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Business mechanism of innovation-driven development of the agricultural market infrastructure

Abstract. The article presents a mechanism of innovation-driven development of the agricultural market infrastructure, consisting of 5 subsystems: innovation customers, innovation suppliers, innovation activity objects, innovation process support, innovation regulations. Regional public institutions promoting investment activity establish formal rules for ensuring innovative development. Research institutions as innovation suppliers create innovative products for their further introduction into objects of innovative activity (agricultural sector enterprises in our case). Appropriation of innovations and commercialization of inventions takes place with the help of investors and consumers who establish informal norms. The generated mechanism provides a range of positive effects from creation and use of innovations by each participant of the innovative system, which can be commercial, budgetary, social or ecological one.

Keywords: innovation-driven development; agricultural market; AIC; infrastructure; business mechanism; provision

JEL Classification: O13; O30; O38

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Організаційно-економічний механізм забезпечення інноваційного розвитку інфраструктури агропромислового ринку

Анотація. Актуальність теми дослідження обумовлена необхідністю застосування інноваційних розробок в якості конкурентної переваги суб'єктів агропромислового ринку. Мета наукової роботи полягає в обґрунтуванні теоретико-методологічних підходів і системи, практичних заходів, що забезпечують інноваційний розвиток інфраструктури агропромислового ринку. Проведене дослідження виявило, що процес інноваційного розвитку галузі забезпечують механізми ринкової конкуренції та активної державної політики у сфері фундаментальних наукових досліджень. У статті представлений організаційно-економічний механізм забезпечення інноваційного розвитку інфраструктури агропромислового ринку, що складається з 5 підсистем: замовники інновацій, постачальники інновацій, об'єкти інноваційної діяльності, обслуговування інноваційного процесу, правила забезпечення інновацій. Регіональні інститути влади, що стимулюють інвестиційну активність, встановлюють формальні правила забезпечення інноваційного розвитку. Постачальники інновацій – науково-дослідні організації – створюють інноваційні продукти з метою впровадження їх в об'єкти інноваційної діяльності – підприємства інфраструктури АПК. Процеси апробації інновацій і комерціалізації розробок відбуваються за активною участю інвесторів і споживачів, які формують неформальні норми. Розроблений механізм передбачає отримання корисного ефекту від створення й використання інновацій кожним учасником інноваційної системи, який може бути комерційним, бюджетним, соціальним або екологічним.

Ключові слова: інноваційний розвиток; агропромисловий ринок; АПК; інфраструктура; організаційно-економічний механізм; забезпечення.

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Организационно-экономический механизм обеспечения инновационного развития инфраструктуры агропроизводственного рынка

Аннотация. Актуальность темы исследования обусловлена необходимостью применения инновационных разработок в качестве конкурентного преимущества субъектов агропроизводственного рынка. Цель научной работы состоит в обосновании теоретико-методологических подходов и системы, практических мер, обеспечивающих инновационное развитие инфраструктуры агропроизводственного рынка. Проведенное исследование выявило, что процесс инновационного развития отрасли обеспечивают механизмы рыночной конкуренции и активной государственной политики в области фундаментальных научных исследований.

В статье представлен организационно-экономический механизм обеспечения инновационного развития инфраструктуры агропроизводственного рынка, состоящий из 5 подсистем: заказчики инноваций, поставщики инноваций, объекты инновационной деятельности, обслуживание инновационного процесса, правила обеспечения инноваций. Региональные институты власти, стимулирующие инвестиционную активность, устанавливают формальные правила обеспечения инновационного развития. Поставщики инноваций – научно-исследовательские организации – создают инновационные продукты с целью внедрения их в объекты инновационной деятельности – предприятия инфраструктуры АПК. Процессы апробации инноваций и коммерциализации разработок происходят при активном участии инвесторов и потребителей, формирующих неформальные нормы. Разработанный механизм предполагает получение полезного эффекта от создания и использования инноваций каждым участником инновационной системы, который может быть коммерческим, бюджетным, социальным или экологическим.

Ключевые слова: инновационное развитие; агропроизводственный рынок; АПК; инфраструктура; организационно-экономический механизм; обеспечение.

1. Introduction

In the context of global economic challenges and the transnationalization of capital by the Russian Federation government, the agrarians are faced with the difficult task of increasing the demand for and competitiveness of the domestic raw materials and foodstuff on the world markets. It is impossible to create a science-intensive and innovative product without large infusions in new technologies and advanced forms of industrial and administrative management.

The study of the state programs for the agriculture development and regulation of markets for agricultural products, raw materials and food until 2020 [1] showed the priority strategies for the social and economic development of agribusiness in the territory of the Russian Federation. Innovative technologies and approaches to managerial decision-making are the basis for the effective use of available resources, quality improving, reducing of prices for products and competitive standards establishing in production.

2. Brief Literature Review

There are various approaches and interpretations of the *innovation* concept in the economic literature. A significant contribution to the study of problems of innovative development of an enterprise was made by a lot of foreign and domestic scientists, such as J. Schumpeter (1934) [2], M. Porter (1998) [3], N. Kondratiev [4], A. Prigozhin [5].

The Austrian scientist Joseph Schumpeter was the first to write about innovation as entrepreneurship means of increasing profits in his «*Theory of Economic Development*» published in 1912.

In 1937-1941, Pitirim Sorokin (1941) [6] in his four-volume «*Social and Cultural Dynamics*» quantified innovative waves in the spheres of spiritual reproduction.

In 1954 in London John Bernal (1954) [7] published a fundamental monograph «*Science in History*» which determined the relationship of innovation with economic growth.

Arthur Schlesinger (1986) [8] in his «*Cycles of American History*» reported about the rhythm of fluctuations in innovation activity.

In 1975, Gerhard Mensch (1979) [9] published his fundamental work «*Technology: Innovations Overcome the Depression*», outlining the theory of innovation.

A. Capaldo, D. Lavie, and A. M. Petruzzelli (2014) in their work «*Knowledge Maturity and Scientific Value of Innovations. The Roles of Knowledge Distance and Adoption*» state that the scientific value of innovation directly depends on the time aspect and its interaction with technological and geographic distances [10].

S. Terjesen, and P. C. Patel (2015) in their research «*In Search of Process Innovations: The Role of Search Depth, Search Breadth, and the Industry Environment*» argue that technological innovations play a central role in improving the productivity of the firm and focus their studies on the processes and strategies of the search of innovations in technology [11].

Nicolai J. Foss, and T. Saebi (2016) in the paper «*Fifteen Years of Research on Business Model Innovation. How Far Have We Come, and Where Should We Go?*» note that the definition of innovative business models of the organisations is an uncertain construction for learning, because the lack of clarity of design makes it difficult to operationalise and measure. They also highlight the associated with such a situation problem of power distribution and antagonism of interests between the members of one organisation. The task of top executives they see in overcoming fault lines caused by the conflicts of interests [12].

N. Anderson, K. Potocnik, and J. Zhou (2014) in the work «*Innovation and Creativity in Organizations. A State-of-the-Science Review, Prospective Commentary, and Guiding Framework*» analyse a rapidly growing volume of research concerning innovation and creativity, focusing on the period of 2002-2013. Considering both creativity and innovation as integral parts of practically the same process, they offer a new integral definition of innovative-creative activity, as well as measuring characteristics of the phenomena being studied [13].

We share the opinion of the international community that scientific and technical breakthrough is a key feature of innovation.

3. Purpose

The conducted scientific research was focused on working out of business mechanism of innovation-driven development of the agricultural market infrastructure, which would reveal the specifics and demand for this segment of the market economy when analysed from the position of the system approach and institutional analysis. The main task of the above-mentioned mechanism is the identification of objects and subjects of innovation and investment processes taking place on the territory of the region and being financed by budget and extra-budgetary funds (investors) on terms of co-financing and self-financing.

4. Results

We consider business mechanism for ensuring innovation-driven development of the agricultural market infrastructure is a set of administrative and market regulators that ensure innovation-driven development and system interaction of the agricultural market entities.

Coordination and strategic development of any business entity, rational use of available resources and the introduction of innovative developments are ensured primarily by the mechanism of free market competition based on supply and demand for an innovative product. Consumers of agricultural products, raw materials and food vote with their wallets, thus stimulating the production of better and cheaper products, i.e. they establish *informal rules and norms*. As soon as the market does not provide social guarantees and equal conditions for running business, does not smooth out inflation or eliminate monopoly, the government should interfere,

acting rather as a catalyst accelerating and facilitating complex economic processes.

The institutional approach involved for generating business mechanism for ensuring innovation-driven development imposes studying the peculiarities of economic behaviour of the market entities from the point of view of social control and the political structure of society, i.e. relations influenced not only by the market, but also by the whole system of dominant interrelated institutions which establish formal game rules (laws, decrees, contracts, instructions) and informal norms of social behaviour [14-19].

The agricultural market shall be understood as the relations that arise between agricultural producers and enterprises of the first and third spheres of the agricultural sector in the process of exchanging various types of resources (financial, information, labour, tangible and intangible assets) on the basis of free and mutual agreement, equivalence and competitiveness.

The infrastructure of the agricultural market is the organizational and economic system of institutions ensuring the interconnection between the structural elements of the agricultural market, and creating conditions for the smooth functioning of market entities.

Figure 1 shows the regional institutional system for ensuring innovation-driven development of the agricultural market infrastructure, consisting of 5 subsystems: innovation customers, innovation suppliers, innovation activity objects, innovation process support, and innovation regulations. Let us analyse the essence and functioning mechanism of each subsystem.

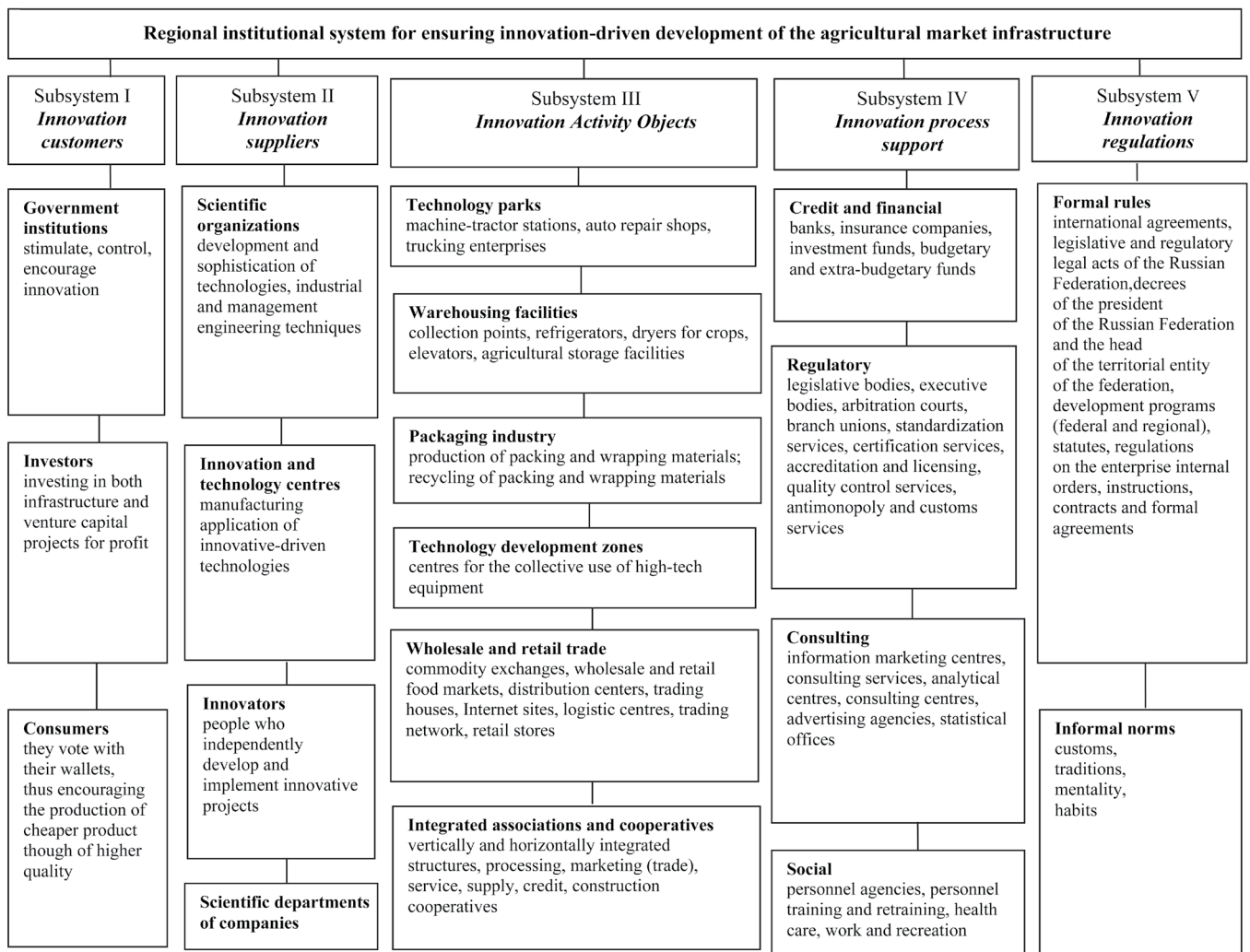


Fig. 1: Regional institutional system for ensuring innovation-driven development of the agricultural market infrastructure
Source: Original development by the authors

The subsystem I *Innovation Customers*. This subsystem comprises, first of all, government institutions striving to increase the competitiveness of domestic products, raw materials and foodstuff on the world markets. It also includes investors, i.e. financially interested legal or physical entities placing their own, borrowed or attracted funds for innovative projects in order to gain profit. Consumers are end users of innovative products.

The subsystem II *Innovation Suppliers*. Fundamental inventions made by research institutes are priority areas of state policy and, to a large extent, are realised under the state financial support. That is why, at the stage of scientific discovery or the birth of innovation, they are assessed based on their social significance. The commercialization of technological novelties results in capital consolidation: various forms of public-private partnership emerge. Applied scientific studies are carried out on the basis of innovation and technology centres, scientific departments of companies or by innovators. Such studies are financed, as a rule, through the profit gained from the sale of studies results [20-29].

The subsystem III *Innovation Activity Objects*. Agricultural market, represented by organizations producing means of production, agricultural producers, processing industry and infrastructure enterprises, is the investment object and the driving force of scientific and technological progress. Its infrastructure includes technology parks, warehousing facilities, packaging industry, centres for the collective use of high-tech equipment, wholesale and retail trade, integrated associations and cooperatives.

Government institutions (Subsystem I) finance fundamental scientific research, they stimulate, control, encourage innovations, i.e. establish *formal rules* (*Subsystem V Innovation Regulations*), which are implemented through the Subsystem IV *Innovation process support*, namely: credit and financial, regulatory, consulting, social [19; 21-23].

In their turn, investors and consumers (Subsystem I) when establishing customs, traditions, mentality and habits, do actively influence innovation rules (Subsystem V), establishing informal norms.

The number of organizations engaged in research and development for the years 2000-2016 on the territory of the Russian Federation, was about 4000 organizations (Table 1). Research institutions and educational institutions of higher education prevailed among others: 48% and 18% respectively for the period under study.

It is worth mentioning that out of 4,032 organizations participated in R&D in 2016 only 33 belonged to the branch of agriculture, and other 447 represented processing industry. Personnel engaged in R&D in the agricultural branch counted for

279 people, and in processing industry - 43,567 people out of 370,379 of professionals who worked on R&D in Russia in 2016 [31].

In the agrarian sector in 2016, the financial structure of expenses for research and development was as follows: internal current costs - RUB 673,777,000.2 (EUR 9,201,468.29), out of which fundamental research - RUB 1,307,000.5 (EUR 17,849.12); applied research - RUB 193,808,000.5 (EUR 193,808,000.5); developments - RUB 478,661,000.2 (EUR 6,536,857.17) [31].

In general, in 2010-2016 internal current costs on R&D in Russia amounted to 1.13-1.10% of GDP. There is a strong tendency on importing of developments to the country which affects innovation activity and its systems at all levels and in the different sectors of the economy. Thus, the deficit of the balance of technology export-import in Russia skyrocketed from USD 798.1 million in 2010 to USD 2,124 million in 2017 [32].

The internal costs for research and development in respect of funding sources cumulatively increased 12 times and amounted to RUB 943.8 billion in 2016, including the 43 times increase in funds of private non-profit organizations.

Thus, the basics of the mechanism of innovation-driven development are as follows (Figure 2):

- the principle of efficiency, implying the comparison of costs for development and innovation with the results obtained from introduction of those innovations. Provided that the achieved useful effect can be commercial, social, budgetary or ecological ones;
- the principle of control and stimulation, relying on government institutions that stimulate, control, encourage for the introduction of innovations (*formal rules*);
- the principle of feedback, ensuring the demand for innovations, their commercialization through the formation of consumer demand for innovative products (*informal rules*).

5. Conclusions

The change-over to an innovative course of development is influenced by market competition and an active state policy in the sphere of fundamental research and private sector of the economy involved in innovation processes. However, the global growth in production is enabled by the government in the process of creating institutional conditions that activate innovation activities in the region. Accelerating the process of introduction of science and technology achievements into all spheres of financial and economic activity; creating favourable investment climate by improving the regulatory framework, reforming credit and taxation systems; and developing a monitoring and control system are strategic factors for ensuring innovation-driven development of the agricultural market infrastructure in the region.

Tab. 1: Dynamics of organizations' participation in R&D and internal costs for research and development by funding sources in the Russian Federation

	2000	2010	2014	2015	2016	Ratio between the years 2016 and 2000, %
Total organizations	4099	3492	3604	4175	4032	98.4
including:						
research institutions	2686	1840	1689	1708	1673	62.3
design organizations	318	362	317	322	304	95.6
design and survey organizations	85	36	32	29	26	30.6
development plants	33	47	53	61	62	187.9
educational institutions of higher education	390	517	702	1040	979	251.0
production organizations containing research, design and development departments	284	238	275	371	363	127.8
others	303	452	536	644	625	206.3
Total costs for research and development in respect of funding sources, RUB billion	76.7	523.4	847.5	914.7	943.8	increased 12 times
including in respect of the following funding sources:						
public funds of different levels	41.2	360.3	569.1	617.3	622.3	increased 15 times
internal funds	6.9	47.4	99.7	109.9	129.1	increased 19 times
funds provided by organizations of higher education	0.1	0.1	1.8	2.3	1.6	increased 16 times
funds provided by business enterprises	14.3	85.9	145.8	150.9	154.9	increased 11 times
funds provided by foreign sources	9.1	18.6	21.0	24.2	25.4	increased 3 times
funds provided by private non-profit organizations	0.03	0.6	1.0	1.3	1.3	increased 43 times
Others	11.97	10.5	9.1	8.8	9.2	76.8

Source: Compiled by the author based on the official statistics [30]

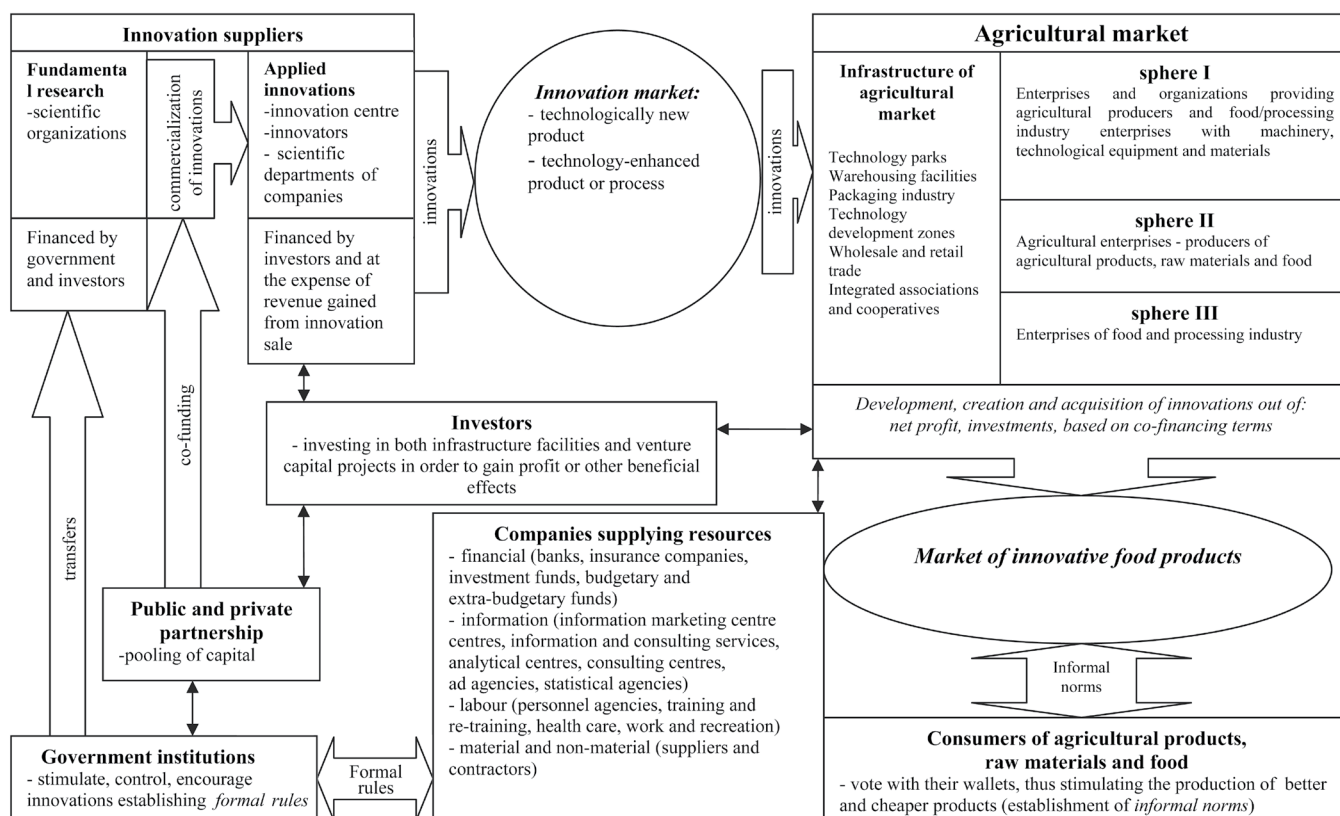


Fig. 2: Business mechanism of innovation-driven development of the agricultural market infrastructure
Source: Authors' original development

References

- Government of the Russian Federation (2017). *State-run program for agriculture development and regulation of markets for agricultural products, raw materials and food for the years 2013-2020*. Regulation No. 717 of 14 July 2012. Retrieved from http://www.consultant.ru/document/cons_doc_LAW_133795 (in Russ.).
- Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*. Cambridge: Mass (in German).
- Porter, M. E. (1998). *The Competitive Advantage of Nations: With a New Introduction*. Palgrave Tenth Edition. N.Y.: The Free Press.
- Kondratiev, N. D. (2002). *Major business cycle and theory of foresight*. Moscow: Ekonomika (in Russ.).
- Prigozhin, A. I. (1989). *Innovations: incentives and obstacles: social problems of innovation theory*. Moscow: Politizdat (in Russ.).
- Sorokin, P. A. (1941). *Social and Cultural Dynamics, IV*. N.Y.: American Book Company.
- Bernal, J. D. (1954). *Science in History*. London: Watts & Co.
- Schlesinger, A. M. Jr. (1986). *The Cycles of American History*. Boston, Mass.: Houghton Mifflin.
- Mensch, G. (1991). *Stalemate in technology: innovations overcome. The depression*. Cambridge: Ballinger.
- Capaldo, A., Lavie, D., & Petruzzelli, A. M. (2014). Knowledge Maturity and Scientific Value of Innovations. The Roles of Knowledge Distance and Adoption. *Journal of Management*, 43(2), 503-533. doi: <https://doi.org/10.1177/0149206314535442>
- Terjesen, S., & Patel, P. C. (2015). In Search of Process Innovations: The Role of Search Depth, Search Breadth, and the Industry Environment. *Journal of Management*, 43(5), 1421-1446. doi: <https://doi.org/10.1177/0149206315575710>
- Foss, N. J., & Saebi, T. (2016). Fifteen Years of Research on Business Model Innovation. How Far Have We Come, and Where Should We Go? *Journal of Management*, 43(1), 200-227. doi: <https://doi.org/10.1177/0149206316675927>
- Anderson, N., Potocnik, K., & Zhou, J. (2014). Innovation and Creativity in Organizations. A State-of-the-Science Review, Prospective Commentary, and Guiding Framework. *Journal of Management*, 40(5), 1297-1333. doi: <https://doi.org/10.1177/0149206314527128>
- Kouz, R. (1991). *Firm, market and law*. New-York: Teletext.
- Gritsenko, A. A. (Ed.). (2008). *Institutional architectonics and dynamics of economic transformations*. Monograph. Kharkiv: Fort (in Ukr.).
- Hayami, Y. (2002). Norms and Rationality in the Evolution of Economic Systems: a View from Asian Villages. *The Japanese Economic Review*, 49(1), 36-53. doi: <https://doi.org/10.1111/1468-5876.00070>
- Oleinik, A. N. (2011). *Power and market*. Moscow: ROSSPEN (in Russ.).
- Ryazanov, V. T. (1999). *Economic Development of Russia: Reforms and the Russian Economy in XIX-XX centuries*. Saint-Petersburg: Nauka (in Russ.).
- Pavlenko, I. V. (2018). Innovation-driven development of the agricultural sector infrastructure: administrative and economic aspects. *Economics of agricultural and processing enterprises*, 1, 35-38 (in Russ.).
- Yalyalieva, T. V., Nosov, V. V., Volkova, T. S., Tekueva, M. T., & Pavlenko, I. V. (2016). Issues of import substitution in the agro-industrial sector. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 7(6), 1620-1624. Retrieved from [https://www.rjpbcs.com/pdf/2016_7\(6\)/216.pdf](https://www.rjpbcs.com/pdf/2016_7(6)/216.pdf)
- Ukolova, N. V., Novikova, N. A., & Marakova, A. V. (2016). Directions of government regulation of sustainable development of rural territories. *Agrarian Scientific Journal*, 8, 82-89 (in Russ.).
- Adadimova, L. Yu., & Kosachev, A. M. (2014). Raising the Efficiency of Government Regulation of Agrarian Production According to WTO. *Niva Povolzhia*, 32(3), 107-115 (in Russ.).
- Kuznetsov, N., Iurkova, M., Shibaykin, V., Novikova, N., & Sadovnikova, N. (2016). Interaction and influence of investment process stimulating factors in agriculture on the main trends in the development of the agricultural sector in Russia. *Economic Annals-XXI*, 158(3-4), 26-30. doi: <https://doi.org/10.21003/ea.V158-06>
- Chandler, D., & Hwang, H. (2015). Learning From Learning Theory. A Model of Organizational Adoption Strategies at the Microfoundations of Institutional Theory. *Journal of Management*, 41(5), 1446-1476. doi: <https://doi.org/10.1177/0149206315572698>
- Galasso, A., & Schankerman, M. (2015). Patents and Cumulative Innovation: Causal Evidence from the Courts. *The Quarterly Journal of Economics*, 130(1), 317-369. doi: <https://doi.org/10.1093/qje/qju029>
- Heyden, M. L. M., Sidhu, J. S., & Volberda, H. W. (2015). The Conjoint Influence of Top and Middle Management Characteristics on Management Innovation. *Journal of Management*, 44(4), 1505-1529. doi: <https://doi.org/10.1177/0149206315614373>
- Kogan, L., Papanikolaou, D., Seru, A., & Stoffman, N. (2017). Technological Innovation, Resource Allocation, and Growth. *The Quarterly Journal of Economics*, 132(2), 665-712. doi: <https://doi.org/10.1093/qje/qjw040>
- Lee, J., & Kim, M. (2014). Market Driven Technological Innovation Through Acquisitions. The Moderating Effect of Firm Size. *Journal of Management*, 42(7), 1934-1963. doi: <https://doi.org/10.1177/0149206314535439>
- Yuan Jiang, & Chen Chao C. (2016). Integrating Knowledge Activities for Team Innovation: Effects of Transformational Leadership. *Journal of Management*, 44(5), 1819-1847. doi: <https://doi.org/10.1177/0149206316628641>
- Federal State Statistics Service (Rosstat) (2017). *Russian Statistical Yearbook 2017*. Retrieved from http://www.gks.ru/free_doc/doc_2017/year/year17.pdf (in Russ.).
- Higher School of Economics (2018). *Indicators of science 2018. A Statistical Collection*. Retrieved from https://www.hse.ru/data/2018/02/12/1162058327/Science_and_Technology_Indicators_2018.pdf (in Russ.).
- Federal State Statistics Service (Rosstat) (2018). *Target indicators for the implementation of the Strategy for Innovative Development of the Russian Federation for the period up to 2020*. Retrieved from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/science_and_innovations/science (in Russ.).

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