

Olga IERMAKOVA

Institute of Market and Economic & Ecological Researches of the National Academy of Sciences of Ukraine
impeer@ukr.net

INNOVATION VALUE CHAINS IN THE AGRICULTURAL SECTOR

ABSTRACT

The paper presents the research on the formation of innovation value chains in the agricultural sector illustrated by the example of the cluster for processing the recycled resources of winemaking in the Odessa region. The vision of the process of transforming ideas into commercial outputs as an integrated flow was taken as a methodical basis of the research. This process, which includes generation, conversion, diffusion of innovations, is illustrated in the paper by the example of the Ukrainian-Moldavian cross-border production-scientific-educational cluster for processing of winemaking by-products. The sequence of implementation of innovative solutions within the cluster is revealed. On the basis of the provided research, the institutional preconditions for the development of innovation value chains are proposed.

Key words: innovation, value chain, agricultural sector, cluster, winemaking by-products, social capital.

JEL Classification: Q16, O31, R11.

1. INTRODUCTION

The agricultural sector is very promising for innovation implementation. The role of agriculture sector has increased significantly in recent years due to the food security problem at global scale. Innovations drive the sector into intensive development instead of extensive. Countries with significant agricultural potential, like Switzerland, increase their competitiveness by innovation implementation and become world leaders in the agriculture sector. For Ukraine, with its significant agricultural potential and traditions, such experience is very useful. Thus, the paper proposes mechanisms for innovation increase in the agricultural sector through the development of innovation value chains. As an example in the paper, the cluster for processing winemaking by-products was chosen as a promising direction for the wasteless approach.

2. STATE OF KNOWLEDGE

The concept of transforming ideas into commercial outputs as an integrated flow, which was taken as a methodical basis of this research, was described in the Harvard Business Review (Hansen & Birkinshaw, 2007). The authors made a parallel with Michael Porter's value chain for transforming raw materials into finished goods (Porter, 2008). The concept of the European Innovation Partnership is defined in the regulatory documents of the European Commission (EU, 2014, 2015). The publications of scientists from different schools actively address methodological issues of evaluating the effectiveness of innovation partnerships, identifying external and internal factors influencing the effectiveness of European innovation partnerships (Maziliauskas A., Baranauskiene J., Pakeltiene R., 2018, 2020), the impact of innovation partnerships on the development of innovation in the EU (Dobrinsky R., 2019), the practical application of the European Innovation Partnerships (Lizana FG, 2013; Poppe K., 2014). Research confirms the effectiveness of the European Innovation Partnerships in intensifying innovation and increasing its effectiveness in the EU. Description of the Ukrainian-Moldavian cross-border production-scientific-educational cluster for processing of winemaking by-products is based on the author's project implementation experience within the Eastern Partnership Territorial Cooperation (Osypov *et al.*, 2018).

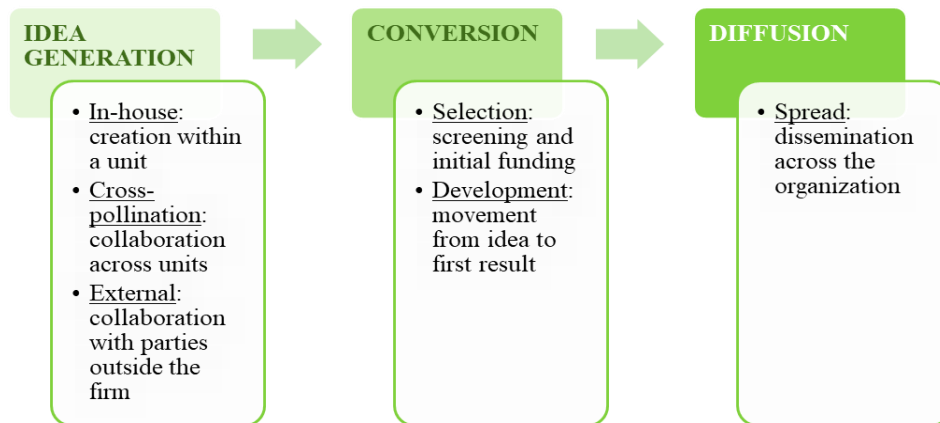
3. MATERIAL AND METHOD

The research is based on concepts of innovation value chain, innovation system, social capital, glocalization, cluster, innovation partnership. The idea of the research is to make a bridge between theoretical concepts and their practical implementation. For this purpose, methods of analysis and synthesis, theoretical generalization, system analysis and comparative analysis were used.

4. RESULTS AND DISCUSSIONS

The managerial theory, proposed by (Hansen & Birkinshaw, 2007), represents the process of transforming ideas into commercial outputs as an integrated flow (Figure 1).

The first phase "generation" is to generate ideas; this can happen inside a unit, across units in a company, or outside the firm. The second phase "conversion" is to convert ideas, or, more specifically, select ideas for funding and developing them into products or practices. The third phase "diffusion" is to diffuse those products and practices.



Source: Hansen & Birkinshaw, 2007

Figure 1. Innovation value chain at enterprise level.

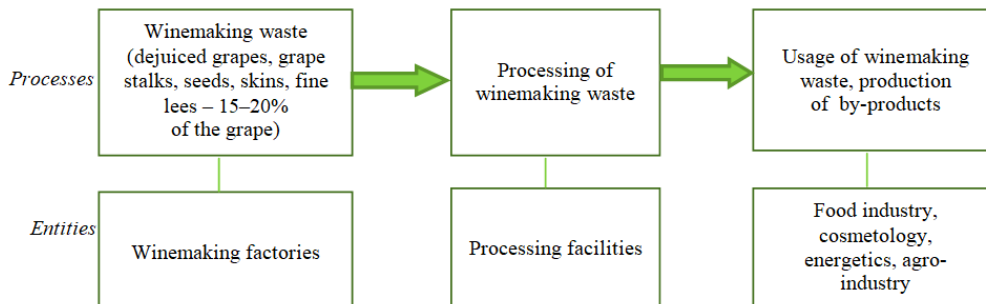
In order to analyze how this theory works in practice let us call wasteless approach in the winemaking industry. The new economic model is based on the recovery industrial system, in which waste is used in production. According to the World Economic Forum, the circular economy includes opportunities for economic growth, the potential for innovation development and job creation. The economic benefits of moving to this new business model are estimated at more than \$ 1 trillion by materials alone (World Economic Forum, 2014).

The basis of wasteless production is the transformation of non-profit values into capital, i.e. capitalization, but the priorities of sustainable development and green economy are considered. The introduction of low- and wasteless production is considered as a strategic direction for the rational use of limited natural resources and environmental protection in the concepts of sustainable development and green economy. Creation and development of wasteless production leads to stabilization and improvement of the quality of the environment due to more rational use of the whole complex of natural resources under the conditions of balanced socio-economic development.

The problem of secondary use of resources is relevant for the wine industry, as this industry generates a significant number of recyclable waste – about 15–20% of gross grape harvest, the rational usage of which can bring additional products with a significant value for a number of sectors of national economy. Today, most of the secondary raw materials of winemaking in Ukraine are not used for further processing. According to experts, the profitability of winemaking by-products is high: grape oil – 25.58%, tartaric acid – 33.33%, tannin – 32.13%, vitamin B – 70%; polyphenol concentrates, low-alcohol and non-alcoholic beverages, bioactive food-based products – more than 100%. At the same time, more than 90% of Ukrainian enterprises' demand of tartaric acid is covered by imports. Analytical studies demonstrate a stable growing demand for these goods. Other economic results will

be new workplaces, implementation of the principles of sustainable growth and green economy, wasteless production, import substitution.

Added value creation within the processing of recycled resources of winemaking is shown in Figure 2.

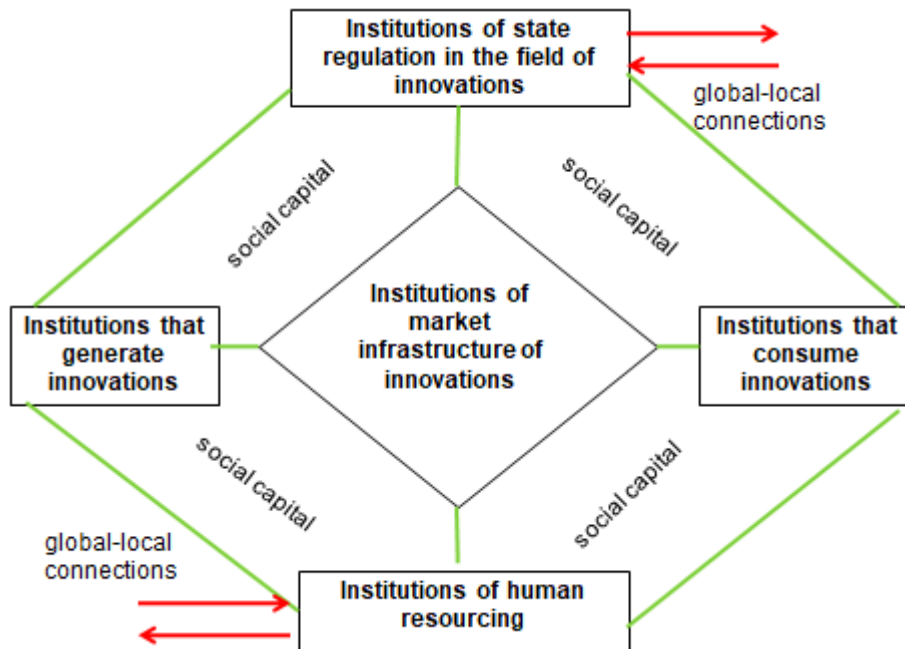


Source: Developed by the author

Figure 2. Added value creation in the processing of recycled resources of winemaking.

In order to provide a system approach to the above-mentioned problem, the cluster concept was introduced. The concept of cluster is used in many fields of knowledge, and although the interpretation of this concept is different, the essence remains the same: *cluster* is a combination of several homogeneous elements (in the case of an economic cluster – a combination of business, science and education and government), which can be considered as an independent unit with its inherent certain features. By nature, clusters are an organizational innovation – each cluster is a unique management system with a unique combination of resources.

An important advantage of the cluster is the synergistic effect of the diffusion of innovations. Innovative synergy is the result of joint use of production capacity, distribution of research and development costs, joint use of high-tech equipment, etc. Technology exchange significantly increases the overall competitiveness of the cluster, since new ideas, business processes, technologies become available in the cluster for all enterprises, which, in turn, seek to implement and improve knowledge gained, thereby creating new competitive advantages. The introduction of innovations and dissemination of information in the enterprises of the cluster determines the accelerated innovative development of the region, the realization of its innovative and scientific potential and, what is important, the strengthening of the practical significance of scientific research and education. Research and development of scientific and educational institutions included in the cluster are put into practice in the enterprises of the cluster, which is made possible by the joint funding of scientific research within the cluster. Considering innovativeness of the cluster for processing of winemaking by-products, its structure should be based on institutions of the innovation system (Figure 3).



Source: Developed by the author

Figure 3. Innovative cluster participants.

Innovative cluster participants, according to their functions in the system, can be classified into four groups: institutions of state regulation in the field of innovation (regulatory institutions, institutions for financial incentives of innovations, institutions of non-financial stimulation of innovations); institutions of generation and consumption of innovations (subjects of demand and supply of innovations); institutions of market infrastructure of innovations (financial institutions, industrial-technological and information institutions, market of innovations); institutions of human and social capital, that represent links between all elements of the innovation system.

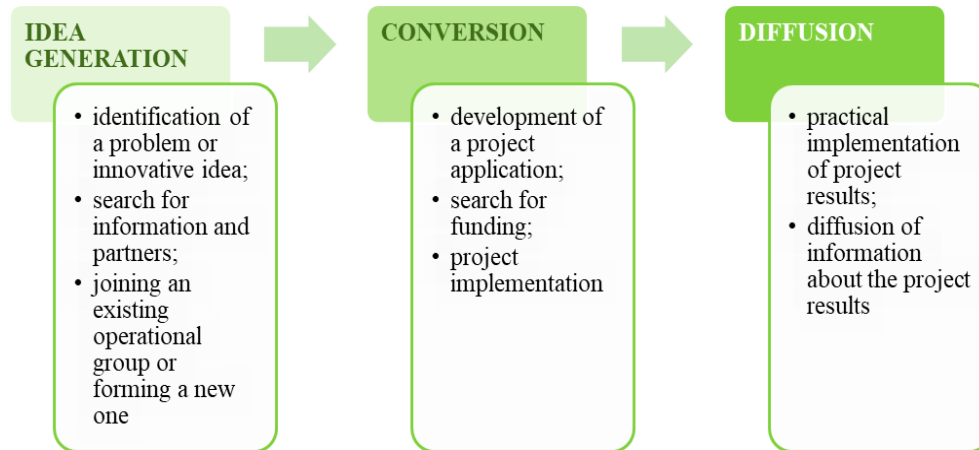
Social capital is a resource embodied in interpersonal relationships based on trust and cooperation between individuals, which enhances the innovative capacity of actors of innovation through synergy and collective learning. The significance of social capital for the economic development of the country and its regions is to obtain an economic return from social relations in a society united by a national idea and common goals, capable of various forms of development-oriented self-organization, the domination of spirituality and human dignity, mitigation of social injustice and the trust-based interaction of all sectors of society, in particular authority, business, science and community. The accumulation of social capital manifests itself in the growth of social interaction in society. A society with a low level of trust and lack of social capital is not capable of innovation.

The role of clusters is growing in the context of increasing glocalization processes (Iermakova *et al.*, 2019). The main principles of glocalization are the priority of national / local interests and focus on local (endogenous) resources, considering global trends, using local specifics as a competitive advantage when integrating into global networks of added value creation. Clusters are able to mobilize endogenous resources and optimally combine them in the process of creating a competitive product.

The Ukrainian-Moldavian cross-border production-scientific-educational cluster for processing of winemaking by-products, which was created within the European Union grant program EaPTC – Eastern Partnership Territorial Cooperation in 2018–2019, gave the following effects: 1) technological: experience of engineering and use of the equipment set (separator, crusher, dryer) for processing of recycling resources of winemaking within the cross-border cluster, cheaper than foreign analogues equipment, its local production will develop the internal market and will substitute import; 2) scientific: technologies were practically implemented and tested; 3) educational: students received a practical experience; 4) communicational: on the basis of the technological test sites a social capital (capital of communication) was created among cluster stakeholders and target groups that is necessary for the further sustainability of the project results and cluster functioning and capitalization; 5) demonstrative: the created technological test site on the basis of the Cluster “Frumushika-Nova” includes basic equipment, that is an alive model of cross-border cluster for processing of recycled resources of winemaking, on which economic and organizational mechanisms for stakeholders collaboration will be elaborated and transferred all around partner countries.

The technological test site with equipment for the processing of recycled resources of winemaking within the Ukrainian-Moldavian cross-border production-scientific-educational cluster for processing of winemaking by-products was set up on the basis of the agro-ecological and recreational cluster “Frumushika-Nova”, which is located in Veselodolinska Village in Tarutinsky District of Odessa Region. The Cluster has an optimal geographical location, suitable for cross-border communication and is a territorial centrum for the four local winemaking factories, suitable for logistics tasks “resources – processing”. It has all the initial infrastructure for practical implementation of the cluster concept: winemaking factory (provides recycled resources of winemaking); equipment prototypes (initial experience in processing of recycled resources from winemaking); business net with processing factory in the Odessa region – the Odessa Kernel Oils Factory (it was already the test delivery of the processed recycled resources of winemaking from the “Frumushika-Nova” on the Factory for further processing into oil); consuming facilities for innovative products, produced from recycled resources of winemaking (restaurants, tourism objects, agro-industrial objects, energy pellets).

Within a cluster, the innovation value chain is transforming in the following way (Figure 4):



Source: Developed by the author

Figure 4. Innovation value chain within a cluster project.

The practice of cluster formation has revealed the following directions for improvement in the Ukrainian institutional environment for innovation development:

a) Idea generation: functioning of national platforms for innovation partnerships in priority areas; formation of the institute of innovative brokers; creation of permanent consulting / brokerage services in the field of innovation.

b) Conversion: training, getting experience of participation in grant projects of final beneficiaries – farmers; expanding sources of funding through: participation in the Horizon Europe program, national funds, private investors, co-financing by farmers on a cooperative basis, etc.; introduction of mechanisms aimed at accumulating social capital.

c) Diffusion: joining European innovation partnership platforms; development and adoption of a national concept and program for the formation of innovation partnerships; inclusion of activities for the formation of innovation partnerships into regional sectoral programs.

5. CONCLUSIONS

In all stages of the innovation value chain within a cluster, the social capital, which is based on trust and partnership, is required. Its development needs a favorable institutional environment at regional and national level. In order to scale up the existing practice of innovation clusters, a national policy should be provided that will be oriented on social capital building in the innovation field by creating partnership platforms, brokerage service etc. Regional sectoral programs should also consider the necessity of activities for social capital accumulation.

The analysis of the innovation value chains from the point of integrated flow provides a complex vision on the innovation process. The unity of three main chain links – idea generation, conversion and diffusion – can make the innovation process effective, which should be considered in cluster formation and innovation policy.

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