Influence of the Commercialization of Innovations on Leadership Positions of the Agro-Industrial Sector

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Abstract. In the current highly competitive, dynamic and volatile context, an agro-industrial sector is able to operate successfully in the market and take leadership positions, to a large extent, due to the development and commercialization of innovations. The purpose of the article is to study the scientific and applied principles of the development of commercialization of innovations in the agro-industrial sector in Ukraine as a direction of support of its leadership positions in the world market of agro-industrial products. As a result of theoretical generalization and comparison of the views of leading scientists, the author’s approach to the determination of the essence of commercialization of innovations has been substantiated. By means of system analysis, the current situation of innovation activity in the agro-industrial sector and the current important tasks that are necessary to ensure the process of commercialization of innovations have been analyzed. On the basis of the use of strategic and structural-functional analysis methods, the forms and methods for the commercialization of innovations in the agro-industrial sector have been identified. The polycriterial model of the selection of the most optimal forms and methods of the commercialization of innovations in the agro-industrial sector have been developed, which is based on a number of criteria, such as: level of resource support; expected efficiency from the implementation of innovations; maintenance of control and responsibility center within the enterprise; availability of a professional outsourcing enterprise in the market that meets the requirements of the manufacturer of innovative products; availability of the center of responsibility; pooling of resources; focus on expanding market share; possibility of provision of consulting services; maintenance of the trademark. The necessity of improvement of the infrastructure of the scientific and educational sphere for the commercialization of innovations in the agro-industrial sector has been substantiated.

1 Introduction

In the current context, the agro-industrial sector faces the necessity of an increase in a range of products, improvement of the consumer parameters of products, technical and technological modernization, development of the control systems, search for innovative solutions to ensure leadership qualities, etc (Moskalenko and Yevsieieva, 2015; Zambon et al., 2019). Such transformations are aimed primarily at cost optimization, better meeting consumers' needs, stabilization of financial condition, formation of competitive advantages, and consolidation of market positions (Klasen et al., 2016). In such conditions, there is a need to implement effective commercialization of innovations in the agro-industrial sector on the basis of the use of the most effective forms and methods taking into account the needs for increasing the leadership positions in the market environment.

It should be noted that the opinion of Ukrainian scientists regarding the process of commercialization is similar. All authors support the idea that the main purpose of the commercialization process is to generate profits or other economic benefits. Furthermore, most scientists believe that commercialization is a set of certain actions and relationships in the process of transformation of scientific research into goods.

Many authors consider the commercialization process as a particular ecosystem, which is a market and includes a set of components involved in the process of commercialization (Gideon et al. 2008). McCoy et al. 2010) agree that the process of commercialization is a process of making of decisions and appropriate actions for the transformation of an innovative product from an idea to the market (McCoy 2010). The authors point out that the process of commercialization often concerns the development of a new product, but not its expansion.

In the context of innovation activity of scientific and educational institutions, Pushkarenko (2004) treats commercialization as a modernization of the results of research work in relation to a particular consumer in order
to bring them to the market. The author states that the creation of innovations does not necessarily involve the receipt of a commercial product at once. This requires the involvement of a third party professionally engaged in the commercialization of innovations (Pushkarenko 2004).

We have distinguished three contradictions regarding the views on the commercialization process and its economic affiliation. The first contradiction is that the purpose of the commercialization is to sale innovations, but not to create innovations demanded by the market. As a result, we can see a secondary importance of demand for innovation in accordance with its proposal. The second contradiction is that commercialization does not have a significant impact on the development of a market economy because it is mainly at the micro level. The third contradiction is that commercialization is regarded as a static process, but it is a dynamic one (Gryshova et al. 2017a).

Multidimensionality of this category requires the conduct of multidisciplinary research, the integration of different scientific approaches. It has been proposed to consider the commercialization of innovations in the agro-industrial sector as a process of introducing them to the market in order to obtain socio-economic benefits and to strengthen leadership positions.

2 Materials and methods of research

In the course of the research, general scientific and special research methods have been used, in particular: theoretical generalization, comparison and morphological analysis – in the process of formation of the conceptual-categorical apparatus of research; system analysis – for identification of opportunities and justification of the results of the functioning of the agro-industrial sector of Ukraine which take leadership positions in the commercialization of innovation; strategic and structural-functional analysis – for formation of conceptual principles for construction of the components of the model for the selection of the methods for commercialization of innovations in the agro-industrial sector.

3 Results and discussions

The high level of innovation activity of the agro-industrial enterprises creates the preconditions for forming new competitive advantages, increasing investment attractiveness, expanding opportunities for entering new markets, is an impetus for ensuring progressive development and leadership. The commercialization of innovations in the agro-industrial sector is a mechanism for turning the results of the intellectual sphere into market products. A large number of both fundamental and applied discoveries remain at the stage of development. The reasons for this situation can be not only lack of funds, but also inability to make commercialization of innovation, technology or ideas properly. Consequently, the significance and necessity of the commercialization process are evident. The realities of the Ukrainian economy are characterized by the uncompromising need to increase the role of innovations as a key factor for the leadership of the agro-industrial sector in the competitive struggle.

Despite the inevitability of the processes of increasing the dependence of success of the agricultural producers from the innovation of agribusiness, in practice, the pace of production and introduction of innovation remain low in the domestic agro-industrial sector. Compared to 1995, the number of innovative enterprises in the industry declined by 63%. Thus, in 2016, 735 enterprises carried out innovation activities in the agro-industrial sector (Table 1), which was 16.6% of the total number of industrial enterprises in Ukraine and 20.8% of the total number of enterprises that carried out innovative activities. Among them, most enterprises were engaged in such types of innovation activities as the purchase of machinery, equipment, and software (61.1% of the total number of innovative enterprises engaged in the production of food products); personnel training (24.4%); other works (5.5%) (Ministry of Agrarian Policy and Food of Ukraine 2018).

Despite the tangible, at first glance, increase in the number of names of innovative products introduced by the enterprises in the field of food products, beverages and tobacco products, the share of such products in the total volume of industrial innovative products decreased. In addition, in 2017, new machinery, equipment, apparatus, and devices did not exceed 3.6% of the total volume of innovative products. Furthermore, they were not fundamentally new one for the market at all, which is unacceptable, given the state of deterioration of agricultural machinery in Ukraine (State Service of Statistics of Ukraine 2019).

Innovative activity in the field of distribution of agro products is even lower than directly in the field of agrarian production. During 2010-2017, the number of agro-industrial enterprises that sold innovative products and their share in the total number of all industrial enterprises decreased. Similarly, the number of enterprises that sold innovative products outside Ukraine and the volumes of such products went down. At the same time, as of 2017, only 15.9% of enterprises in the field of production of food products, beverages and tobacco products sold innovative products that were new to the specific market, the remaining 84.1% of products were new exclusively for the enterprise.
Another enterprise (for instance, for commercialization in the domestic and foreign markets). That the enterprise producing innovative products can partially make commercialization by itself, partly through another enterprise that will carry out the process of commercialization professionally. A combined form provides case of reluctance or impossibility of the enterprise to make commercialization independently, it can involve the enterprise needs to attract resources from external sources (investors, sponsors, lenders, the state, etc.). In Under self-commercialization, an enterprise does not always have all the necessary resource support. In this case, carried out independently by an enterprise producing innovative products, outsourcing, and its combination.

To implement the commercialization of innovations in the agro-industrial sector, it is necessary to have information about all its possible forms and methods. Based on the analysis of available resources and the set of goals in innovation activities, the agro-industrial enterprise chooses an optimal form and method of commercialization of innovations. In case of successful selection, the maximum benefit is obtained for the functioning and development of the agro-industrial sector.

The forms of commercialization of innovations in the agro-industrial sector can be commercialization carried out independently by an enterprise producing innovative products, outsourcing, and its combination. Under self-commercialization, an enterprise does not always have all the necessary resource support. In this case, the enterprise needs to attract resources from external sources (investors, sponsors, lenders, the state, etc.). In case of reluctance or impossibility of the enterprise to make commercialization independently, it can involve another enterprise that will carry out the process of commercialization professionally. A combined form provides that the enterprise producing innovative products can partially make commercialization by itself, partly through another enterprise (for instance, for commercialization in the domestic and foreign markets).

However, in order to make commercialization of innovation successfully in accordance with the goals and opportunities of the agro-industrial sector, it is necessary to choose the best form and methods. The form of self-realization of the commercialization of innovative products provides the following methods: use at the enterprise, establishment of a subsidiary and sale of a patent. In this form, these methods are most rational, because the enterprise is expedient and realistic to carry out all of the above-mentioned on its own.

In the framework of the outsourcing commercialization form, it is possible to select a method with a complete commercialization cycle and an incomplete commercialization cycle. The difference in these methods is the number of enterprises involved in commercialization. If one external enterprise can provide all stages of commercialization and the developer satisfies the quality of the services provided, the external enterprise uses

Table 1. Perspectives and results of commercialization of innovations in the agro-industrial sector of Ukraine

<table>
<thead>
<tr>
<th>Years</th>
<th>Agro-industrial enterprises that introduced innovations, units</th>
<th>Share of agro-industrial enterprises that introduced innovations, %</th>
<th>Share of sold innovative products in the volume of industrial products, %</th>
<th>Developed innovative types of products, units</th>
<th>Introduction of new technological processes, units</th>
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<tr>
<td>1995</td>
<td>2002</td>
<td>22.9</td>
<td>-</td>
<td>11472</td>
<td>2936</td>
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<tr>
<td>2000</td>
<td>1491</td>
<td>14.8</td>
<td>-</td>
<td>15323</td>
<td>1403</td>
</tr>
<tr>
<td>2001</td>
<td>1503</td>
<td>14.3</td>
<td>6.8</td>
<td>19484</td>
<td>1421</td>
</tr>
<tr>
<td>2002</td>
<td>1506</td>
<td>14.6</td>
<td>7.0</td>
<td>22847</td>
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<tr>
<td>2003</td>
<td>1120</td>
<td>11.5</td>
<td>5.6</td>
<td>7416</td>
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<td>2004</td>
<td>958</td>
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<td>5.8</td>
<td>3977</td>
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<td>810</td>
<td>8.2</td>
<td>6.5</td>
<td>3152</td>
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<tr>
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<td>999</td>
<td>10.0</td>
<td>6.7</td>
<td>2408</td>
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<td>11.5</td>
<td>6.7</td>
<td>2526</td>
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<tr>
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<td>2408</td>
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<td>1.4</td>
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<td>735</td>
<td>16.6</td>
<td>-</td>
<td>4139</td>
<td>3489</td>
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<tr>
<td>2017</td>
<td>-</td>
<td>14.3</td>
<td>-</td>
<td>2387</td>
<td>1831</td>
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</table>

Source: Own results
the complete cycle commercialization method. In case the developer wants to choose different providers of commercialization for different stages, then the incomplete commercialization cycle method is used (Strielkowski et al. 2016).

We have proposed the polycriterial model of the selection of the methods of the commercialization of innovations in the agro-industrial sector, which is based on a number of criteria, such as: possibility of full resource support; expected efficiency from the implementation of innovations; maintenance of control and responsibility center within the enterprise; availability of a professional outsourcing enterprise in the market that meets the requirements of the manufacturer of innovative products; availability of the center of responsibility, pooling of resources; focus on expanding market share; possibility of provision of consulting services; maintenance of the trademark (Figure 1).

![Polycriterial model of the selection of commercialization methods for innovations in the agro-industrial sector](image)

**Stage I. Identification of the possibilities for resource support for agro-industrial sector**

- **Possibility of full resource support**
  - Yes
  - Independently by the enterprise that produces innovations
  - Outsourcing
  - Combined

**Stage II. Selection of the form of commercialization**

- **Independently by the enterprise that produces innovations**
- **Outsourcing**
- **Combined**

**Stage III. Selection of the methods of commercialization**

- **Sale of a patent**
  - Yes
  - No
- **Complete cycle commercialization method**
  - Yes
  - No
- **Incomplete cycle commercialization method**
  - Yes
  - No

**Expected efficiency from the implementation of innovations**

- Yes
- No

**Maintenance of control and responsibility center**

- Yes
- No

**Sale of innovative products on the market**

- Yes
- No

**Establishment of a subsidiary**

- Yes
- No

**Maintenance of the trademark**

- Yes
- No

**Licensing**

- Yes
- No

**Franchising**

- Yes
- No

**Engineering**

- Yes
- No

**Leasing**

- Yes
- No

**Joint venture**

- Yes
- No

**Industrial co-operation**

- Yes
- No

**Pooling of resources**

- Yes
- No

**Focus on expanding market share**

- Yes
- No

**Possibility of providing consulting services**

- Yes
- No

Fig. 1 Polycriterial model of the selection of commercialization methods for innovations in the agro-industrial sector

Source: Own results

Despite the objective demand for innovations in the real sector of agrarian economy, justified by the dynamic development of world agrarian markets, increase in demand for high-quality agrarian products and, at
the same time, catastrophic rates of degradation of domestic assets of material resources, processes of commercialization of innovations by the agro-industrial enterprises are mainly “preserved” in a primitive state.

In agriculture and agro-industries, activities that only with a certain degree of conventionality can be attributed to innovation (acquisition of new machines and equipment, marketing research, training of personnel) are prevalent. There are serious problems in establishing an effective interaction of the entrepreneurial sector with the branch, academic and university sectors of agrarian science, which require a more detailed study. The commercialization of innovations in the agro-industrial sector is not possible without the existence of a powerful source of new ideas and technologies for agribusiness. In the developed countries, the scientific and educational institutions that are generators of ideas and applied developments for enterprises of the real economy are the basis of the national innovation systems. The integration of Ukraine into the European political, social and economic space and the consolidation of the leading exporter's position in the world food markets sharply update the need for the development of the domestic system of agrarian education and support of scientific research in order to provide the agrarian sector with modern innovative technologies and competitive staff (Mazur 2013; Gryshova et al. 2017b).

That is, the commercialization of innovations is an effective mechanism for interaction between institutions of higher education, scientific and research, project and research enterprises, individual scientists interested in the practical application of their scientific developments and projects both on the territory of Ukraine and abroad. The selection of potential customers (partners) of the commercialization of innovations is based on the analysis of information from various sources: specialized databases, publications, booklets, advertising materials, evaluations of authoritative experts, etc. Particular importance for the successful promotion of innovation is the availability of a database for relevant relations and support for developers’ research results from the state (Kholiavko 2018).

The Ministry of Education and Science of Ukraine as an authorized central body of executive power in the field of technology transfer and the Academy of Technological Sciences of Ukraine signed an Agreement on Cooperation in the field of Technology Transfer in 2018. During the duration of this Treaty, the Academy developed the conceptual foundations and methodological principles for the establishment of the National Technology Transfer Network, which were the basis for the functioning and operational model of the pilot project - the Ukrainian Technology Transfer Network (UTTN) and its segments.

The technology transfer network existing in Ukraine, in the name of their coordinators or networks, created on the initiative of the national coordinator or the subjects of innovation activity, can join the national technology transfer network on the rights of its segment. To join the national technology transfer network, a potential participant applies to the national coordinator and establishes a contractual relationship with him. The participants of the national network are required to be certified for compliance with the network requirements in accordance with the Regulation, which is approved by the national coordinator.

To ensure the efficiency of the commercialization of innovations generated by the scientific and educational sector, we propose to establish appropriate centers of commercialization, as an organization or a structural unit which activities are aimed at generating revenue from the use of innovations. The main mission of the Center is determination of the feasibility of the commercialization of innovations, assistance in the formulation of rights to selected innovations for commercialization, conclusion of license agreements for transfer of property rights, promotion of establishment of start-up companies, fair distribution of royalties between authors of research results, the units in which they work, the scientific and educational institutions. The partners of the Center can be the research sectors of higher education institutions, industrial parks, and science parks, as well as startup companies and structural units related to the commercialization of innovations. Potential licensees, created startups, small business representatives, etc. can be potential customers. Science parks and industrial parks related to a higher education institution, patent-licensing departments, and research sectors can be both partners and competitors.

4 Conclusions

Overall, it becomes clear that the new ideas and developments that can be turned into innovations and their successful commercialization increasingly determine the competitiveness and leadership of the agro-industrial sector in the world. As practice shows, only a small part of innovation is transformed into innovative products and is successfully commercialized through its promotion to interested consumer groups. The polycriterial model of the selection of commercialization methods for innovations in the agro-industrial sector, which is based on a combination of factors, has been formed. The main criteria by which the agro-industrial enterprise determines for itself the most optimal way of the commercialization of innovations is profitability, risk of this process, level of monopoly, needed for resource support, distribution of powers, control, responsibility, time savings, maximum impact of external factors and others.

Therefore, taking into account the peculiarities of the functioning of the model of the organization of the scientific and educational process, and market economy, the activity of complex centers, which together with the
transfer of technologies, would deal with issues that cover the entire commercialization process (from the formation of an innovative idea to its promotion to the market: development of the strategies for using innovations, acquiring rights to research results, other issues of the life cycle of innovative products) will be relevant for Ukraine. One of the effective models for the commercialization of innovations in the agro-industrial sector can be start-up or spin-off companies created on the basis of the scientific and educational sector. Their main task is to bring innovations to a state suitable for use in industry. Among the promising directions of the development of the commercialization of innovations is the formation of commercialization centers, which are a newly created organization or a structural unit in the scientific and educational institutions, which activity is focused on getting income from the use of innovations in the agro-industrial sector.

References


