value of genuine savings (GS) in the region, according to our methodology, characterizes the rate of savings' accumulation after proper accounting of the depletion of natural resources and damage from environmental pollution. The indicator is the result of correction of gross domestic savings. There are three main stages of correction: at the first stage, the amount of fixed capital depreciation is subtracted from gross domestic savings (in Russian statistics, depreciation of fixed assets can be regarded as an analogue of this indicator). At the second stage, genuine savings are increased by the amount of education expenses enhancing the human capital. From the point of view of sustainable development, the third stage is fundamentally important, as here the depletion of natural capital (energy and mineral resources, as well as the balance of changes in forest resources) and damage from environmental pollution (emissions of CO_2 and particulate matter) are subtracted. All values included in the calculation are taken as a percentage of gross national income.

Thus, the value of genuine savings of regions is determined as follows:

$$GS = (TS - FPC + HC - DNR - ED) / GRDP \times 100\%, \quad (1)$$

where TS are gross savings (mln rub.);

FPC is fixed capital consumption (mln rub.);

HSC is investment in human capital (mln rub.);

Table 1. Features of author's GS calculation methodology

GS component	Indicators used for evaluation
Gross Savings	Gross fixed capital formation
Consumption of fixed capital	Accrued for the accounting year depreciation of fixed assets (depreciation and amortization recorded in the accounting and reporting periods) of commercial and non-commercial organizations by all forms of ownership
Investments in human capital	– Expenditures of consolidated budgets of RF subjects concerning education and healthcare; – Grants to leading universities; – Consumer spending of households on education and health
Damage from environmental pollution	1) Valuation of damage from emissions of pollutants from stationary sources: – carbon dioxide, – hydrocarbons without VOC (methane), – nitrous oxides. 2) Cost estimates of carbon dioxide emissions from mobile sources (based on CO_2 emissions, average fuel consumption, vehicle mileage and number of vehicles registered in the territory)
Depletion of mineral and energy resources	Valuation of the depletion of natural resources: – oil, natural gas, coal; – gold, copper, nickel
Depletion of forest resources	Valuation of forest resource depletion coupled with reforestation costs (based on forest auction data)

DNR is the cost of depletion of non-renewable natural resources (mln rub.);

ED is the damage from environmental pollution (mln rub.);

GRDP is the gross regional domestic product (mln rub.).

Features of evaluation of each component are given in Table 1.

Genuine Savings of Siberia and the Russian Far East regions

Previously, the researchers estimated genuine savings of the regions of Siberia and the Far East in 2000s and 2010s using the above-described methodology (Syrtsova et al., 2016; Pyzheva et al., 2020). For example, estimates of genuine savings of Siberian regions are presented in Table 2.

The analysis of the received estimates demonstrates a certain regularity: in 2015 negative values of genuine savings are characteristic for resource-mining regions and regions where large scale harmful processing industries are located. Such regions are primarily the Kemerovo Oblast (-14%), Tomsk Oblast (-6.4%), Irkutsk Oblast (-3.3%), Krasnoyarsk Krai (-0.9%). The Kemerovo Oblast has the largest number of single-industry towns (monotowns) among the regions of Siberia and the Far East, which were created in connection with coal mines. The Tomsk Oblast traditionally specializes in the extraction of iron ores, peat and oil, but only the city of Kemerovo has received the single-industry town status. Seversk, which is home to the Siberian Chemical Combine JSC, which belongs to the nuclear industry. In the Irkutsk Oblast (-3.3%) gold, coal and iron ore mining accounts for a large share of mining operations, while machine-building, metallurgy and logging account for a large share of manufacturing operations. The Krasnoyarsk Krai has a minimal negative value approaching 0 (-0.9%), despite huge reserves of various minerals: nickel ores (95% of Russian reserves), gold (about 20% of Russian reserves), coal and lead ores. It is obvious that such a low negative value of GS in large-scale resource extraction is explained by substantial investments in modernization of production facilities, which not only improve their production efficiency, but also have a positive impact on environmental safety (expressed as a reduction of emissions

Table 2. Estimates of GS of Siberian regions in 2004-2015, % GRDP

Region	2004	2007	2010	2014	2015
Altai Republic	39.3	56.0	59.2	47.9	33.1
Republic of Buryatia	10.6	19.4	25.3	17.6	13.3
Republic of Tuva	27.5	32.4	37.6	51.8	34.9
Republic of Khakassia	10.2	15.9	12.1	15.1	5.9
Altai Krai	17.4	23.9	22.2	28.6	20.3
Zabaikalsky Krai	21.4	20.3	19.9	19.9	20.5
Krasnoyarsk Krai	5.8	12.9	11.6	1.4	−0.9
Irkutsk Oblast	8.5	29.6	10.7	3.9	−3.3
Kemerovo Oblast	−1.5	−2.1	1.6	−2.4	−14.0
Novosibirsk Oblast	16.3	24.8	25.0	24.7	18.8
Omsk Oblast	13.9	25.1	20.1	17.6	15.1
Tomsk Oblast	−15.6	9.2	2.0	−3.6	−6.4

Source: (Syrtsova et al., 2016).

Table 3. Estimates of GS of Far East regions, % GRP

Region	2004	2007	2010	2014	2015
Sakha Republic (Yakutia)	−0.8	34.7	10.7	−0.9	−15.8
Kamchatka Oblast	2.3	3.3	14.3	−35.1	15.0
Primorsky Krai	7.9	19.5	41.2	16.2	11.9
Khabarovsk Krai	25.3	36.0	44.2	19.4	7.7
Amur Oblast	36.6	47.9	45.2	24.0	14.3
Magadan Oblast	−1.5	29.5	19.1	12.4	17.6
Sakhalin Oblast	83.4	22.1	0.5	−5.9	−14.6
Jewish Autonomous Oblast	31.5	49.1	60.7	17.6	18.2
Chukotka Autonomous Okrug	87.4	30.9	−36.2	−44.0	−56.3

Source: (Pyzheva et al., 2020).

into the atmosphere and, consequently, an increase in GS value).

Similar conclusions can be drawn from estimates of GS savings of the Far East regions on a corresponding time horizon (Table 3).

Analysis of GS of the Far East regions also points to three leading raw material regions (according to data for 2015): The Republic of Sakha (Yakutia) (-15.8), Sakhalin Oblast (-14.6), Chukotka Autonomous District (-56.3). In all the above-mentioned regions the structure of gross value added is dominated by minerals extraction and there is a sharp upsurge in natural resources depletion due to the boost of hydrocarbon production in the regions. The Magadan Oblast is an exception, since despite the predominant role of extraction of minerals, GS there are much higher than zero. The reason for this is the dynamics of gross savings of regions: the majority of regions have negative dynamics for the period under consideration, while for the Magadan Oblast it is positive. Over the studied period (2004-2015) the Magadan Oblast's GS value displayed negative dynamics. The GRDP of the Magadan Oblast grew in 4.7 times, while the gross savings of

Magadan Oblast grew in 12.5 times. Thus, the annual increase in the share of gross savings (% of GRDP) allows the region to keep positive GS while natural resources are being depleted due to the increase in gold production, with stable coal production volumes. As for positive GS, the maximum value can be observed in the Jewish Autonomous Oblast. The given territory does not possess mineral and raw material base for development of mining sector, hence, the value of exhaustion of natural resources is minimal, so the value of GS is high.

Genuine Savings of Single-Industry Towns of Siberia and the Far East

Let us consider what role single-industry towns play in ensuring genuine regional savings (Tables 2 and 3) and what consequences are experienced by the population living there. At present, 89 out of 312 single-industry towns of the Russian Federation are located in Siberia and the Far East. A more detailed analysis of the economy of these single-industry towns on the basis of their development indicators, which were determined by Order of the Russian Government No. 170-r dated February 2, 2017, shows that the existing grouping of three categories, depending on the risks of socio-economic deterioration, does not take into account the existing significant features of towns and does not provide for adequate management solutions to improve the quality of life of the population. In our opinion, the policy implications should take into account at least the sectoral affiliation and the scale of settlements, since it is impossible to apply the same measures to towns in which value added is formed according to completely different principles.

According to the results of the audit of available statistical information, we have formed a database on single-industry towns in Siberia and the Far East, which includes such data as the industry affiliation of the towns, the names of the town-forming enterprises, the number of town population, the number of people working at the town-forming enterprises, the unemployment rate, the revenue of the town-forming enterprise, the cost price of sold products of the town-forming enterprise, investments in the fixed assets of the town.

When compiling the database, the following data were used: data from Rosstat; data provided by municipal statistics bodies; data contained in the State reports on the state of the environment of the Russian Federation and regions; annual reports of town-forming enterprises; data from the accounting reports of town-forming enterprises, obtained from the database Kontur.Focus. Static estimates of GS for monotowns in Siberia and the Far East for 2018 were obtained using the database created. The purpose of calculating GS for single-industry towns was to form an alternative classification, taking into account sectoral specificity of towns, which is necessary to improve the quality of life there. Currently, many economically successful industrial towns face the problem of critical deterioration of the environmental situation, which may lead to their unsuitability for the population, while other municipalities, whose businesses are on the verge of closure, face a sharp outflow of population due to lack of jobs and for this reason they are on the verge of extinction. In order to make calculations at the level of towns, the author's methodology for calculating GS for regions was modified (see (1)). As a proxy variable for gross savings of cities, Net investment in fixed assets of the town-forming enterprise (got from open accounting forms) was used. Pollution damage was evaluated on the basis of a minimum estimate (due to a dramatic lack of statistical observations for pollutant emissions), namely, the gross emissions of town-forming enterprises, which were equated to the cost estimate of CO_2 emissions, since not all enterprises provide information on emissions in terms of pollutants. Depletion of mineral resources was estimated by the cost of extraction for the subsoil user company (including costs not directly related to extraction).

Based on the results of the calculation of GS of Siberian and Far Eastern cities, as well as taking into account the sector and scale of settlements, there were identified four clusters of monotowns:

1) towns with a positive value of GS (therefore, they are characterized by relative sustainability of development) and town-forming en-

terprises presumably do not have a significant impact on the city environment (mainly this group includes towns specializing in food and beverage production, road/bridge construction, rail transport services as the basic employment facilities);

2) towns, which have values of GS close to zero and town-forming enterprises that significantly degrade the ecology of the city, while not producing natural resources in the immediate vicinity of the city (mainly this group includes towns that concentrate on metallurgical, engineering, woodworking, chemical production and distribution of electricity);

3) towns with negative values of GS and town-forming enterprises devoted to mining natural resources (coal, iron ores, ores of rare earth metals, diamonds);

4) towns, for which there is no statistical information, in view of the fact that their enterprises are either liquidated, or are in the process of liquidation.

Table 4 presents the average estimates of GS of Siberian and the Far Eastern single-industry towns by regions, indicating their prevailing cluster.

It is easy to notice that even in the regions with positive total GS, the average GS of all monotowns have a negative value. This only confirms the hypothesis expressed at the beginning of the article that these towns experience the major consequences of intensive industrial development. For example, the maximum negative value of the average GS for the Krasnoyarsk Krai is explained by the presence of Norilsk, a big single-industry town with the most powerful mining and metallurgical production, the Polar Division of Norilsk Nickel Company. It should be noted that the total value of GS in the Krasnoyarsk Krai is not the lowest, which is explained by large-scale investments in modernization of production facilities, including environmental investments. However, within a particular town, it can be seen that environmental damage in the form of air emissions exceeds investment in fixed assets. It is also interesting to note that the Kemerovo Oblast, which has the highest negative

Table 4. GS Estimates of single-industry towns of Siberia and the Far East in 2018, % GRDP

Region	Prevailing cluster	GS (weighted by population of towns), % GRDP
Siberia		
Altai Krai	2	0.05
Republic of Buryatia	e2	−0.72
Republic of Khakassia	2-3	−0.32
Zabaikalsky Krai	3	−0.93
Krasnoyarsk Krai	2	−2.17
Irkutsk Oblast	2-3	−0.42
Kemerovo Oblast	3	−0.19
Novosibirsk Oblast	2	0.05
Omsk Oblast	1	0.03
Tomsk Oblast	2	−1.16
Far East		
Sakha Republic (Yakutia)	3	−0.55
Primorsky Krai	2-3	−0.003
Khabarovsk Krai	2-3	−0.28
Amur Oblast	1	−0.21
Chukotka Autonomous Okrug	3-4	−0.94

Source: author's calculations.

value of total GS in the region among Siberian regions, is not characterized by the highest negative value of average GS calculated for every single-industry town. In our opinion, such a situation may be connected with the fact that those industries that determine negative GS are located in larger cities that do not have the status of a single-industry town. In any case, the majority of single-industry towns in the Kemerovo Oblast are towns created to work with coal mines and open-pit mines, undergoing all the negative environmental impacts of the coal industry, and once the operation life of mines and open-pit mines has come to an end, the towns will move to cluster no. 4 and turn out to be on the verge of closure. For the Altai Krai, the Novosibirsk Oblast and the Omsk Oblast as a whole, as well as single-industry towns on average, positive GS estimates have been received. The only towns in the Omsk Oblast and Krasnoyarsk Krai, which exert no significant negative impact on the environment, specialise in the food industry. As for the Altai Krai and the Novosibirsk Oblast, where the chemical industry, machine-building and construction materials industries are predominantly developed, we should note that the listed industries have an unquestionably negative impact on the environment, but the scale of this impact, compared with, for example, the metallurgical industry, is undoubtedly several times smaller. Besides, at relatively small scale of production it is much easier to "reimburse" the environmental damage by investments in the fixed capital of the enterprise.

The resource producing regions, such as Chukotka Autonomous Okrug (-0.94%), the Republic of Sakha (Yakutia) (-0.55%) and the Khabarovsk Krai (-0.28%), are singled out by the calculated average GS value of the single-industry towns of the Far East as well as by the total GS of the regions. It is interesting that for the Khabarovsk Krai total GS value of the region is positive and amounts to 7.7% of GRDP, which correlates well with the fact that there are only two single-industry towns on the territory of the region: with the preponderant coal industry and with the prevalent machine building industry. Obviously, it is the coal industry that predetermines the negative GS average value in the Khabarovsk Krai monotowns. It is worth mentioning that half of the Amur Oblast towns were attributed to the most "environmentally friendly" cluster possible, but on average, the region is indicative of negative GS value. And this is indisputably associated with a fairly large center of coal mining with the region already classified in the cluster no. 3 according to our classification.

Conclusion

To sum up, this study shows that Russian single-industry towns, being milestones of economic growth not only in the regions, but also in the country as a whole, are under great environmental stress nowadays. And even if, as a whole, the region is characterized by sufficiently high GS values, which indirectly attests to the welfare of the population living in the region, a more detailed analysis proves that the monotowns, which host the enterprises actually providing most of the gross value added of the country, have negative values of GS and are often on the brink of either ecological (if the town-forming enterprise operates successfully) or social catastrophe (if the enterprise is on the threshold of social tension). And since the population in the majority of these cities is relatively small, the problems of this population are form being written in the agenda of regional and national authorities. Yet, it is important to understand that sustainable growth of GS as an indicator of the quality of economic growth, both at regional and national levels, can be achieved only when sustainable growth of each component of the system is ensured. It is necessary to start with the development of differentiated policies for groups of towns that are similar in terms of basic industry and population size. In addition, the author's idea of clustering towns depending on the level of GS can be scaled to absolutely all towns of the Russian Federation and the genuine savings can become if not key ones, but at least some of the tools that could be used to pursue the sustainable development policy for a particular city.

References

Barrington-Leigh, C., Escande, A. (2018). Measuring Progress and Well-Being: A Comparative Review of Indicators. In *Social Indicators Research,* 135, 893–925. DOI: 10.1007/s11205-016-1505-0

Belik, I.S., Pryakhin, D.A. (2013). Sotsial'no-ekologicheskaia sostavliaiushchaia ustoichivogo razvitiia regiona [Socio-ecological component of the region steady development]. In *Ekonomika regiona* [*Regional economics*], 3, 142–151. DOI: 10.17059/2013-3-12

Bobylev, S.N., Minakov, V.S., Solovyeva, S.V., Tretyakov, V.V. (2012). *Ekologo-ekonomicheskii indeks dlia regionov Rossii* [*Ecological and economic index of Russian regions. Calculation methodology and indicators*]. Moscow, WWF Russia, RIA Novosti.

Bobylev, S.N. (2012). Indikatory ustoichivogo razvitiia dlia Rossii [Sustainable development indicators for Russia]. In *Sotsial'no-ekologicheskie tekhnologii* [*Socio-ecological technologies*], 1, 8–18.

Bobylev, S.N., Zubarevich, N.V., Solovyeva, S.V., Vlasov, Yu.S. (2011). *Ustoichivoe razvitie: Metodologiia i metody izmereniia: uchebnoe posobie* [*Sustainable development: Methodology and methods of measurement: training manual*]. Moscow, Ekonomika, 2011.

Bolt, K., Matete, M., Clemens, M. (2002). *Manual for calculating adjusted net savings. Environmental department, World Bank.* Available at: http://documents.worldbank.org/curated/en/436351468320071776/pdf/406650Savings0manual0200201PUBLIC1.pdf

Brundtland Commission Report of the World Commission on Environment and Development: Our Common Future. UN Documents (1987). Available at: http://www.un-documents.net/wced-ocf.htm

Cobb, C., Halstead, T., Rowe, J. (1995). If the GDP is up, why is America down? In *The Atlantic Online*, October 1995. Available at: https://www.theatlantic.com/past/docs/politics/ecbig/gdp.htm

Costanza, R., Kubiszewski, I., Giovannini, E., Lovins, H., McGlade, J., Pickett, K.E., Vala, K.R., Roberts, D., De Vogli, R., Wilkinson, R. (2014). Time to Leave GDP behind. In *Nature,* 505 (7483), 283-85. DOI: 10.1038/505283a

Glazyrina, I.P., Zabelina, I.A., Klevakina, E.A. (2010). Uroven' ekonomicheskogo razvitiia i raspredelenie ekologicheskoi nagruzki mezhdu regionami RF [Economic development level and distribution of the ecological load between the Russian regions]. In *Journal of New Economic Association,* 7, 70-88.

Daly, H.E., Cobb, J.B. (1989). *For the Common Good: Redirecting the Economy Toward Community the Environment, and a Sustainable Future.* Beacon Press, 482 p.

Korobitsyn, B.A. (2015). Metodicheskii podkhod k uchetu istoshcheniia prirodnykh resursov, izmeneniia sostoianiia okruzhaiushchei sredy i chelovecheskogo kapitala v valovom regional'nom produkte [Methodical approach to the account of the natural resources depletion, the environment and human capital change in the gross regional product]. In *Ekonomika regiona* [*Regional economics*], 3 (43), 77-88. DOI: 10.17059/2015-3-7

Mekush, G.E. (2011). *Kemerovo Region. Sustainable Development: Experience, Problems, Prospects*. Moscow, Institute for Sustainable Development of the Public Chamber of the Russian Federation; Center for Environmental Policy of Russia.

Pearce, D.W., Atkinson, G.D. (1993). Capital theory and the measurement of sustainable development: An indicator of "weak" sustainability. In *Ecological Economics*, 8, 103–108. DOI: 10.1016/0921-8009(93)90039-9

Pyzhev, A.I., Syrtsova, E.A., Pyzheva, Yu.I., Zander, E.V. (2019). Sovershenstvovanie statistiki ustoichivosti razvitiia rossiiskikh regionov [Improvement of the Russian regions sustainable development statistics]. In *Voprosy statistiki* [*Issues of statistics*], 5, 33–42. DOI: 10.34023/2313-6383-2019-26-5-33-42

Pyzheva, Yu.I., Lapo, E.V., Syrtsova, E.A., Pyzhev, A.I. (2020). Sustainability of development of the Russian Far East: assessment based on genuine savings. In *Region: ekonomika i sociologiia* [*Region: Economics and Sociology*], 2 (being published).

Ryumina, E.V. (2013). Ekologicheski skorrektirovannyi VVP: sfery ispol'zovaniia i problem otsenki [Ecologically adjusted GDP: spheres of use and estimation problems]. In *Ekonomika regiona* [*Regional economics*], 4 (36), 107-115. DOI: 10.17059/2013-4-10

Syrtsova, E.A., Pyzhev, A.I., Zander, E.V. (2016). Istinnye sberezheniia regionov Sibiri: novye otsenki, starye problemy [Genuine savings of the Siberian regions: new estimates, but old problems]. In *ECO*, 6, 109–129.

Zabelina, I.A., Klevakina, E.A. (2011). Otsenka i sravnitel'nyi analiz pokazatelei kachestva ekonomicheskogo rosta v razreze ekologicheskikh tem [Estimation of the ecological expenses in the produced gross regional product]. In *Region: ekonomika i sociologiia* [*Region: Economics and Sociology*], 2, 223–232.

Устойчивость развития моногородов Сибири и Дальнего Востока: какова цена экономического роста регионов?

Ю.И. Пыжева
Сибирский федеральный университет
Российская Федерация, Красноярск

Аннотация. Одним из наиболее известных и относительно легко вычисляемых интегральных показателей устойчивости развития является показатель истинных сбережений. В настоящей статье акцент сделан на модификациях методики расчета истинных сбережений для уровня муниципальных образований на примере моногородов Сибири и Дальнего Востока. Такой выбор объекта исследования обусловлен гипотезой о том, что именно муниципалитеты испытывают большую часть экологических и социальных последствий экономического роста регионов. На основе отчетности предприятий сформирована база данных, которая затем использована для расчета истинных сбережений моногородов Сибири и Дальнего Востока. В результате получена новая классификация моногородов, включающая четыре кластера, выделенных в зависимости от уровня истинных сбережений, отрасли специализации и численности населения. Новый подход к классификации моногородов может использоваться региональными и муниципальными органами власти с целью формирования дифференцированной политики устойчивого развития моногородов. Анализ средних истинных сбережений моногородов в разрезе регионов показал, что даже если в целом регион характеризуется достаточно высокими значениями истинных сбережений, то более подробный анализ городов, в которых на самом деле находятся предприятия, обеспечивающие бóльшую часть валового внутреннего продукта страны, имеют отрицательные значения истинных сбережений и часто находятся на грани экологической или социальной катастрофы.

Ключевые слова: устойчивость развития, истинные сбережения, индикаторы устойчивости развития, моногорода, экономика природопользования.

Исследование выполнено при финансовой поддержке РФФИ в рамках научного проекта № 19-010-00841.

Научная специальность: 08.00.05 – экономика и управление народным хозяйством.

Journal of Siberian Federal University. Humanities & Social Sciences 2020 13(4): 591–599

DOI: 10.17516/1997-1370-0528
УДК 33.2064

Economic Nature of the Phenomenon "Freebie" in Russian Student Community

Marina V. Ryzhkova[a,b] and Darja V. Alimova[b]
[a]*National Research Tomsk State University*
Tomsk, Russian Federation
[b]*National Research Tomsk Polytechnic University*
Tomsk, Russian Federation

Received 10.04.2019, received in revised form 20.11.2019, accepted 09.12.2019

Abstract. The article is devoted to the problems of behavioral economics in terms of formation of the attitude and perception of goods with zero price in their special form – "freebie" (or in Russian – "haljava") as a special form of free (or almost free) good. The study showed the relationship between economic and non-economic goods. The definition of "freebie" is given as a situation of receiving a good in which an individual (recipient) bears zero or insignificant (inconspicuous) economic or physical costs with a perceived high assessment of the usefulness of the good. Three situations were considered: the recipient of a good is a consumer, an employee and a special case of employee – a student obtaining grades in the educational process. Market surpluses in these situations were analyzed in terms of "freebie" and "pure freebie". An in-depth interview was conducted among students which revealed that 95% of respondents drew a parallel between "freebie" and luck but "freebie" can be prepared to. An interesting finding is the fact that parents' money is perceived starting from the third year as a "freebie", while in younger courses it perceived as the help of parents. When studying the issue of morality in a situation "freebie", it turned out that if a "freebie" does not harm anyone, then this phenomenon is allowed and, moreover, is compared with entrepreneurial activity. Such phenomena as "free money" and "freeloader" as a stable "free" strategy were also analyzed. The latter was negatively judged by respondents. In conclusion, questions are raised for further research of the phenomenon.

Keywords: Behavioral economics, economic goods, non-economic goods, free goods, "freebie", "freeloader", economic costs, market surplus, morality, ethics.

Research area: economics.

Citation: Ryzhkova, M.V., Alimova, D.V. (2020). Economic nature of the phenomenon "freebie" in Russian student community. J. Sib. Fed. Univ. Humanit. Soc. Sci., 13(4), 591-599. DOI: 10.17516/1997-1370-0528.

* Corresponding author E-mail address: marybox@inbox.ru
ORCID: 0000-0002-0107-8016 (Ryzhkova)

1. Introduction

Traditionally, in economic theory all goods are divided into economic and free. Free goods are characterized by accessibility without perceived restrictions. In another way, the market for such goods is absent due to their prevalence above their existing demand. The opportunity costs of production and consumption of such goods are also equal to zero. The assertion should be considered as a mistake that free goods do not have the properties of rarity. Reproducible free goods are self-reproducing at a rate exceeding the rate of their economic use, non-reproducible ones have such a level of supply that provides consumption for many years in advance. But this does not mean that the goods are infinitely accessible. There is no point in producing free goods, because their offer is so great that no one is going to pay for them, and, as a result, their price is zero.

In the search for examples of absolutely free goods (Brynjolfsson et al., 2019; Gal & Rubinfeld, 2016), a researcher inevitably stumbles upon a difficulty, because there are no uniquely free goods, or, in other words, at the same time the goods can be both economic and free. For example, in economic theory sunlight is treated as a free good, but why then do consumers pay for visiting a solarium? Often a consumer would like to get rid of free goods and is willing to pay for it. In this case, getting rid of a free anti-good (such as mosquitoes in the open air) is in itself a blessing and also rare for which the consumer is willing to pay.

Most of the goods that are in demand by society are economic ones. A good is economic or rare if its required quantity as a free good exceeds its available free offer (Bronfenbrenner, 1962). For the production of an economic good, it is required to abandon the production of other goods and redirect limited resources to the required good. That is why economic goods have a value associated with the need to reimburse the cost of reproduction (for reproducible resources) or rent (for non-reproducible resources).

Under ordinary conditions, the price of the economic good is set in the positive area of the axes of prices, however, there are situations where it can be set at zero level. In fact, in very rare cases, the price may fall even below the zero level, which means that the consumer will be paid extra for getting rid of the goods. The situation is rare, but in principle conceivable, especially considering costs of storing goods or the opportunity cost of the area of storage facilities. However, this state of business is not normal, but rather a combination of unfortunate circumstances, or an entrepreneurial mistake.

During market competition, buyers are interested in lowering prices, a special case of this process is a zero price condition.

This paper is devoted to answering questions concerning characteristics of a situation when zero price for a product is a nonrandom phenomenon.

In 2007, Dan Ariely published a paper "Zero as a Special Price: The True Value of Free Products" (Ariely, 2007), where he describes the characteristics of the demand for goods with zero price. As a part of the research, he conducted a series of experiments, as a result of which comes the following conclusion: the demand for the good "overreact" to a decrease in the price from its minimum value (for example, 1 cent) to zero. Even when prices for other goods are reduced much more significantly (for example, from 15 to 10 cents) than the price of a "free" product (for example, from 1 cent to 0), the experiment participants prefer a product with a zero price. That is, for people, a product with a zero price ("pure freebie" in our further terminology) acquires additional value. D. Ariely offers a number of psychological explanations for this process. First, the receipt of "freebies" is not regulated by the market, but by the laws of social exchange (Heyman, Ariely 2004). Secondly, individuals have difficulty translating the value of the good's value into money, the case of free facilitates this process. Thirdly, chargeless evokes positive emotions that add utility to good.

It is worth noting that the approach of D. Ariel is unique. In Russian and international studies, free goods or economic goods, but sold at a zero price, fall outside the range of vision of researchers due to the lack of a positive economic effect from the production of such goods (in other words, the production of goods sold at

a zero price means a systematic loss that contradicts the aim of entrepreneurship). However, if the phenomenon exists, then it makes sense.

Firstly, free goods can be made economic by limiting their supply, and it facilitates the formation of a new market in which for some time a situational monopoly will arise, which will induce an economic profit in the short run.

Secondly, economic goods sold at a zero price also induce a positive effect for producer. They help in entering a new market or redistributing shares in an existing market. The perfect mastership in managing consumer market behavior is the creation of a situation where the consumer, at a formally zero price of the product, reimburses its producer not only for costs, but also gives a net positive effect in some cases – profit. It is worth mentioning that in the previous situation, the calculation of the full price (including not only the amount indicated on the price tag, but also the total costs incurred by the consumer in connection with the purchase of the "free" good) is meant.

Since the consumer is not always cognitively able to perceive the full price of the product, the consumer's desire to "buy" the product at zero price is very strong.

2. Theoretical framework: "freebie" as an economic phenomenon

Here the concepts necessary for further discussion will be defined. In economic terminology (as in the terminology of related social disciplines) there is no special word for the situation of obtaining goods at zero price. In youth slang there is an established name for such situations – "freebie" (or in Russian – "haljava"). Based on the etymology of the word "freebie" (as well as the definitions given by answers of our respondents), we can conclude that "freebie" is a situation of receiving a good in which an individual (recipient) bears zero or insignificant (inconspicuous) economic or physical costs with a perceived high assessment of the usefulness of the good (see *Chto oznachaet slovo «xalîava»*, 2017; Helemendrick, 2008).

There are two situations of obtaining a "freebie".

1) The recipient of a good is a consumer. He demands for the good and buys it at zero price.

2) The recipient is an employee, makes a labor offer and receives remuneration for it. In this case, with a zero level of effort, he receives a significant reward. A special case is the situation with obtaining grades in the educational process.

In each of the situations, we consider the general case when there is a compensation payment by the recipient, i.e. the price or level of effort is different from zero (Fig. 1a, 2a, 3a) and a special case ("pure freebie"), when the recipient does not contribute anything for the goods (Fig. 1b, 2b, 3b).

To analyze the first case in economic theory, there is an instrument of consumer surplus. The consumer is ready to pay the price for the product (P_1), but will not do it if it is possible to buy it at a lower price (P_x; Fig. 1a) or even get it for free ($P_x = 0$; Fig. 1b).

The second case means obtaining "free earnings" as a producer surplus. In the perception of respondents, "free money" or "easy money" is, firstly, money received in a very simple way with minimal effort; secondly, the positive difference between the amount that they are promised to get (or the students expected to receive) and the amount that they actually get; thirdly, the additional

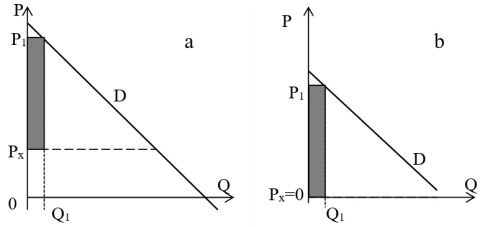

Fig. 1. "Freebie" as a consumer surplus

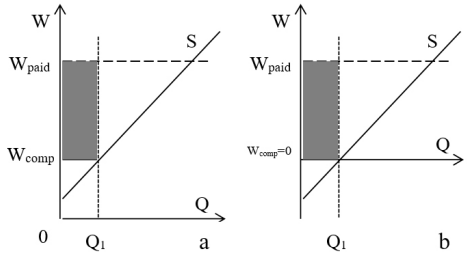

Fig. 2. "Freebie" as a producer surplus

unexpected bonus for the work done earlier and the main payment for which has already been received.

Graphically, "free earnings" is a positive difference between the fee for labor efforts paid (W_{paid}) and the minimum necessary and "honest" compensation from the recipient's point of view (W_{comp}), which is shown in Fig. 2a. If the recipient did nothing at all (his labor efforts are zero, Fig. 2b), he is unlikely to refuse the payment.

"Freebie" in the educational process ("student freebie") is a producer surplus. The student makes an effort that is assessed by the teacher. It is possible both a situation of underpayment for the efforts spent to prepare for the exam (usually causing violent negative emotions) and overpayments (in this case, emotions are no less strong, but carefully hidden in fear of revealing your real level of knowledge and thereby lower the grade). The latter is a "freebie" situation. So, in accordance with Fig. 3a, the student spent on preparing for the exam efforts to calculate it for the satisfactory mark ($Q \in (Q_3, Q_4)$), but quite unexpectedly (s)he received an excellent mark. Even more fun is getting an excellent mark without any effort at all ($Q \in (0, Q_3)$, Fig. 3b).

Of particular note is the measurement of the "freebie" value, which graphically represents the area of the shaded rectangles in Fig. 1, 2 and 3. However, due to the fact that P_1 and W_{comp} are psychologically determined estimates, the determination of the "freebie" value in different situations is a scientific and practical problem. It is necessary to make a remark regarding the conventionality of the above figures containing graphs that clearly show the "freebie" value. The fact is that, in accordance with the results of D. Ariely, the value of a freebie is estimated by the consumer at a higher utility per ruble of savings than the utility per ruble of the price paid for the product, which means that not all of the surplus is shown on the graphs. Sales promotion specialists have long understood this fact and are using these behavioral features when conducting product presentations, distributing samplers, giving gifts, etc. Often, the monetary effect of revenue growth from such events exceeds not only their costs, but also turns out to be more effective than large-scale and expensive advertising companies.

An alternative approach to determining the size of a "freebie" is an excessive compensation (Shmakov, Bulgakova, 2011). In accordance with the risk neutrality approach, compensation should fully compensate for the loss.

Or return the consumer to the original indifference curve. Damage can be understood as all the cases described above, namely: the loss of another good (in the particular case, money) owned by the consumer, as well as the spent efforts of the consumer (as the cost of labor expended).

In accordance with Fig. 4a, damage ($Q_{A1} - Q_{A2}$) can be compensated by the provision of goods B in the amount of ($Q_{B1} - Q_{B2}$), which corresponds to fair compensation, as well as in the amount of ($Q_{B1} - Q_{B3}$), where part ($Q_{B2} - Q_{B3}$) is a "freebie" and corresponds to the general case. Fig. 4b shows the case of a "pure freebie" when the recipient did not lose anything and receives the benefit of B for free.

The approach to measuring the utility of a good to describe the receipt of goods with a zero price is not suitable due to the inability to evaluate utility using any of the existing methods (Ryzhkova, 2013), because the zero price does not allow to reach the optimum.

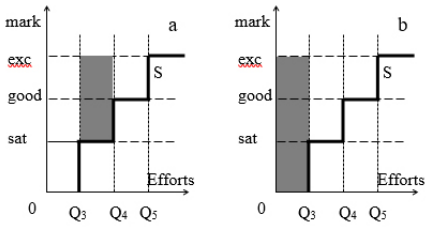

Fig. 3. "Freebie" in learning process

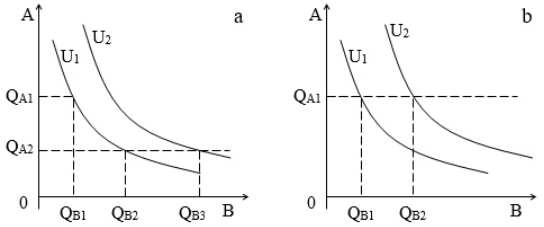

Fig. 4. The method of neutrality to risk and "freebie"

3. Methods

This paper contains results of an in-depth interview of students of different courses in economic specialties of the National Research Tomsk Polytechnic University regarding their perception of the phenomenon of "freebies" in the educational, labor and consumer sectors, and moral and ethical context of "freebies" (Table 1).

Table 1. Sample of students in the survey

Course of study	Female	Male
1	1	2
2	1	1
3	3	0
4	1	1
5	1	1
Total: 12 students		

The list of questions included the following:

1) What do you mean by "freebie"?

2) Who, in your opinion, is a "freeloader" (in Russian – "haljavshick")?

3) What features are inherent in "freebie" situations?

Situation 1: You walk down the street and see five hundred rubles. How will you behave and is it a "freebie"?

Situation 2: Five hundred rubles will fall out of a pocket of a person coming in front of you. How will you behave and is it a "freebie"?

Situation 3: You went into an empty classroom and see a hundred rubles lying on the desk. How will you behave and is it a "freebie"?

4) Do you know any superstitions about a "freebie" in your student life? And how do you feel about them?

5) Have you used these superstitions personally? If so, did they help you?

6) How do you feel about "freeloader" students?

7) What do you mean by "freebie" in terms of earnings?

8) What money do you call "free"?

9) Did you have a "free earnings"? Give an example.

10) From a moral point of view, is a "freebie" good or bad?

The conversation with each of the respondents took place in an informal setting (dormitory) starting from 03.30.2013 to 03.31.2013. Average duration of conversation was 25 minutes.

4. Discussion

4.1. Conception

To start with, it was determined how respondents understood the "freebie" situation. It turned out that their common understanding of "freebies" is no different from the definition of "freebies" that was given earlier. The only addition is that 95% of respondents drew a parallel between "freebie" and luck. For few of them, the concepts are synonymous. For most, there is a difference due to the fact that luck is the result of a randomly obtained positive difference between the expected and actual outcome of the situation. According to respondents, sometimes a "freebie" can be prepared. For example, if you are preparing for the exam satisfactory, then the probability of getting a good or excellent mark is higher comparing to the situation of doing nothing. "There is a "freebie" that you prepare for yourself, that is, you will do something today, and tomorrow you will get some bonus for it, but there is a "freebie" that you don't expect at all, and it falls on you like snow on the head. This "freebie" can be called luck, that is how the second-year student determines the target phenomenon.

Respondents also identified specific features of situations that they could call "freebees". In their opinion, such a situation is characterized by luck, unpredictability, spontaneity and a minimum of one's own efforts. By all indications, this situation can be attributed to the subject of study of economists as an extreme case of maximization behavior.

4.2. Beliefs and superstitions

Further, the respondents were asked a series of questions regarding various beliefs about a "freebie", namely: do they know about existing rituals and do they use them. The list

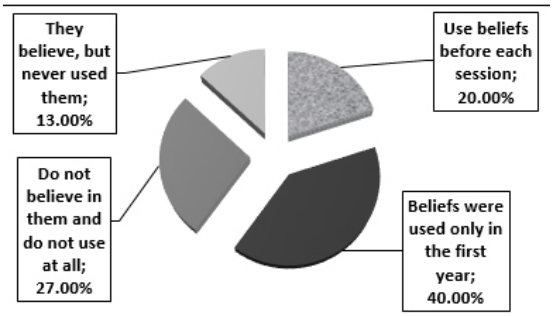

Fig. 5. The students' attitude to beliefs about "freebie" (% of students)

of verified beliefs was borrowed from open sources on the Internet (see "Catch, "Freebie"! Or student superstitions" in References). It turned out that they knew everything about beliefs, but demonstrate different attitudes towards them. The results are presented in Fig. 5.

Someone uses them before each session; someone resorted to their help only in the first year of study. Students who are among those using beliefs before each session say this helps them calm down. Of cause, "freebie" does not add knowledge, but at the subconscious level this gives confidence in one's abilities. In the minority were those who are loyal to the "freebie" as such, but have never used it. The reason is that these people are used to reach goals with their own efforts and do not lay upon superstitions. They believe that those who receive their exams and tests for "free", lose a lot and in the future will not be able to achieve their goals. Most respondents used the "freebie" only in the first year, and then became disappointed in it.

4.3. Earnings

The next area of questions is earnings got in a "free" way. It turned out that "free money" or, in the terminology of respondents, "free, easy money", firstly, is money received in a very simple way with minimal effort. Secondly, the positive difference between the amount that they promised to be paid (students expected to receive) and the one that actually paid, can also be called a "freebie". And the last, "free earnings" is a bonus received for the work done earlier. During a conversation with one of the respondents, it was revealed that when making a decision, the value of the "freebie" is estimated. "For me to help to raise a cabinet to the second floor for five hundred rubles is a "freebie", but hand-bombing half a ton of coal for the same amount is no longer a "freebie", says a first-year student. This focuses on the subjective perception of both the presence and magnitude of the "freebie".

During a conversation with respondents, a very important pattern was revealed. Starting from the third year, that is, at a time when a student can get a job at least part-time, (s)he begins to perceive the financial assistance of his parents as a "freebie". First and second year students perceive this help as parental care.

4.4. Moral issues

One of the main issues in understanding the "freebie" phenomenon is its moral / ethical issue. The ethical idea in benefiting from "free" situations is a commonplace in any conversation with respondents. The general attitude of students to the "freebie" from the moral side can be expressed as follows: if the "freebie" does not harm anyone, does not happen at the expense of others, then there is quite appropriate. Some respondents indicated that this kind of "freebie" is even good, compared this behavior with an entrepreneurial functioning. One of the senior year respondents expresses it this way: "Free" strategy means that a person is looking to make things faster and to spend less energy while doing so; it's like in "Interns" (famous Russian TV show), when Bykov mixed buckwheat and rice and forced the interns to sort them out; the decision to buy a new pack-

age of rice and a package of buckwheat did not harm anyone". Thus, we can conclude that students perceive strategies that are Pareto improvements as a positive "freebie". Most students recognized as inadmissible the systematic behavior aimed at obtaining a «freebie» by causing harm to others.

The personality of the "freeloader" was subjected to discussion with students: a person whose dominant strategy is to search for situations with the presence of a "freebie" ("free" strategy). Naturally, the systematic receipt of a positive consumer surplus is possible only due to the non-receipt of the benefits of social interaction by other people who are forced to encounter a "freeloader". We can say that the "freeloader" lives at someone else's expense.

Two terms should also be distinguished – "free rider" and "freeloader". A free rider receives the public good without directly harming other society members. A "freeloader" receives private goods either at the expense of others or as positive effects from the production of other private goods, or appropriates the loss of private goods from other market participants.

The students' attitude to the "freeloader" has a dual character. On the one hand, being a "freeloader" is good. If a person manages to achieve a result without making any special efforts, if (s)he finds a way out of any situation, albeit with the help of others, if he is always lucky, this is not so bad. Perhaps this is the path that will lead to success in life. But given the moral aspect of the problem, students understand the short-term nature of such a behavior strategy. Sooner or later, the "freeloader" is expelled from the gift exchange, subjected to ostracism, which significantly complicates his/her life. By maintaining a "free" strategy as the dominant behavior, a person runs the risk of being isolated. "You can't live at the expense of others all the time and rely on luck. Living at the expense of others, a person turns into a parasite. And luck is a temporary matter, the odds can be against us at any moment."

In the survey, students were asked three situations.

1) You walk along the street and see five hundred rubles.

2) Five hundred rubles fall out of the pocket of the person walking in front of you.

3) You went into an empty classroom and see a hundred rubles lying on the desk.

In all three situations respondents were asked: What will you do? and Is it a "freebie"?

In the first situation, everyone clearly answered that they would take the money. But whether this is a "freebie" opinion were divided. Some claimed that, yes, this is a "freebie". Others said that this was just a coincidence, but this could not be called a "freebie". The third part of participants could not say for sure whether it was "a freebie" or luck, since the difference between these concepts is very small for them in this case.

In the second situation, no one had any doubts. All respondents showed themselves to be honest and decent people – without any doubt, they would return the money to a passerby. They didn't attribute this situation to either "freebie" or luck.

The third situation was the most controversial. The denomination of a banknote has a considerable influence on the decision to take or not to take money. If there were a hundred rubles, most of the respondents would not have taken this money, and some even tried to find the owner. But, if five hundred rubles will lie on the table, students begin to doubt. The following solution was proposed: if after a short period of time the owner does not come for them, the students, of course, will take them. But if the owner of the money still appears, then they will definitely give it back. And only a few said that they still would not take this money. Almost every student said that (s)he would try to find the owner of this money, but then (s)he caught himself thinking that if (s)he starts asking other students whose money it is, there may be many who want to receive it, that is, in other words – "freeloaders". What will mean the transfer of "freebie". Then, in order to expand this situation, respondents were asked to play the role of those same "freeloaders". Everyone answered unequivocally that they would not take advantage of such a situation. The transfer of "freebie" should be investigated in a separate study.

5. Conclusion

It is normal to establish a zero price for free goods, but in practice there are situations when a zero price is set for an economic good. According to the results of the presented study respondents consider the situation with the presence of a perceptibly sufficient surplus (consumer or producer) to be "free", which is clearly of a probabilistic nature of occurrence. The presence of such a situation modifies the behavior strategies of individuals to the extreme – the appearance of a "freeloader", which is perceived ambiguously. If a positive effect arises due to the loss in the effectiveness of the functioning of social exchange, the behavior of the "freeloader" as well as the existence of the "freebie" itself is recognized as acceptable. If the equivalence of gift-exchange relations is violated, such behavior is suppressed, and the situation begins to be regulated by the social coercive mechanisms.

In the presented study, only a small part of the manifestations of the "freebie" in society was considered. In our opinion the answers to the following questions are quite promising:

1. Is it possible to combine a "freebie" for producers and recipients analogous to a market transaction?

2. How to practically determine the "freebie" value?

3. Is it possible to transfer or sell a "freebie", and how to determine its price?

4. How to evaluate the flows of free "freebies" and assistance in social interaction?

"Freebie" or getting a product at a zero price is a stable part of social life. Due to non-market effects arising in this kind of transactions, the "freebie" falls out of visions of economists. But since the behavioral strategies of many individuals in the modern world are built taking into account this factor it is necessary to smoothly incorporate a "freebie" as a phenomenon into basic economic concepts, what we tried to undertake in the paper presented to the reader.

References

Ariely, D. (2007). Zero as a Special Price: The True Value of Free Products. In *Marketing Science*, 26 (6), 742–757.

Bronfenbrenner, M. (1962). The Scarcity Hypothesis in Modern Economics. In *The American Journal of Economics and Sociology*, 21 (3), 265–270.

Brynjolfsson, E., Collis, A., Diewert, W.E., Eggers, F. & Fox, K.J. (2019). GDP-B: Accounting for the value of new and free goods in the digital economy. In *WP National Bureau of Economic Research*, w25695.

Chto oznachaet slovo «xalî ava» [What does the word "freebie" mean] (2017). In *Rambler.Novosti* [*Rambler. News*]. Available at: https://news.rambler.ru/other/37516408-chto-oznachaet-slovo-halyava/ (accessed 12 August 2019).

Gal, M. & Rubinfeld, D.L. (2016). The hidden costs of free goods: implications for antitrust enforcement. In *Antitrust Law Journal*, 80 (401), 14-44.

Helemendrick, S. (2008). Xalî ava kak vedushchaî a strategiî a russkogo cheloveka [Freebie as a leading strategy of the Russian people]. In *Internet-project InoSMI.RU.* 02.06.2008. Available at: https://inosmi.ru/world/20080602/241704.html (accessed 12 August 2019).

Heyman, J., & Ariely, D. (2004). Effort for Payment: A Tale of Two Markets. In *Psychological Science,* 15(11), 787–793.

Moiseenko, E. (2012). Lovis′, Xalî ava! Ili studencheskie sueveriî a. [Catch, Freebie! Or student superstition]. In *Alma Mater: Magazine of Tomsk State University.* 13.06.2012. № 2523. Available at: http://almamater.tsu.ru/show_story.phtml?nom=2523&s=5474 (accessed 12 August 2019).

Ryzhkova, M.V. (2013). Vozmozhnosti teorii ozhidaemoĭ poleznosti v opisanii potrebitel′skogo vybora [Expected Utility Theory and Consumer Choice]. In *Izvestiî a TPU* [*Bulletin of the Tomsk Polytechnic University*], 322 (6), 65–70.

Shmakov, A.V., & Bulgakova, E.A. (2011). Ispol′zovanie mekhanizma kompensat sii v grazhdanskom prave [The use of the compensation mechanism in civil law]. In *TERRA ECONOMICUS*, 9(4), 65–76.

Экономическая природа феномена «халява» в среде российских студентов

М.В. Рыжкова[a,б], Д.В. Алимова[б]
[a]Национальный исследовательский
Томский государственный университет
Российская Федерация, Томск
[б]Национальный исследовательский
Томский политехнический университет
Российская Федерация, Томск

Аннотация. Статья посвящена проблемам поведенческой экономики в части изучения особенностей социально-экономических отношений, возникающих в случае товаров с нулевой ценой в их особой форме – «халяве» – как особой форме бесплатного (или почти бесплатного) получения товара. Исследование показало связь между экономическими и неэкономическими товарами. Дано определение понятию «халява» – ситуация получения товара, при которой физическое лицо (получатель) несет нулевые или незначительные экономические или физические издержки при высокой оценке полезности товара. Были рассмотрены три ситуации: получателем товара является потребитель, работник и особый случай работника – студент, получающий оценки в учебном процессе. Рыночные излишки в этих ситуациях анализированы в терминах «халява» и «чистая халява». Было проведено глубинное интервью среди студентов, которое показало, что 95 % респондентов проводят параллель между «халявой» и удачей, но «халява» может быть подготовлена. Интересным фактом является то, что деньги родителей с третьего курса воспринимаются студентами как «халява», а на младших курсах – как помощь. При изучении вопроса о морали в ситуации «халява» выяснено, что если «халява» никому не причиняет вреда, то это явление допускается и, более того, сравнивается с предпринимательской деятельностью. Были также проанализированы такие явления, как «свободные деньги» и «халявщик» как стабильная стратегия поиска бесплатных товаров. Последний вариант был отрицательно оценен респондентами. В заключении даны возможные дальнейшие направления исследования этого явления.

Ключевые слова: поведенческая экономика, экономические блага, неэкономические блага, бесплатные товары, экономические издержки, «халява», «халявщики», избыток рынка, нравственность, этика.

Научная специальность: 08.00.00 – экономические науки.

Из фондов музея Сибирского федерального университета

Мишарин М.Н.

Ачинский глинозёмный. 1980-е гг.

Бумага, акварель, 84х58

Мишарин М.Н.

Геологи прилетели., 1970-1980–е гг.

Бумага, акварель, 52х75

Мишарин М.Н.

Женский портрет.,1980-е гг.

Бумага, акварель, 46х65

Степанов С.А.

Лист из серии «Красноярская ГЭС». 1970-е гг.

Бумага, гравюра, 53х42,5