

Concept of Innovation-Driven Development of Regional Industrial Complex

Valery V. Bezpалov¹; Natalya Anatolievna Solopova²; Irina N. Kovalyova³;
Anastasia A. Avtonomova⁴

¹Plekhanov Russian University of Economics, Russia.

²Moscow State (National Research) University of Civil Engineering, Russia.

³Russian International Academy of Tourism» (RIAT), Russia.

Moscow State Technical University, Russia.

⁴Plekhanov Russian University of Economics, Russia.

Abstract

The paper discusses the concept of innovation-driven development of a regional industrial complex in the transition to an innovation economy, based on the criterion of alignment between production operations and innovation activities. The methods of concept formulation are determined, as well as their relation to the methods of innovation-driven development of socioeconomic systems. Major elements of the concept and its relation to the development strategy of the analysed complex are outlined. The objectives and principles are described in detail, as well as the performance indicators of innovation-driven development of the industrial complex in their interrelation with the functions of the modern innovation market development.

Key-words: Innovation-Driven Development, Regional Industrial Complex, Innovation Market, Development Concept, Institutional Innovation Environment.

1. Introduction

Apart from speeding up innovation-driven development in a region, the transition to an innovation economy also involves ensuring the alignment of production operations and innovation activities of the regional industrial complex. Such speeding up involves raising activity levels in the industrial complex, operating a multifactor management model with a focus on the adoption of novel features across the production and life cycles, taking steps to expand the innovative product range, introducing and expanding best practices in the analysed complex in order to attain the objectives of

innovation-driven development.

The alignment of production operations and innovation activities in the regional industrial complex means ensuring rational resource utilisation in the interaction of research and development, commercial and public structures, coordinated stages of project and process-based management in production operations and innovation activities, enhancement of networking and communications between the participants of innovation events and programs implemented by enterprises of the analysed complex. In fact, the innovation-driven development of the regional industrial complex is a major factor in the transition to an innovation economy with a major segment of production running on research-intensive technologies.

A specific point here is that the regional industrial complex should be approached as a complex socioeconomic system integrating all regional industrial operations in a single industrial complex functioning as a distributed holding.

Purpose. The choice of the regional industrial complex as a research object reflects its systemic role in the region, which consists in the establishment of organisational economic conditions for the adoption of modern processes and technologies in production operations to facilitate meaningful growth of the economic potential and competitiveness of the analysed complex.

Basically, the industrial complex integrates the major components of the region's available economic potential but only pursues competitive improvement through traditional methods and technology. A rational alignment of the production operations and innovation activities of the industrial complex would not only build up the existing potential but would also reinforce the systemic ties in the region. To address this objective, a concept of innovation-driven development of the regional industrial complex is required.

The concept of innovation-driven development of the regional industrial complex should be systemic by nature, i.e. apart from the attainment of the overall goal, it should describe the conditions of its realisation. For that, the concept has to be integrated into all development strategies operating in the region in respect of the industrial complex and should be aligned with the development priorities of the innovation market. Otherwise, any attempt at transition to an innovation economy will fail.

The main objective of innovation-driven development in the regional industrial complex is the alignment of development between the production operations and innovation activities of the constituent enterprises, which is maintained via a system of organisational and economic conditions facilitating the integration of advanced processes and technologies in the production operations. The attainment of the main objective supports the growth of economic potential and competitiveness of

the regional industrial complex. The basic objectives of the concept may include:

- alignment of production and innovation policies;
- rational utilisation of resource potential based on the principle of maximising the effect of innovation results;
- efficiency of innovation projects and programs and relevance of the resulting outcomes;
- balanced sequences of innovation activities in line with the maximum value-added criterion;
- integration of novel features across product life cycles while maintaining and/or improving the economic security profile of production.

The attainment of the set objectives requires the implementation of a sequence of steps to align the priorities of production operations and innovation activities of the regional industrial complex.

The first step is to ensure uniformity and concordance of the language, excluding any risks of misinterpretation. Problem statement, project and activity references and planning elements should be compliant with the applicable statutory regulations and should not hinder innovation-driven development in the regional industrial complex.

The second step is maintaining the technologies of organisation and management of innovation-driven development, particularly through the establishment of a specialised coordination centre with requisite competences. Irrespective of the size of the regional industrial complex, the alignment in development of the production operations and innovation activities of its constituent enterprises can be only achieved with a control centre in place.

The third step is monitoring and supervising the results of innovation-driven development, which allows evaluating the qualitative and quantitative parameters of performance on the set tasks and initiate a reasonable adjustment process.

Finally, the fourth step is the adjustment of production and innovation performance in the regional industrial complex, taking into account the economic security level and the development references of its constituent enterprises.

Each of the above steps should be designed to simplify the settings of performance on the set objectives and should accommodate the applicable development priorities and targets of the national innovation market. A special point to be mentioned is the role of a control centre involving the accomplishment of the above steps with a focus on coordinating the task performance settings between different socioeconomic institutions.

As to the principles of the innovation-driven development of the regional industrial complex, the transition to an innovation economy primarily centres on the systemic approach, hierarchy, multidimensionality, coordination, balanced operation and the planning principle. The coordination of these principles with the principles of development of the innovation market operates on the same scientific and methodological basis, as the coordination of innovation development objectives for the regional industrial complex.

2. Literature Review

The issues of managing innovation-driven development and the transition to an innovation economy are covered in a number of research papers. The strategic planning priorities of the spatial development of the Russian Federation are adopted in official documents and their implementation is closely supervised by the Government of the Russian Federation (The order of the Government of the Russian Federation No. 207-r: 2019; Federal Law No. 172-FZ: 2014). The fundamentals of spatial development supporting the national security objectives and activation of the innovation potential of the industrial sector are laid out in (Grishina et al.: 2018; Shichkina, Grishina: 2018).

The specifics of the development of regional innovation economies and innovation-driven growth in individual territories were studied in general terms (Bezpalov et al.: 2016; Efimova, Kotilko: 2014) and specifically with regard to infrastructure development and monitoring innovative territorial clusters (Kotilko, Vishnyakova: 2016a; 2016b). The aspects of the development of an innovation-oriented industrial policy were described in (Lochan et al.: 2015). Methods for ensuring the security of regional industrial complexes implementing strategies of innovation-driven development in the import substitution environment are addressed in (Bezpalov et al.: 2017).

Current applied problems in adopting innovation as a driver of secure economic growth at different levels of regional strategic development are described in (Lipina et al.: 2017; Lipina, Smirnova: 2017). The specifics of innovation-driven development of corporations partially owned by the government, as well as the advantages and disadvantages of the scientific and technological renovation of an industrial corporation, are identified in (Lochan, Klimenko: 2016; Lochan, Fedyunin: 2015). The conceptual fundamentals of managing innovation-driven development in corporations partially owned by the government are discussed in (Klimenko: 2015). The results of the development of the methodological support, the mechanism and model of innovation-driven development for regional industrial complexes in an unstable macroeconomic environment amid technological and economic change were studied in (Bezpalov et al.: 2019a; Fedyunin et al.: 2019;

Bezpalov et al.: 2019b).

The analysis of existing research concerned with the transition to an innovation economy showed the need for further development and refinement of the subject in terms of concept formulation for innovation-driven development of the regional industrial complex with a focus on the strategic planning and motivation function via the alignment of the production operations and innovation activities of the enterprises of the analysed complex. The above substantiates subject relevance.

The adoption of the Strategy of Spatial Development of the Russian Federation until 2025 at the beginning of 2019 opened a new chapter in the history of strategic planning. One of the key objectives of spatial development within the said horizon is the geographic expansion and acceleration of economic growth, scientific and technological progress and innovation-driven development of Russia (The order of the Government of the Russian Federation No. 207-r: 2019). To address this objective, the Strategy offers a range of proposals, including priority support of high-tech and research-intensive production industries; therefore, the industrial complex should become one of the regional growth points, which is only possible with a developed concept of innovation-driven development in place.

Such concept is meant to solve the problem of raising the levels of innovation activity and competitiveness among the enterprises of the complex, subject, however, to the systemic integration of such concept into the regional spatial and innovation-driven development processes. In that case, the industrial complex is assigned the important role of fostering innovation activities governed by the principles of national security, rational distribution of resource flows, balanced market regulation and priority support of innovation projects and other growth points.

The innovation-driven development of the regional industrial complex during the transition to an innovation economy constitutes systemic changes in operations at the enterprises of the analysed complex reflecting prioritised utilisation of novel features across the life cycle stages of the products (works, services). For that, innovation processes should be automated and totally integrated in operations of the regional industrial complex with due regard for innovation support at all stages of the production process. Active deployment of digital technologies and automated systems is also required for the coordination of efforts of innovation support.

The current statistics on innovation-driven development of the regional industrial complex reflects technological, marketing and organisational innovations but provides no visibility in terms of the alignment between the production operations and innovation activities of the constituent

enterprises. Based on the annual federal statistical observation form No.4 "Svedeniya ob innovatsionnoi deyatelnosti organizatsii" [Information on innovation activities of the enterprise] and the findings of research conducted by the National Research University Higher School of Economics as laid out in Table 1 (Gokhberg et al.: 2019), no conclusions could be drawn as to the systemic nature of change or alignment of development in the analysed types of activity. Meanwhile, the alignment of production operations and innovation activities makes the basis of innovation growth in priority development directions of the industrial complex and requires the integration of constantly-monitored innovation activity indicators as part of the system.

Table 1. Indicators of innovation activity for enterprises by staff size as of the end of 2017

Indicator	Enterprises by staff size, number of employees									
	Total	< 50	50-99	100-199	200-249	250-499	500-999	1,000-4,999	5,000-9,999	≥ 10,000
Level of innovation activity of enterprises, %	8.5	2.6	6.4	9.4	12.5	16.1	25.6	45.2	77.6	85.4
Relative share of enterprises putting up innovation vs. the total number of enterprises, %										
•technological	7.5	2.0	5.7	8.3	11.0	14.1	23.8	43.1	75.9	85.4
•marketing	1.4	0.4	0.8	1.3	2.1	3.0	4.9	8.3	12.8	16.7
•organisational	2.3	0.6	1.2	2.3	2.6	4.1	7.2	16.4	35.3	43.8
Spending on innovation, billion roubles	1,416.9	9.8	17.2	46.3	20.4	92.5	162.2	601.0	197.9	269.6
Spending on innovation, %	100.0	0.7	1.2	3.3	1.4	6.5	11.4	42.4	14.0	19.0
Distribution of spending by innovation types, %										
•technological	99.2	93.4	97.3	99.6	97.6	99	99.1	99.2	99.4	99.3
•marketing	0.3	0.5	2.1	0.1	1.2	0.5	0.5	0.2	0.3	0.2
•organisational	0.5	6	0.6	0.3	1.2	0.5	0.3	0.6	0.3	0.5
Note: The presented figures reflect aggregate data for enterprises engaged in industrial production and operating in the services sector, agriculture and construction.										

Source: Gokhberg et al.: 2019.

The statistics show that the innovation development strategy is implemented under an "innovation enforcement" scenario. The overall level of innovation activity, equal to 8.5% as of the end of 2017, and the highest levels of spending on innovation are primarily maintained by major enterprises. The highest level of activity at 32.2% is registered for state corporations maintaining leadership in all types of innovation, namely: technological (30.2%), marketing (5.3%), organisational (13.0%). The figures are significantly above the overall (average) activity levels in the table. For other state enterprises, the activity level is 9.7% with the following distribution by innovation types: 8.8%, 1.2% and 2.8%, respectively. Meanwhile, the biggest volume of spending

incurred is registered for private enterprises (45.2%). State enterprises account for 18.4% of the total spending and state corporations – for 6.3%.

What can be safely stated is that the results of innovation activities at state corporations are the most effective, which reflects better alignment between the production operations and innovation activities due to the scale of business and the scope of penetration into the production cycle. On the contrary, private companies spend a lot on the development of novel features that will never become innovations. On the one hand, the reason is the freedom in innovation direction choices and, on the other hand, this reflects the lack of effective mechanisms of cooperation between the state and private enterprises, particularly in the development and implementation of organisational innovations.

3. Methods

The implementation of the objectives of innovation-driven development in the regional industrial complex requires relevant methods. Apart from the traditional methods proposed by the theory of innovation activities, the transition to an innovation economy may warrant an emphasis on certain methods of innovation-driven development of the regional industrial complex, such as:

- the method of problem-oriented development helping to identify bottlenecks in the production and innovation processes and targeting the improvement of innovation activity to eliminate such bottlenecks by leveraging a reasonable combination of traditional and modern techniques of performance on the set objectives;

- the method of refinement of the existing scientific and technological platform and production intensification targeting the aspects of technology development and deployment of innovation across the production cycle stages, adoption of systemic innovations across the life cycle and implementation of innovative approaches in HR and customer relations;

- the method of innovation infrastructure refinement, targeting corporate culture development, improvement of innovative features in the internal and external infrastructure of the regional industrial complex, stimulation of innovation activity among partners and counterparties, introduction of novel features in production diversification and new market development, which facilitates the reorganisation of industrial production in line with the development requirements of the innovation market;

- the method of monitoring of innovation competitiveness determining the usability of the results of innovation activities and the degree of relevance of specific innovations for the enterprises of the regional industrial complex, which helps to identify the bottlenecks in production and build the

innovation pipeline;

- the method of innovation life cycle moderation, targeting the coordination of innovation life cycle stages with the production sequences of individual enterprises of the industrial complex in line with the criterion of maximum communicative effect in the interactions of its participants with innovation market players;

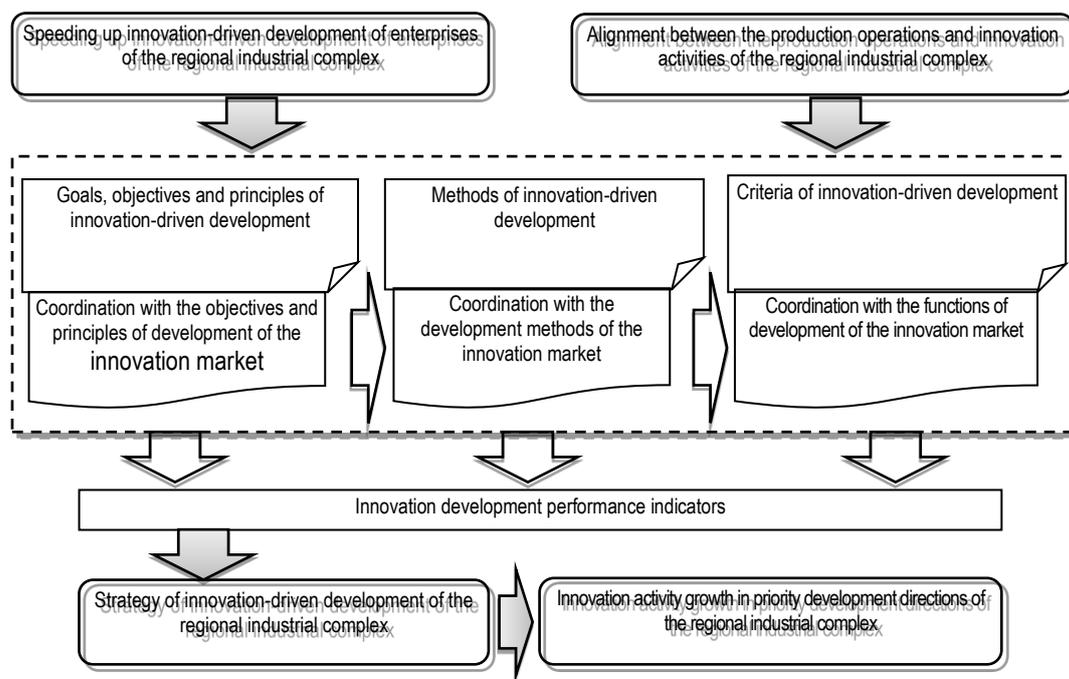
- the method of feasibility studies governing innovation development instructions, promoting the formation of a portfolio of highly-feasible items and determining the range of instruments for automation of innovation operations for enterprises of the regional industrial complex;

- the method of technological modelling of system relations and innovation transfer based on the strategic networking modelling tools taking into account environmental factors, economic security risks and innovation business process optimisation.

4. Results

The major propositions and methods of the innovation-driven development of the regional industrial complex can be rendered as a visualisation of the respective concept (Fig. 1). It is worth noting that the alignment of innovation activities and production operations not only helps to improve performance and efficiency but is also helpful in shaping incentives for raising the competitiveness of innovation efforts. This can be achieved through the reasonable delineation of functions and responsibility areas and rational utilisation of resources in innovation activities.

Figure 1. Concept of innovation-driven development of the regional industrial complex



The concept of innovation-driven development of the regional industrial complex is more than just a foundation for the formulation and implementation of the processes of production operations and innovation activities and their alignment. It constitutes a system of progressive views determining the essence of the process as represented by a series of performance indicators. Moreover, it shapes the conditions to support such process by coordinating individual stages of the production operations and innovation activities of the industrial complex with the development priorities of the innovation market and the fundamental propositions of the regional innovation development strategy. Thus, an industrial complex development strategy and a further program are shaped.

The key priorities of a development strategy of the industrial complex include the following: expanding the scope of innovation efforts; building an organisational economic mechanism to coordinate innovation development efforts; resource, information and methodological support of production operations and innovation activities; planning scenarios of innovative transformation performance with respective evaluation scorecards; management by objectives in the innovation-driven development process. The described approach helps to chart four strategic development scenarios (negative, no change, positive and best case) and to further specify the respective development programs, mechanisms and methodological approaches for their realisation. Subject to the attainment of the target performance indicators, these elements would support innovation activity growth across the enterprises of the regional industrial complex based on improved rational utilisation of the available resource potential.

5. Discussion

The main result of implementing a concept of innovation-driven development of a regional industrial complex is the alignment of production operations and innovation activities. The degree of alignment is evaluated against performance indicators. Therefore, concept performance evaluation relates to analysing such indicators. An important point to keep in mind is the relation between the indicators and the innovation market development functions targeting innovation activity growth through critical analysis of the existing methods and instruments of innovation activities, active adoption of best practices and transfer and foresight techniques for improving performance of innovation processes and leveraging the mechanisms of organisational economic management of systemic change at the enterprises of the regional industrial complex. The key performance indicators are as follows:

- the attainment of an optimum share of spending on innovation in the annual spending. The indicator is linked to the economic functions of innovation market development and supports the economic alignment between production operations and innovation activities via the establishment of norms and rules of resource support of innovation projects, programs and efforts;

- the adequacy levels of innovative technology in the production and technology cycle and innovative products in the product portfolio in respect of innovation-driven development objectives. The indicator is linked to the scientific and methodological functions of innovation market development and supports the technological alignment between production operations and innovation activities via the establishment of technological norms and rules of resource support of innovation projects, programs and efforts;

- the steady growth of the innovative product share of the product portfolio. The indicator is linked to the production functions of innovation market development and supports the product alignment between production operations and innovation activities via the establishment of norms and rules regarding product profile updates and the innovation profile of products and technologies;

- the steady growth of the number of enterprises in the industrial complex pursuing active adoption of various innovations. The indicator is linked to the management functions of innovation market development and supports the organisational alignment between production operations and innovation activities via the establishment of rules and favourable environment for stimulating creative and inventive activities;

- infraintensity of innovations and infrastructure availability in the regional industrial

complex. The indicator is linked to the infrastructure functions of innovation market development and supports the infrastructure alignment between production operations and innovation activities via the establishment of norms and rules of service support of innovation projects, programs and efforts.

Putting the performance indicators to practice would not only foster the attainment of the required alignment between the production operations and innovation activities in the regional industrial complex but would also positively influence the dynamic of its interaction with innovation market participants. This reflects several technological opportunities for utilising the innovation potential for accumulating novel features that are feasible and practicable for the enterprises of the complex, expanding the resource base of the regional industrial complex and uncovering the reserves only becoming available for use after improvements in the innovation activity levels at the constituent enterprises, improving the economic security positions in the analysed complex through the establishment of systemic relations with the innovation market participants and introducing a specialised control centre to manage change as would be adequate in terms of the current requirements and the criterion of resource intensity and adaptability.

6. Conclusion

Successful progress in speeding up the innovation-driven development of the regional industrial complex would depend on the adopted national economic modernisation ideology. Most importantly, such a plan is now in place and its fundamental propositions are reflected in the Strategy of Spatial Development of the Russian Federation until 2025. It marks considerable progress on the way to an innovation economy.

A concept of innovation-driven development of a regional industrial complex, in turn, would facilitate a strategic approach to socioeconomic development of industries and services sector, which, in the medium term, would change the traditional pattern of relations between the state, business and society, making them a balanced planned and innovative instrument for regulating innovation behaviour in the regional industrial complex. Such instrument will be helpful in neutralising the negative effects of state influence in the economy and in promoting market relations of the participants of innovation activities in industry sectors and in the innovation market toward a higher efficiency level. Progress will be facilitated by the structuration and efficient operation of the described methods and instruments of innovation-driven development of the regional industrial complex.

Acknowledgments

This article was prepared as part of the government contract as requested by the Ministry of Science and Higher Education of the Russian Federation on the subject formulated as «Structural changes in economy and society as a result of achieving the target indicators of National projects, which provide opportunities to organize new areas of social and economic activity, including commercial, both in Russia and abroad». № FSSW2020-0010

References

- BEZPALOV, V.V., FEDYUNIN, D.V., LOCHAN, S.A. (2017). *Mechanism for ensuring the external trade security of regional industrial complexes in the import substitution environment*: Monograph. Moscow: RUSCIENCE, 184 p.
- BEZPALOV, V.V., FEDYUNIN, D.V., LOCHAN, S.A. (2019a). Organisational mechanism of innovation-driven development of regional industrial complexes. *Managing economic systems: electronic scientific journal*, 2(120), 25.
- BEZPALOV, V.V., FEDYUNIN, D.V., SOLOPOVA, N.A., AVTONOMOVA, S.A., LOCHAN, S.A. (2019b). A model for managing the innovation-driven development of a regional industrial complex. *Entrepreneurship and Sustainability Issues*, 6(4), 1884-1896.
- BEZPALOV, V.V., ZHARIKOV, V.V., ERSHOVA, M.V. (2016). *Motivation of the development of an innovation economy in Russian regions*. *Innovation and Investment*, 2, 2-6.
- EFIMOVA, E.A., KOTILKO, V.V. (2014). *Modern innovation-driven development of the federal subjects of the Russian Federation*. *Modern Management Technology*, 6(42), 18-22.
- Federal Law No. 172-FZ. (June 28, 2014). "On Strategic Planning in the Russian Federation". Available: <http://publication.pravo.gov.ru/Document/View/0001201406300016> (accessed on 16.07.2019).
- FEDYUNIN, D.V., BEZPALOV, V.V., LOCHAN, S.A. (2019). Methodological support of innovation-driven development of regional industrial complexes. *Bulletin of the Altai Academy of Economics and Law*, 3-2, 178-186.
- GOKHBERG, L.M., DITKOVSKII, K.A., KUZNETSOVA, I.A., LUKINOVA, E.I., MARTYNOVA, S.V., RATAI, T.V., ROSOVETSKAYA, L.A., FRIDL'YANOVA, S.YU. (2019). *Indicators of innovation activities: 2019: statistical book*. Moscow: NRUHSE, 376 p.
- GRISHINA, I.V., POLYNEV, A.O., SHKUROPAT, A.V., KOTOV, A.V. (2018). *Strategy of the spatial development of Russia: methodological approaches to the formulation of the economic block*: monograph. Moscow: VAVT, 281 p.
- KLIMENKO, E.YU. (2015). *Management concept of innovation-driven development of a corporation partially owned by the government*: monograph. Moscow: KnoRus, 170 p.
- KOTILKO, V.V., VISHNYAKOVA, V.S. (2016a). *Methods of assessment of the infrastructure of innovative clusters*. *State Counsellor*, 1(13), 5-14.

KOTILKO, V.V., VISHNYAKOVA, V.S. (2016b). *On the aspects of monitoring the activities of innovative territorial clusters*. State Counsellor, 4(16), 51-59.

LIPINA, S.A., SMIRNOVA, O.O. (2017). *Innovations as a driver of a secure economic growth at the macro- and mesolevels of the national economic system*. Regional Economy. South of Russia, 4(18), 16-27.

LIPINA, S.A., ZAIKOV, K.S., LIPINA, A.V. (2017). Implementation of technology innovation as a factor of environmental modernisation in the Arctic regions of Russia. *Economic and Social Changes: Facts, Trends, Forecast*, 10(2), 164-180.

LOCHAN, S.A., FEDYUNIN, D.V. (2015). *Conceptual fundamentals of investment in the scientific and technological and organisational renovation of an industrial corporation*. Bulletin of the Academy, 4, 58-66.

LOCHAN, S.A., FEDYUNIN, D.V., BEZPALOV, V.V., PETROSYAN, D.S. (2015). Theoretical issues of the formation of the industrial policy of enterprises. *International Journal of Economics and Financial Issues*, 5(3S), 274-280.

LOCHAN, S.A., KLIMENKO, E.Yu. (2016). Advantages and drawbacks of managing innovation-driven development of corporations partially owned by the government. *Journal of Economy and entrepreneurship*, 2-1(67), 219-226.

The order of the Government of the Russian Federation No. 207-r. (February 13, 2019). “*On Approval of the Strategy of Spatial Development of the Russian Federation Until 2025*”. Available: <http://publication.pravo.gov.ru/Document/View/0001201902150042> (accessed on 16.07.2019).

SHICHKINA, M.I. GRISHINA, I.V. (2018). *Spatial development of Russia*. Economic strategies, 6(156), 58-61.