Influence of Institutional Factors on Innovations in Grain Production by the Agroindustrial Complex

Zhanna Mingaleva [1], Bektur Keneshbayev [2] and Gulmira Mombekova [2]

[1] Perm National Research Polytechnic University, 29, Komsomolsky Av., Perm, 614000, Russia
[2] International Kazakh-Turkish University named after H. A. Yasawi, 29, B.Sattarkhan Ave, Turkestan, 161200, Republic of Kazakhstan
d-song-ru@mail.ru

Abstract: The article provides the analysis of institutional factors affecting the implementation of innovations in agriculture. The factors such as the technological infrastructure of the economics, the institutional structure of the society, the current conditions of legislation on protection of intellectual property rights, and state innovation policy were identified and analyzed. The general ways of implementation of innovations in crop production were highlighted and conformity of institutions of innovative development of plant growing and grain production in Russia to the modern requirements of development has been assessed. A special emphasis was made on the analysis of the current legal protection of breeding and biotechnological developments in the field of seed growing and grain production. The problem of simplicity of the several ways of protection of intellectual property rights in the field of breeding related with the implementation of several basic methods to improve the seed material in grain production: improvement of seed breeding using standard selection (the so-called development of the sort – the varietal selection) and production of genetically modified (GM) seeds (by changes in a gene) in the legislation of Russia and other countries was analyzed. The study of existing standards in the protection of intellectual property rights in grain production and seed growing revealed the general problems of the innovative development of grain production in Russia.

[Mingaleva Zh., Bektur Keneshbayev and Gulmira Mombekova. **Influence of Institutional Factors on Innovations in Grain Production by the Agroindustrial Complex**. *Life Sci J* 2013;10(4):900-904]. (ISSN:1097-8135). http://www.lifesciencesite.com. 114

Keywords: innovation, institutional factors, intellectual property rights, intellectual property in the grain production industry.

1. Introduction

The successful development of grain production depends largely on the efficiency of the implementation of modern achievements of science, engineering, and technology. The general directions of implementation of innovations in plant growing include:

- implementation of modern and efficient agricultural machinery;
- creation of modern granaries and the implementation of innovative technologies of grain storage;
- the use of prospective technologies of farming including innovative technologies of melioration and irrigation; effective methods of processing of crops, soils, and other;
- creation of new biological and mineral fertilizers, and expansion of their implementation in plant-growing;
- improvement of plant protection including protection from pests, diseases and etc;
- implementation of resource-saving technologies in agriculture;
- development of seed production, creation of new seeds with higher yields and more resistant to disease, pests, adverse weather conditions (drought, high humidity, low temperatures etc) and other.

The speed, breadth, and complexity of implementation of innovations in agroindustrial complex largely depend on the institutional factors of their implementation, specific for each country.

2. Institutional factors of the modern innovative developmenT

The influence of institutional factors on the speed and scale of implementation of innovations has been investigated in the studies of Cimili, M. (2011), Dosi G. et all (2006), Merges R.P. (1995), Cooter R.D. (1997), Mingaleva Zh. (2009a, 2010, 2012) and a number of other researchers [1-7].

The general institutional factors of innovations in modern society are the technological infrastructure of the economics, the institutional structure of the society, the legislation on intellectual property rights, as well as the state policy in the field of innovations [8-11].

Foreign authors (Malecki, E.J., 2000) [12] define the technological infrastructure as scientific, engineering, and technological knowledge available to private industry. A main part of the technological infrastructure consist of innovative technologies

created by governmental research institutions and laboratories, which results are available for people, and intellectual property rights are strongly protected and freely transferred between sectors and single subjects of innovative activity [13].

The institutional structure ensures a sort of public and private institutions that promote the technological opportunities for firms and markets of new technologies. An efficient institutional structure in the industry arise the competitive advantages in the areas of production, where due to transparency and clarity of the rules (institutions), the manufacturers have a clear notion about demands of the customers in specific goods and solvent demand in various consumer products (private, state, and foreign) [14]. The institutional structure that supports technological changes and determining the potential of development and competitiveness of a particular economic sector is closely related with the national system of innovations as well as with the technology infrastructure.

Concerning of the state policy factor in the field of innovations, the role of the state is important in direct financial support of science and promotion of the persistent transition of knowledge and technologies from the science into the economics. According to some researchers, the government is responsible for the development of institutions and mechanisms to ensure the innovative development of the economics [15].

3. Legal support of innovations in agroindustrial complex related with grain production

Innovative development of material-technical basis of agroindustrial complex

Implementation of innovations in agroindustrial complex and agriculture including grain production is largely determined by a national system of protection of intellectual property rights in a country and specificity of the protected objects. However, there are significant differences.

Implementation of innovations and innovative technologies for the improvement of the material-technical basis of the agroindustrial complex including agricultural production is ensured by current legislation including the law on financial leasing [16]. Leasing allows producers to use the most modern machinery, even without sufficient funds for its acquisition. Therefore, leasing is widely used in agriculture for rent of tractors, harvesters, and other agricultural machinery.

Peculiarity of the market of leasing of agricultural machinery in Russia is the fact that this segment of the market was less affected by the crisis of 2008. This is explained by the fact that the main volume of leasing bargains in the sector of agricultural machinery (72% of total volume of bargains) was committed by Rosagroleasing Ltd., which operates within the state program to support the agricultural sector. Thus, Rosagroleasing Ltd. had no serious problems with financing in comparison with other leasing companies during the world economics crisis. This allowed the leasing of agricultural equipment in the required quantities to satisfy the demands of manufacturers.

The part of leasing bargains of agricultural machinery by the late 2000s was approximately 7-10% in the total volume of leasing services. In monetary terms, it was 22834,46 million rubles (6,27%) in 2008, 25323,43 million rubles (10.3%) in 2009, and 17297,35 million rubles (6,67%) in 2010 [17].

Numerous factories (including small factories) on milk processing and production of dairy products, meat processing, production of all kinds of canned food, juices etc. are also widely lease in Russia.

Thus, institutional factors, legislation, state policy, and technological infrastructure are favorable for implementation of innovations for the development of material-technical basis of the agroindustrial complex including the implementation of modern agricultural machinery, technologies for processing and storage of agricultural products, processing of soil and other. Different situation is observed in agricultural production, especially in plant growing.

Legislative regulation of innovations applied in plant growing

Plant growing is the economic sector, which includes agricultural production, science, and protection of intellectual property rights. Furthermore, Russian legislation does not regulate the breeding processes for receiving of new sorts or plant species. Rules of the law determine only the procedure and conditions for the implementation of selection achievements and protection of the intellectual property rights of the scientists-breeders. Selection legislation, thus, consists of civil and legal standards, and is a sub-sector of the civil legislation. Besides of the Civil Code of the Russian Federation in the field of breeding, some provisions of the Federal law approved on December 17, 1997, № 149-FZ “On seed production”, which establishes the legal framework of agricultural activities such as production, harvesting, processing, storage, sale, transportation, and implementation of seeds of agricultural and forest plants, as well as organization, and sort and seed control has been applied [18].

Legal provisions in the field of plant breeding appeal to protect rights of breeders and

ensure the purity and high productivity of new plant sorts. The general provisions on the protection of intellectual rights for selection achievements as well as implementation mechanisms of achievements in business are contained in the Civil Code of the Russian Federation (part 4, chapter 73) [19].

According to article 1412 of part 4 of the Civil Code of the Russian Federation, the plant sorts registered in the State register of protected achievements of breeding are the objects of intellectual rights for selection achievements. Moreover, the plant sort is a group of the plants, which is determined by the features specific for particular genotype and different from other groups of plants of the same botanical taxon by one or more features. A sort can include one or more plants or a part/several parts of a plant if this part or parts will be used for the reproduction of entire plants of a sort. Clone, line, first generation hybrid, and population are protected categories of plant sorts.

According to the Civil Code of Russian Federation, the eligibility criteria for protection of a selection achievement are a novelty, distinctness, uniformity, and stability. A measure of protection is a patent.

However, only a small part of selection achievements is legally protected in Russia by a patent. The exception are the deviations in the plant sorts obtained by individual breeding from the initial plant sort, selection of an induced mutant, back-crossing, and genetic engineering. Thus, the article 73 of the Russian Federation Civil Code does not cover the numerous breeding achievements including achievements of biotechnology and genetic engineering. This is inconsistent with international legislative practice.

In general, the plant breeding is a science modifying a genetic plant sample obtained to produce new sorts with new properties and the particular characteristics. These improvements and new desired properties can be obtained by different methods, the main of which for many centuries is the natural selection of plants with desirable features for their distribution - varietal selection. However, it was a long, routine, and unpredictable process, which improvement involved complex and expensive scientific researches. Recently, the plant breeding has been conducting by biotechnological and genetic engineering methods [20, 21].

Further development of plant growing included the wide transformation of the plants based on the implementation of biotechnological methods in two directions:

1) improvement of seed selection through the natural selection (the so-called creation of a sort – the varietal selection), but faster and more efficient method using a marker system;

2) creation of genetically modified (GM) seeds (by changes in genes).

According to international approaches, both of these methods correspond to all requirements for patenting, therefore a patent in this case is limited by the method, rather than the material selected for transformation. As a result, there are two elements in the seeds: first – obtained by common plant breeding method (“sort”) and second – obtained using biotechnological and genetic engineering methods (“genes”).

In present, the seeds are the particular goods with specific properties and factors that cannot be reproduced by other farmers or copied by plant breeders. This promoted the expansion of the patent protection of living organisms and stimulated the innovations in agriculture.

The United States were the first who used the patenting of living organisms by introduction of the changes in the patent protection of living organisms and greatly expanded the range of their legal protection. As a result, the United States are the world leaders in scientific, technical, and innovative activities in agriculture and food production for many years. Besides the United States, the five world top-leaders in agriculture are China, India, Brazil, and Japan [22].

In Russian Federation, the patenting of the living organisms is quite narrowed that significantly hinders the fast introduction of scientific results into production.

To overcome this negative factor and stimulate the introduction of agricultural innovations, the legislator anticipates the measures of compulsory registration of a license for an achievement of breeding (article 1421 of the CC RF, part 4). According to this article, if the patent owner refused to conclude a license agreement on the production or sale of seeds with a person within three years from the issue date of a patent for a selection achievement, then a person has the right to appeal in a court with the claim to the patent owner for the compulsory simple (nonexclusive) license for the use of the selection achievement on the territory of the Russian Federation. In the claims, this person should specify the conditions for granting him of the license including the range of implementation of a selection achievement, the size, order, and terms of payments. If the patent owner fails to prove that there are good reasons to prevent the provision of the right to the applicant to use the appropriate selection achievement, the court shall take a decision to grant the license and the conditions of its provision. The total amount of payments for this license is

established by the decision of the court, but not lower than the price of the license determined under comparable circumstances (according to paragraph 1 of article 1421 of the Civil Code of Russian Federation, part 4).

Analysis of foreign experience of stimulation of innovations in the plant growing has showed the expansion of methods of protection of intellectual property rights on living organisms (including the seeds) and their inclusion into the range of the objects for patenting promoted the significant increase of the attractiveness of plant growing as a kind of business, increase the profit from investments into the breeding studies as well as into the basic researches and development, ensure the strong protection of the obtained results and encourage the private investment into industry [23-28].

Collisions of legislation

The studies have shown that the expansion of patenting of the living organisms was entailed by the conflicts in the field of protection of living organisms, and the development of biotechnology derived new challenges for existing intellectual property regimes and changes in this area.

As already noted, there are two elements in genetically modified seeds, first of whose can be obtained by common breeding methods (sort), and the second - using biotechnological methods (genes). These two elements, - the components of genetically modified foods are protected by various intellectual property rights, which can be contradictive: a sort is protected breeder rights (PBR), and biotechnology assets by patent law.

In present, in terms of legal protection of results of scientific researches and developments in the plant growing, there are three basic components affecting the development of the whole sector.

1. The development and expansion of "commercialization" of the results of researches and development in plant breeding based on emergence of new laws allowing the private appropriation of the results of Research and Advanced Development in the breeding of living organisms based on the patent legislation.
2. The possibility of patenting of the living organisms has expanded the range of implementation of the patents and opened new opportunities for investments into the business and plant growing companies that has resulted in greater number of short stories in this area.
3. However, the presence of two parts in majority of the seeds and plants emerged because of the classical plant breeding and implementation of biotechnological methods (sorts and biotechnological assets), protected by different laws (the right of the breeder (PBR) and patent law) can result in legislative conflict.

4. Conclusions

The rise of agricultural production is largely determined by the successful implementation of scientific achievements.

There are favorable institutional factors for the implementation of innovations for the development of material-technical basis of agroindustrial complex in Russia.

The civil legislation and special laws in the seed production stipulate the possibilities of implementation of innovations in grain production.

The possibility of patenting of living organisms, in particular the seeds emerged as a result of the wide implementation of biotechnological and genetic engineering methods in agriculture, which provided the new opportunities for prospective development. Agriculture, traditionally considered as the production with the low technological capabilities and less attractive for numerous investors for a long time, affected by the new technological paradigm and development of patenting, has attracted the number of private investors into this economic sector. The possibility of changing of the plant breeding methods has essentially contributed to this process, which resulted in a change of knowledge base and organization of activities.

Acknowledgements:

This article is based on the results of the research made by Zh. Mingaleva as a team leader of research project of the Ministry of Education and Science of Russian Federation (project no. 6.6042.2011).

Corresponding Author:
Dr. Mingaleva, Perm National Research Polytechnic University, 29, Komsomolsky Av., Perm, 614000, Russia.
d-song-ru@mail.ru

References

1. Cimili, M., G. Dosi, R. Mazzoleni and B. Sampat, 2011. Innovation, technical change and patents in the development process: long term view. In New economics papers. Business, economic and financial history, 13: 1-29.
2. Cooter, R.D., J.S. Bhandari, and A.O. Sykes. 1997. Market modernization of law: Economic development through decentralized law. In Economic dimensions in international law: comparative and empirical perspectives, Cambridge University Press, pp: 276-278.
3. Dosi, G., L. Marengo and C. Pasquali, 2006. How Much Should Society Fuel the Greed of

Innovators? On the Relations between Appropriability, Opportunities and the Rates of Innovation. Research Policy, 35(8): 1110-1121.
4. Merges, R.P., 1995. Contracting into Liability Rules: Institutions Supporting Transactions in Intellectual property Rights. University of California at Berkeley School of Law.
5. Mingaleva, Zh., O. Gayfutdinova and E. Podgornova, 2009. Forming of Institutional Mechanism of Region's Innovative Development. World Academy of Science, Engineering and Technology, 58: 1041-1051.
6. Mingaleva, Zh. and I. Mirskikh, 2010. On Innovation and Knowledge Economy in Russia. World Academy of Science, Engineering and Technology, 66: 1032-1041.
7. Mingaleva, Zh., 2012. Structural Modernization of Economy and Innovation Development. World Applied Sciences Journal, 20 (9): 1313-1316
8. Mingaleva, Zh., 2010. Institutional Aspects of Economic Modernization. V Mire Nauchnykh Otkrytii, 3(3): 134-139.
9. Mingaleva, Zh., 2008. Reforming of the Institutional Structure as a Factor of Economic Development. Vestnik Permskogo Universieta, Ser. Politologiya, 1: 140.
10. Mingaleva, Zh., 2010. Formation of a Complex System of State Measures to Stimulate Innovation Activities in Russia. Nauchno-Tekhnicheskie Vedemosti St. Peterburgskogo Pedagog. Universiteta, 99: 12-19.
11. Mingaleva, Zh. and I. Mirskikh, 2009 The Problems of Legal Regulation of Intellectual Property Rights in Innovation Activities in Russia (Institutional Approach). World Academy of Science, Engineering and Technology, 29: 464-477.
12. Malecki, E.J., 2000. Technology & Economic Development: The Dynamics of Local, Regional and National Competitiveness. Longman.
13. Mingaleva, Zh. and I. Mirskikh, 2013. The Problems of Legal Regulation and Protection of Intellectual Property. /Procedia - Social and Behavioral Sciences, 81: 329-333.
14. Mingaleva, Zh. and K. Balkova, 2011. Problems of Innovative Economics: Forming of "Innovative Society" and Innovative Receptivity. World Academy of Science, Engineering and Technology, 59: 838-843.
15. Mindeli, L.E. and S.I. Chernykh, 2012. Russian Science: Present and Future. Innovatsii, 12 (170): 42-50.
16. Russian Federation Federal Law on October 29, 1998, no. 164-FZ "On Financial Leasing". Konsultant Plus Database.
17. Roslizing website. www.rosleasing.ru
18. Russian Federation Federal Law on December 17, 1997, no. 149-FZ "On Seed Production. Konsultant Plus Database.
19. Civil Code of the Russian Federation, Part 4. Konsultant Plus Database.
20. Busch, L., 2006. Seeds of Change: Intellectual Property Rights, Genetically Modified Soybeans and Seed Saving in the United States, Sociologia Ruralis, 46 (2): 122-138.
21. Kloppenburg, J., 2004. First the Seed. The Political Economy of Plant Biotechnology, 1492-2000. Madison: University of Wisconsin Press.
22. R&D Magazine. December 2010.
23. Campi, M., 2011. Innovation and intellectual property rights. The case of soybean seeds in Argentina and the U.S. In Creativity, Innovation and Economic Development. Buenos Aires, pp: 1-33.
24. López, A., H., Odagiri, A. Goto, A. Sunami and R. Nelson 2010. Innovation and IPR in a catch up-falling behind process: the Argentine case. In Intellectual property rights, development, and catch up. An international comparative study, Oxford: Oxford University Press.
25. Lowaars, N., H. Dons, G. van Overwalle, H. Raven, A. Arundel, D. Eaton and A. Nelis, 2009. Breeding Business. The Future of Plant Breeding in the Light of Developments in Patent Rights and Plant Breeder's Rights, Netherlands Ministry of Agriculture, Nature and Food Quality (LNV). Wageningen: Centre for Genetic Resources (CGN), Wageningen University and Research Centre.
26. Nogueira, A., L. Carlos, J. Kesan and A. Gallo, 2007. Intellectual property in the seed industry: a comparative analysis of Argentina, Brazil and the United States. www.isnie.org/assets/files/papers2007/nogueira.pdf.
27. Kesan, J. and A. Gallo, 2005. Property Rights and Incentives to Invest in Seed Varieties: Governmental Regulations in Argentina. Ag Bio Forum, 8 (2-3): 118-126.
28. UPOV, 1991. International Convention for the Protection of New Varieties of Plants, Act of 1991. Geneva: UPOV.

28/9/2013