

LAW

THE IMPACT OF CLUSTER COOPERATION ON THE DEVELOPMENT OF DIGITAL INNOVATIONS IN THE AGRICULTURAL SECTOR: LEGAL ASPECT

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Annotation. *The article analyzes the legal framework for the digitalization of agrarian clusters in a developing economy. A review of a large number of legal studies shows that the ownership structure is a key factor in ensuring knowledge transfer, training and professional development of small producers in agricultural clusters. The research shows that, in addition to ownership structure, the development of digital innovation, cluster governance, and the inclusion of intermediaries in clusters are critical factors to consider when understanding the impact of intermediaries on the modernization of smallholders in clusters.*

Keywords: *digital innovations, agricultural sector, cluster, legal regulation of agribusiness, cluster cooperation.*

Introduction. The focus on digital innovation is particularly noticeable across various sectors of the economy, as the European Commission has announced the European Declaration on Digital Rights and Principles for the Digital Decade 2021 [6]. A key aspect of the initiative is the digital transformation of businesses and the provision of digital skills necessary for successful operations and sustainable development. Clusters in general and agricultural clusters in particular are key elements of the economy that support the digital transformation of their members.

Research methods. The main research methods are general methods – comparison, generalization, analysis, synthesis, etc. The objectives of this study are:

- 1) analysis of the expected results of the digital transformation of the agricultural sector;
- 2) study of the main stages of European digitalization;
- 3) development of a methodological approach to assessing the digital maturity of agricultural enterprises.

Literature review. Despite a significant number of publications on the issues of ensuring the innovative development of domestic enterprises within integrated structures, in today's realities there is a need to find effective forms of interaction between business, government and science to activate the development of agricultural sector enterprises on an innovative basis.

In the formation and development of innovation theory, its researchers distinguish five main stages: classical innovation theory (J. Schumpeter, V. Zombart, V. Micherlich), long-wave theory (M.D. Kondratiev), neoclassical (post-Schumpeterian) innovation theory (Mensch H., Kalecki M., Hartman V., Twiss B., Haustein H. and others), theory of acceleration (innovative entrepreneurship) (Drucker P., Twiss B.), social-psychological theory (Barnet H., Denison IS.). All these stages of the evolution of the theory of innovation have a common feature – subordination (direct or indirect) to the general concept of economic development [10, p. 24]. With this in mind, research modern conceptual theory innovations are expedient in the context of the concept of economic development.

Of course, this does not mean that other visions of scientists regarding the relationship between the theory of innovation and economic development, as well as the analysis of indicators and methods of assessing the state of innovative activity, should not be explored, because all this will contribute to the development of sound scientific and methodological approaches to solving the issue of interaction theories of innovation and economic development. In particular, one of these concepts is the concept of innovation clusters (concept of innovation capsule), which describes the interaction of various innovations and their impact on the innovation process.

The importance of digital technologies to ensure sustainable development of land use and agricultural production is actively studied by domestic [1, 3, 8, 14] and foreign researchers [7, 11], but the problem remains unsolved either theoretically or practically from the standpoint of the complex application of digital technologies in this field.

Results obtained. In the fall of 2021, the European Commission, together with the European Parliament and the European Council, agreed on the Data Governance Act [12], which increases trust in data sharing and strengthens legal opportunities for data protection. In February 2022, it was supplemented by a Draft Law on Data that sets new rules on who can use and access data, aimed at developing all sectors of the economy in the European Union (“EU”). The Commission is also creating common European data spaces in strategic areas, involving private and public actors, so agricultural clusters are also involved in the digitalization process.

In March 2022, the EU reached an agreement on the Digital Markets Act [13], which is an important milestone as it regulates the activities of large digital platforms to ensure

an open and fair European digital market.

Another decisive agreement was reached in April 2022 on the Digital Services Act, the world's first digital regulation. This law follows the principle that what is illegal offline should also be illegal online, so very large online platforms and search engines will have to protect their users from illegal content, goods and services.

In fact, 70% of agricultural enterprises in the United States of America (“United States”), Canada, and Europe operate on modern innovative digital agricultural technologies. The rate of adoption of innovations and digital production solutions in Ukraine is significantly lower, but many experts believe that the active implementation of modern digital technologies in the agricultural sector will contribute to effective development and productivity growth, despite military, human and resource risks.

Global population growth in the coming decades will lead to a demand for agricultural products that will be almost twice as high as today. Providing the population with the required amount of products requires a large-scale modernization of the agricultural sector. The problem is that many countries have very limited land resources suitable for agricultural activities.

In addition, the Food and Agriculture Organization of the United Nations predicts that the amount of land used for growing crops per capita in the world will decrease from 0.6 hectares in 2000 to 0.2 hectares by 2050, while food demand will increase by 70%.

To date, development opportunities that are limited to increasing production capacity on the former technical base in the agricultural sector have not yielded the expected results, which necessitates the introduction of modern digital technologies to improve productivity and product quality.

According to the forecasts of the Analytical Agency for Marketing Research, which brings together experts in the field of global market analysis, the global market for agricultural technologies will grow by 12.1% per year and reach USD 41.17 billion by 2027.

In 2019, the global market for information technology in the agricultural sector reached USD 17.44 billion, with North America accounting for 39% of sales. The Asia-Pacific region ranks second in terms of sales, with a 29.7% share in 2019, and Europe is third in terms of these positions [16].

The active development of the Asia-Pacific region in the field of modern technologies was facilitated by such factors as population growth in China, India, Indonesia, Japan, the Philippines and Vietnam, as well as growing demand for strategically important projects for the agricultural sector.

According to section 2(8) of the 2014 Regulation [5], cluster means a spatial and sectoral concentration of: operators committed to economic development or innovation; research units; and entrepreneurs engaged in economic activities in the relevant territory, competing and cooperating in the same or similar sectors and interconnected by a network of cooperation.

The Food and Agriculture Organization of the United Nations promotes the agricultural cluster model, which is used in various forms around the world and can

bring numerous benefits:

- expanding cooperation: promoting active dialogue between the public and private sectors and facilitating integration in the development of agricultural strategy;
- integration of smallholder farmers into international agribusiness: providing smallholder farmers with better market access, as well as increased productivity and more market-oriented production;
- diffusion of innovations: promoting the diffusion of innovations in agriculture through better access to training and the introduction of modern technologies;
- increasing competitiveness: leveraging synergies and collective efforts to promote resilience and increase farmers' competitiveness;
- brand and identity promotion: support for the creation of a regional brand/identity and green tourism;
- water conservation: promoting the conscious and responsible use of renewable water;
- food security;
- environmental protection: focus on protecting natural resources and reducing land degradation;
- creating jobs;
- productivity: supporting productivity gains through the deployment of improved methods and technologies;
- raising living standards and improving socio-economic conditions in the region [16].

The crisis caused by the coronavirus pandemic has affected the development of agriculture in North America, reducing human resources and the efficiency of logistics processes. The crisis has led to a halt in agricultural production in the United States, Canada, and Mexico, which in turn has negatively impacted exports of agricultural products, machinery, and modern digital equipment. The pandemic has negatively impacted geomarketing and trade, intensifying economic and business processes in North America, where many manufacturing and technology companies operate.

The war unleashed by Russia federation against Ukraine has caused a grain crisis, which a number of countries are working to overcome under the auspices of the United Nations.

Today, with the adoption of the Law of Ukraine “On Amendments to Certain Legislative Acts of Ukraine on the Terms of Turnover of Agricultural Land” [9], which came into force on July 1, 2021, the land reform in Ukraine has been completed and will further modernize the conduct of agricultural business in Ukraine by attracting foreign capital and foreign investment in the agro-industrial complex of Ukraine, creating and developing large agribusinesses called “agrarian clusters” in our country.

According to scientists, the development of agricultural clusters will contribute to the creation of high-tech and scientific associations with a closed production cycle and a high level of added value of final products, the creation of new jobs of various qualifications, and the development of social and production infrastructure in rural areas [1, p. 286].

It is also worth noting that the effectiveness of agricultural clusters, according to experts in the field of economic science, is due to the fact that their organizational nature is a combination of specialization and concentration, which are impossible without innovation, so the nature of clusters is objectively innovative. The priority task in this aspect of positioning innovative structures is the development of clusters in such areas as rural green tourism, organic production, highly specialized production of certain types of products, and innovative activities [8, p. 558].

The development of agrarian clusters in Ukraine will allow domestic agricultural products to be competitive on both foreign and domestic markets and will ensure that the country's agricultural business reaches a new, more productive, innovative and progressive level.

The cluster approach to agribusiness in the country will ensure the financial and economic prosperity of the united territorial communities. This is facilitated by recently adopted regulations, namely: The Presidential Decree “On Certain Measures to Accelerate Reforms in the Land Relations Sector” [4] and the Resolution of the Cabinet of Ministers “On Certain Measures to Accelerate Reforms in the Land Relations Sector” [15], which provide for the transfer of state-owned agricultural land to municipal ownership and its subsequent disposal by territorial communities. This will allow foreign investments to enter the regional level to develop commercial agricultural production and create innovative enterprises, such as “agricultural clusters”.

Given the high demand for digital economy models in almost all areas of production, it can be assumed that human resources in this area will soon be replaced by automated technologies. This fact is also confirmed by the high demand for specialists with modern digital and innovative competencies, experts in big data processing technologies, data science, mathematics, analytics, and robotics.

Agriculture has been identified as one of the key sectors where digital solutions can help reduce global greenhouse gas emissions and pesticide use. Digital farming technologies can allow the agricultural sector to produce more adaptable and efficient products, thus increasing the sustainability and competitiveness of the sector. The combination of the main phases of cluster economy creation and the digitalization process allows to achieve the greatest effect in the shortest possible time.

In general, the creation of agricultural clusters pursues several goals:

- Increase the area of agricultural land and its productivity;
- Protecting and restoring natural landscapes and soil quality;
- Ensuring environmental sustainability;
- Supporting environmental sustainability by preserving natural resources and combating desertification;
- Improving the quality of life for the population and maximizing resilience to climate change;
- Promoting job creation for citizens and supporting small farmers;
- Increased welfare of farmers;
- Ensuring economic sustainability;

- Promoting food security;
- Attracting creative and innovative ideas in agriculture.

The strategies for Europe's digital future will enhance the digital transformation of agricultural business and ensure a fair and competitive digital economy.

The transformation of the agricultural business depends on its ability to rapidly and widely adopt new digital technologies, particularly in the lagging agricultural and service ecosystems (logistics, marketing, etc.). EU support, in particular through the programs “Single Market”, “Digital Europe”, and “Cohesion”, with Ukraine's inclusion, will facilitate the deployment and use of digital capabilities, including industrial data spaces, computing power, open standards, and the results of testing and experimentation.

Agricultural enterprises should be encouraged to adopt digital technologies and products with lower environmental impact and higher energy and material efficiency. Digital technologies should be rapidly deployed to enable more intensive and efficient use of resources.

Particular attention should be paid to advanced and disruptive innovations in the agricultural sector. Although Europe already has as many agribusinesses as the United States, it needs to create a more favorable environment and a truly functioning single market to enable rapid growth and scale-up of the agricultural sector. Europe is equipped with various instruments, but the investment gap to finance the growth of the agricultural sector between the United States and Europe and even between the EU and China is still significant. The intensification of the formation of agricultural clusters and their digitalization will contribute to the development of the market abroad, including increased access to finance for the expansion of agribusiness [3].

Analyzing the existing experience of agribusiness digitalization, we can identify a number of typical problems:

- 1) excessive conservatism and unwillingness to change business practices;
- 2) lack of a clear strategy and distinct stages of business digitalization;
- 3) the desire to minimize the cost of equipment, expert services, software, etc;
- 4) the desire to digitalize the business at once, without planning separate stages;
- 5) the lack of a program to improve the skills of employees.

The main reasons for the underdevelopment of clusters in the agricultural sector of Ukraine are external (war, unfavorable macro- and microeconomic business environment), but there are a number of reasons that lie within the existing clusters themselves, or in their small financial and production capacity, lack of trust and cooperation between cluster members.

Despite all the flaws, shortcomings, and limitations of clusters in Ukraine, it is too early to assess their sustainability or future development potential, especially given the fact that active hostilities are taking place in Ukraine and a significant area of agricultural land is occupied and mined.

Conclusions. Nevertheless, it can be said that clusters will develop successfully in the postwar reconstruction period if the obstacles to their development, especially in the area of external constraints on cluster development, are removed or at least reduced.

The digitalization of agrarian clusters will be crucial in supporting them. The government action to remove quotas and other restrictions on the development and growth of the agricultural sector that are in macroeconomic policy and the microeconomic/business environment (removing external constraints on cluster development) will help identify growth points. It is necessary to create a favorable institutional and business enabling environment for companies and family farms, including agricultural policy incentives, stimulating fiscal measures, employment and investment support measures, an effective legislative and judicial framework, etc. In addition, the success of clusters will also depend on removing internal constraints to cluster development (building trust, reconciling) the interests of different actors and forces, developing cooperation between cluster members, increasing the digitalization of clusters, increasing production, innovation and export opportunities to enhance the association and implementation of joint projects and activities. However, the most important requirement for the development and sustainability of an agricultural cluster in the future, which is in the area of internal cluster capabilities, will be to address the issue of digitalization of such a cluster.

The digital transformation of the agricultural sector will lead to the introduction of smart agriculture, a high-tech set of solutions that will maximize automation in the industry to increase competitiveness and productivity, as well as attract investment in agricultural enterprises.

We believe that it is necessary to pursue an active state and legal policy to create conditions for the development of the cluster movement in Ukraine as a key to successful post-war reconstruction. Such a policy can be implemented by adopting relevant government programs at the legislative level that will provide comprehensive support for the development of such agricultural businesses. The final aspect of the land and agrarian reform, in our opinion, is the establishment of legal peculiarities of the right to use and own agricultural land for «agricultural clusters», which will certainly increase the economic potential of Ukraine.

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