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AGRICULTURAL PRODUCTION IN EASTERN EUROPE: HISTORY, CURRENT STATUS, AND PROSPECTS OF THE DEVELOPMENT FOR INNOVATION

Introduction. *Agricultural production is a prerequisite for the economic development of the Eastern European countries, which ensures food security of the citizens in the conditions of constantly varying economic environment.*

Problem Statement. *The main condition for the development of the agrarian sector is an established system of selling products at high prices. Therefore, its assessment requires in-depth analysis, with the need for organic and high-quality food products making this problem extremely urgent.*

Purpose. *Studying the current status of agro-food production and food security in the countries of Eastern Europe and the needs in raw materials of interrelated industries of the national economy, which can become a driving force for the development of rural areas; assessing the investment attractiveness of the agricultural sector; and determining the prospects for the development of agro-food production in Eastern Europe.*

Material and Methods. *In this research, we have used systematic approach, comparative analysis, generalization, synthesis and analysis. The sources are statistical reports of international institutions, government and private organizations, scholarly research publications of foreign and domestic researchers.*

Results. *The five elements of agro-food production in Eastern Europe have been identified: availability of resources suitable for agriculture; transformation of land relations; the structure of gross production by branches of agriculture; development of organic agriculture; investment attractiveness of the studied countries. The challenges of the agricultural sector at the middle and lower levels of agriculture have been described.*

Conclusions. *The key prospects for the development of agricultural production in Eastern Europe are: improvement of the agricultural land market, sale of agricultural products in European and international markets, development of innovation through the introduction of modern technologies of agricultural production, development of organic farming, enhancing interest of credit and banking sector in investment projects in the sphere of agricultural production.*

Keywords: agricultural production, food security, organic farming, investment attractiveness, and rural areas.

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The implementation of the land and administrative territorial reform, the transformation of land relations, and the transfer of authority with regard to the disposition of lands for agricultural purpose to self-governing bodies have become the driving force for the development of agricultural productions in Eastern Europe. Agriculture is one of the main components that enable sustainable development of rural territories. The existence of agricultural production in rural areas fosters jobs in agriculture and interconnected sectors of the agro-industrial complex. Eventually, it is positive contributes to the formation of the gross domestic product whole country — in the state level, as well as individuals revenue of nationals and local budget — in local level. However, the main condition for the development of the agricultural sector is a well-established system of selling products at high prices. Therefore, the assessment of the development of the agricultural sector of the national economy of each country in the context of the final financial and economic results requires in-depth analysis. The need for organic and high-quality food makes this problem extremely relevant. As a result of the introduction of the institution of private land ownership, agrarian business intensified.

Agriculture in general and agricultural production in particular are the subject of research by many foreign and domestic scientists. F. Eigenbrod, M. Beckmann, S. Dunnett, L. Graham, R. A. Holland, P. Meyfroidt, R. Seppelt, X.-P. Song, R. Spake, T. Václavík, P. H. Verburg [1], E. B. Barbier [2], E. Hatna, M. M. Bakker [3] considered the increase in agricultural production through the level of agriculture and land resources, as well as forecast the expansion of arable land in the regions where their consolidation is taking place. W. F. Laurance, J. Sayer, K. G. Cassman [4] studied the expansion of arable land with extensive farming, as it poses a potential threat to the biodiversity of the agricultural landscape. V. Ricciardi, N. Ramankutty, Z. Mehrabi, L. Jarvis, B. Chookolingo [5], P. Meyfroidt, F. Schierhorn, A. V. Prishchepov, D. Müller, T. Kuemmerle [6] studied the development of market circulation of agricultural land after the introduction of the institution of private property. A. Smaliychuk, D. Müller, A. V. Prishchepov, Ch. Levers, I. Kruhlov, T. Kuemmerle [7] studied the impact of selling prices on the size of agricultural land use, access to international and European markets. Z. Lerman, K. Brooks, C. Csaki [8] studied the restructuring of agricultural enterprises, among which the priority and benefits were given to farms, and K. Deininger, D. Byerlee [9] observed the agrarian structure of large and small producers, opportunities to attract large investors to agriculture. S. Piras, S. Botnarenco, M. Masotti, M. Vittuari [10] studied the small farms that try to diversify their activities based on family needs and the large farms that aim to maximize profits from activities. However, the issues of agricultural production in Eastern Europe require careful study, despite the significant work of scientists in the field of agriculture in some countries. Therefore, the chosen topic of our study is relevant and modern.

The purpose is to study the current state of agricultural production in Eastern Europe to provide the population with quality food and related industries with the necessary raw materials that can become the basis of food security, especially in countries with economies in transition; determining the availability of resources for agricultural production. The derivative task of our study is to identify challenges and prospects for the development of agricultural production in the context of the formation of sustainable land use.

1. HISTORICAL-INNOVATIVE DEVELOPMENT OF AGRICULTURAL PRODUCTION IN EASTERN EUROPE

According to the UN definition, Eastern Europe includes ten countries: Belarus, Bulgaria, the Czech Republic, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, and Ukraine. A positive aspect was the involvement Czech Republic, Slovakia, Hungary, and Poland in 2004, Bulgaria and Romania in 2007 to Euro-

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pean Union [11]. Since the 1990s, land reforms have been actively implemented in Eastern Europe, justified by the transition from a planned to a market economy. The vast majority of countries redistributed land among peasants working in state farms and collective farms, or returned the land to its former owners. However, during the 30 years of transition, some countries have managed to complete land reform, while others are just trying. Nevertheless, after the fragmentation of the land fund, the restoration of property rights and land consolidation became important priorities. Therefore in Belarus, at the beginning of the land reform of 1991, the main forms of land use were represented by state farms, collective farms, and subsidiary farms. Based on the goal of developing a socially oriented market economy, the task of reform was the redistribution of land for the development of various forms of management and diversified economy. Consequently, the monopoly of state ownership of land was eliminated by introducing private ownership of land. Peasant farms were established, the average size of which is 76.1 ha with the number of 2941 units on the area of 223.8 thousand ha (74.9 thousand ha in lifelong hereditary ownership, 113.7 thousand ha in permanent use, 0.4 thousand ha in temporary use, 34.8 thousand ha under rent) as of 01.01.2019 [12], which is almost 2% of all agricultural enterprises. At the same time, 2073 agricultural enterprises are located on 8865.6 thousand ha (98%), of which 8554.6 thousand ha are in permanent use, 94.1 thousand ha in temporary use, 216.9 thousand ha under rent. Simultaneously, 99.6% of the land fund of the republic is in state ownership and only 0.4% in private [12]. Therefore, farm or personal subsidiary farm is formed on the terms of a lease through an auction, and can be transferred to a lifelong hereditary possession for 20% of the cadastral value. In Bulgaria, during the land reform, 98% of agricultural land was transferred to the private ownership of former landowners (until 1946). The average size of the land plot is 8 ha. Land is bought and sold. The predominant buyers of agricultural land are Bulgarian nationals due to the small size of land plots, as foreigners invest in large tracts of land. In the Czech Republic, the reform of cooperative farms has created private legal entities and family farms. Accession to the European Union has had a positive impact on agriculture and the development of trade for farmers through regional subsidies. The main forms of labor organization are large industrial farmers and small organic farms, which are actively developing the organic direction in agriculture in recent times. In Hungary, the reform redistributed 86% of land to private ownership and 14% of state-owned land. Restitution was carried out on the basis of bonds, which enabled getting a land share (unit) from ownership of collective and state farms. The maximum size of a land plot is 300 ha for an individual who has agricultural education or work experience in agriculture for at least 3 years. The maximum area in use is 1200 ha [13]. One part of the cooperative lands was bought at bond auctions, while the second and the third ones were given to the workers of the cooperatives and to the workers of the landless cooperatives, respectively. The next country is Poland that has the peculiarities of the formation of agricultural land use in that all arable land before the reform was privately owned by farmers and individual farms (78%), and the acquisition of rights in the land market was regulated by the Civil Code (1964). The nationalization of arable land in Soviet times was not carried out. However, in 1991 a land reform was carried out concerning the privatization of state lands (the Polish Law «On the Management of State Agricultural Lands»). Thus, the family farm has officially acquired legal status as the main type of land use in the fields of agriculture of the country. Its maximum size is 300 ha. The elementary unit of the administrative-territorial division of Poland is gmina that is identical to the Ukrainian amalgamated territorial community. A farmer can be a citizen who has a professional education, work experience of 5 years, live at the location of the land. Moldova has been actively reforming the agricultural sector of the economy (1990). During

the land reform, collective and state-owned agricultural enterprises were privatized, the lands of which were subject to division into land shares. Most agricultural land is now privately owned. There are no restrictions on the size of agricultural land use. In Romania, land restitution to former owners or heirs during land privatization prevailed. Collective agricultural enterprises have been liquidated, part of the land belongs to the state. It is allowed to buy land up to a limit of 100 ha. The person buying the land shall have experience in agriculture. In Russia, privatization took place by providing employees of collective and state-owned enterprises with shares from their land fund. As a result of land reform, 66.7% of all agricultural lands remained in state and municipal ownership, legal entities — 5.2%, nationals — 28.1% [14]. In organizational and legal forms of management the area of large agricultural companies increases (Prodimex, Agrokultura, Miratorg, Rusagro, Agrocomplex named after M.I. Tkachev, Volgo-Don Agroinvest), and in small business (farms) the area decreases with increasing production volumes. Only nationals of this country have the right to buy land, and foreigners only have the right to purchase land for rent. In Slovakia, land reform was returned lands to their owners or heirs. As a result, land fragmentation occurred, when the average land plot of 0.45 ha has up to 15 co-owners [13]. When selling a plot of land there is a need for the consent of all co-owners. Thus, unconsolidated land, strict state control of most agricultural land, state regulation of land purchase and sale led to a decrease in their market value. In Ukraine, the land reform began in 1991. A significant part of agricultural land was divided into land shares (units). Initially, employees of agricultural enterprises received the right of ownership of land share (unit) of about 6.9 million nationals in the form of certificates. Then they were exchanged for state acts on land ownership. Unfortunately, there remained unclaimed land plots. The final stage of the land reform was the abolition of the moratorium and the opening of the agricultural land market. Most of the land has been leased. The main organizational and legal forms are large agricultural holdings, farms, and agricultural enterprises.

In the pre-revolutionary period (before 1917), the market of agricultural lands was actively functioning on the territory of Ukraine. This determined the historical development of agricultural sectors in our country. We agree with Makhov's opinion that «the profitability of extensive agriculture, in which natural factors took a leading place, depended to a large extent on soil conditions» [15, p. 49]. According to this statement, we have identified three areas of agricultural development: industrial — was in the northern part, where woodworking, forestry, pottery were flourished; animal husbandry and horticulture — concentrated in the middle part, in particular, gardening, horticulture, as well as pig breeding, etc. were widespread here; in the southern part, there was crop production that gradually turned into intensive forms due to the agro-technical measures of that time, in particular fertilization, sorting of seed material, and others [16, p. 76]. Livestock steadily declined [17, p. 81]. Analysis of the development of agricultural production gives grounds to conclude that from a historical point of view, land reforms were actively implemented in the post-Soviet space and, from an innovative point of view, there were used new means such as computer tools and geographic information technologies, which allowed both implementing large-scale transformations of agricultural land use in a short time and ensuring quality accounting of a large stratum of owners and land users. The World Bank, international organizations and European funds have made significant contributions for stimulating and financing changes in land relations in Eastern Europe. For example, to accelerate land reform, the World Bank funded the «Project for issuance of state acts on land ownership in rural areas» during 2004—2013. However, land fragmentation was negative due to the emergence of large numbers of small landowners. At the same time, the lease relations has been widely implemented because the peasants could not cul-

tivate their land by themselves. Today, the improving of the institutional business environment of the agricultural sector is obvious. This is primarily due to the development of entrepreneurial activity in order to make a profit.

2. THE INSTITUTIONAL AND BUSINESS ENVIRONMENT FOR THE DEVELOPMENT OF ENTREPRENEURSHIP OF AGRICULTURAL PRODUCTION IN EASTERN EUROPE

In the scientific works of modern scientists, the issue of institutional business environment of entrepreneurship is very important because this process is associated with the ordering, formalization, standardization of business relations based on political, legal and socio-economic rules and customs that establish legal and moral restrictions for business entities. We consider property, rights, freedom of action, etc. to be the main institutions of entrepreneurship. The financial support of small and medium business enterprises is provided by commercial banks, state financial support of small businesses, mutual investment organizations, leasing and factoring companies, etc. Eastern European countries take an active part in international agricultural business through partnership between states and economic activities of international companies in their domestic markets based on international norms and rules established in international standards of world organizations on business conditions, behavior in foreign markets. The vast majority of modern scholars believe that the institutional environment of companies of international and national level forms the organizational structure of an international company. The World Economic Forum established that the quality of institutions is a guarantee of economic growth and the basis for assessing the competitiveness of the state economy. As a result, three groups of indicators became the basis for the annual Global Competitiveness Survey: the first group consists of the quality of institutions, infrastructure, macroeconomic sustainability, health and education; the second group contains training, efficiency and volume of the market of finance, goods and labor; the third group takes into account the factors of technological development, competitiveness of enterprises, the size of the domestic market and the potential for innovation. In 2019, the ranking of the world according to the Global Competitiveness Index was distributed as follows: no data are available for Belarus, 64.9 for Bulgaria, 70.9 for the Czech Republic, 65.1 for Hungary, 68.9 for Poland, 56.7 for Moldova, 64.4 for Romania, 66.7 for Russia, 66.8 for Slovakia, and 57.0 for Ukraine [18]. The Czech Republic (70.9) and Poland (68.9) have the highest Global Competitiveness Index of the country, Moldova is at the end of the rating. Articles and existing approaches to measuring the institutional business environment are closely related to the quality and effectiveness of public administration, including the Worldwide Governance Indicators methodology, based on a comprehensive study by the World Bank Group, reflecting the views and experiences of citizens, entrepreneurs and experts in various areas of public administration. Thus, the methodological basis of the study consists of six key indicators (Governance Indicators): *Voice and Accountability* shows the political aspects of civil liberty and equality; *Political Stability and Absence of Violence* reflects the stability of state institutions; *Government Effectiveness* measures the quality of public services; *Regulatory Quality* outlines the ability of the government to create and implement sound policies and regulations; *Rule of Law* measures the degree of confidence of various entities in the rules established by law; and *Control of Corruption* reflects corruption in society. However, the authors question the objectivity and argumentation of the Governance Indicators to reflect the set of traditions and institutional changes that govern the country. In general, the problem of developing the right methodology for studying the impact of public administration quality on the institutional business environment has not yet been properly addressed. In 2008, the ranking of the world's countries according to the govern-

ment's efficiency index was as follows: Belarus (12), Bulgaria (58), the Czech Republic (82), Hungary (73), Poland (68), Moldova (24), Romania (50), Russia (45), Slovakia (77), and Ukraine (33) [18]. The highest efficiency of government organizations was observed in the Czech Republic, and the lowest was reported for Belarus. Therefore, the analysis and reporting of international business helps to identify weaknesses and prevent negative phenomena and thus generate additional profits. Thus, the focus on the patterns of business development exposes a trend where a large number of small firms are typical of low-income countries, as most services are provided in the local market. At the same time, the development of large enterprises takes place in conditions of macroeconomic and political stability. Therefore, the firm's exit from the national market is possible under conditions of gradual economic growth and increasing purchasing power of the population. Thus, the strengthening of large companies in the market suspends the growth of small and medium-sized businesses.

We consider that the sticky wages in large enterprises attracts more working age people than the uncertainty of their own small business. Several important semantic accents that have become the main levers of the formation of the institutional business environment of agricultural production, attract attention. Let us consider the innovative activity of the agrarian sector of the economy, which is becoming the main means of structural adjustment. The Common Agricultural Policy (CAP) is one of the main areas of EU activity that accounts for the most budget expenditure. Therefore, it also covers the development of farms and consumers who have to pay real prices for quality food. However, the advantages of the Community are common prices, a common market for agricultural products, financial unity, and so on. CAP priorities are becoming important guidelines for the countries of Eastern Europe, according to which they develop their own strategies for the development of the agricultural sector. Consequently, the European Parliament created the update of the EU's Common Agricultural Policy (CAP). The main areas were environmental regulation for farms (climate change, anti-erosion measures, withdrawal of land from circulation, support for biodiversity), legal support for farmers (consultations, crisis prevention), financial support (development of small and medium agricultural businesses, state support for young farmers). The Food and Agriculture Organization (FAO), a specialized agency for rural development and agricultural production, plays an important role in setting priorities for the development of UN agricultural policy. Its new guidelines for development were protection and rational use of natural resource potential, development of rural areas and agriculture, strengthening the network of value formation of quality products. Therefore, the countries of Eastern Europe are members of this organization and adapt its guidelines in their own legislation. The authors emphasize that the development of the institutional business environment of agricultural production is a universal phenomenon for the whole world. At the same time, the expression of this phenomenon in different countries of Eastern Europe has different features, and sometimes it differs within the legal framework of one country, which leads to a large number of economic entities that need a systematic approach to their organization and classification and thus direct efforts to maintain their entry into both the national and international market of agricultural products. The analyzed state of institutional support at the international level creates common key features. It is proved that the definition of business environment categories at the international level and a wide range of its values leads to the adaptation of key provisions to the agricultural production of each state at the national level. Innovative directions of agricultural development, including the technological and practical methods, are supported for implementation, which leads to the formation of an advisory system for the development of farms in Eastern Europe in a functioning market economy. We emphasize that such important characteristics as the level of eco-

nomic development, features of the historical formation of agricultural production, institutional «heritage» of the previous state system and norms, customs, traditions, which are embedded in the consciousness of public perception of agriculture shall be taken into account. It should be noted that the indices of public administration, which reflect the quality of services to the population and regulation of economic relations of agricultural entities, primarily determine the natural resource favorable for the development of agriculture of large agricultural enterprises, while the development of agricultural production in the private sector economy remains out of society's attention.

3. INNOVATION-DRIVEN DEVELOPMENT OF AGRICULTURAL PRODUCTION IN EASTERN EUROPE

Rural regions in most Eastern European countries are characterized by a low level of innovation activity of agricultural enterprises. We found that in many Eastern European countries, administrative-territorial reform has been carried out, as a result of which territorial communities have been formed and a significant number of powers have been transferred from public authorities to self-governing bodies. The numerous studies by both foreign and Ukrainian researchers have indicated the need to audit the socio-economic situation at the national, regional and local levels for identifying the specifics of socio-political system, material well-being, quality of life, engineering and transport infrastructure, natural and climatic conditions, resource potential and economic opportunities for doing business, the activity of small and medium-sized businesses, the level of involvement in the economic circulation of individual farms. As international experience shows, there is a direct relationship between the economic growth of the state and its achievements in science and innovation. A study of the economic activity of successful international companies in agricultural production found that the increase of their own competitive advantages in the international market is due to the introduction of innovations in production activities. In addition, the introduction of innovations in agricultural production strengthens the food security of each Eastern European country, providing the national and international market with quality food. According to UN forecasts, the world's farms need to produce one and a half times more agricultural products to provide the population with basic necessities [19]. Thus, in early 2020, the concept of «Innovative Food Valley» was introduced at the World Economic Forum. Gradually, this practice was introduced in other Eastern European countries, including Ukraine. Therefore, the activities of Ukrainian Food Valley aim to develop and produce innovative and healthy food both in the national and in the world markets of agricultural products. The current trends in agricultural development are based on cooperation + competition. The individual small and medium-sized businesses cooperate to achieve a common goal through open platforms, which increases their competitiveness in the market and profitability several times as compared with single direct competition. In the context of globalization, this trend is becoming a new driving force.

We emphasize that it is organic farming that provides the population of each country with high-quality food products. Turning to primary sources, we found that the concept of organic farming was first used by J. Rodal and meant agricultural production without the use of pesticides and fertilizers [20]. At the same time, the modern term according to IFOAM (International Federation of Organic Agriculture Movements) defines organic farming as a system of production that contributes to the preservation of ecological systems and human health [20]. That is, the term "organic farming" is identified with "ecological farming". Therefore, the term "organic farming" is used in Russia, Ukraine, and the term "ecological farming" is typical for Hungary, Poland, Slovakia and the Czech Republic. In Central Europe, the term "biological production" is common. In Eastern Europe, there is an increase in organic farming.

We believe that the main obstacle to the continuous introduction of organic farming is to reduce yields and increase overall costs, including an increase in the share of wages of employees involved in the cultivation of crops. Moreover, organic farming needs certification. Therefore, the European Agricultural Fund for Rural Development in its resolution proposed a list of measures for the development of organic farming [21]. At the same time, for the time of restoration of biological activity of the ecological system (up to 5 years) a subsidy is provided per 1 ha of the organic sector, which depends on the types of products and the structure of lands. In addition, subsidies for arable land in 2011 amounted to EUR165 / ha in Bulgaria, EUR 181—251 /ha in Hungary, EUR 195 /ha in Poland, EUR 179 /ha in Slovakia, and EUR 155 /ha in the Czech Republic [22]. Poland, Hungary, and Romania are traditionally important producers and importers of organic products. However, domestic markets are developing very slowly in these countries [22]. In addition to financial support, economic levers such as tax and credit benefits, as well as indirect management of laboratory research, certification of organic products and insurance, are being introduced (Table 1).

During the period 2009—2018, the area of organic farming in Eastern Europe increased by almost 68.3% and reached 2795.09 thousand ha at the end of the study. In Russia, there was reported the largest area of organic farming, while in Belarus where the formation of this type of land use started since 2018, there was the smallest one. Poland is characterized by environmentalization of agriculture and growing sales of organic products (by EUR 83 million, from EUR 167 million, in 2016, to EUR 250 million, in 2018, with a decrease in the area of organic land use [24, 25]. A positive trend is observed in Ukraine, where effective management in the form of certification bodies has been established. Demand for organic products is increasing sales growth against the background of a slow increase in the area of organic farming. Thus, in 2018, 0.7% of organic land use of the total area of agricultural land provided EUR 33 million in sales of organic products or an increase of 12% [24, 25]. In organic land use, there are arable lands, perennial plantations and pastures. Cereals and fodder crops occupy the largest share. According to the data, in each country of Eastern Europe there is a gradual increase in the area under organic farming.

Table 1. **Forecasting the Area of Organic Farming in Eastern Europe**

Country	Actual area, thousand ha			Forecast area, thousand ha				
	2009	2013	2018	2019	2020	2021	2022	2023
Belarus	0.00	0.00	1.66	2.49	3.32	4.15	4.98	5.81
Bulgaria	12.32	56.00	128.80	138.42	151.59	194.54	230.42	203.03
Czech	398.00	476.00	522.00	508.08	505.81	510.23	527.99	548.24
Hungary	140.26	131.00	209.40	179.27	173.36	178.50	222.03	222.64
Poland	416.00	669.90	484.70	537.91	529.22	453.74	447.47	450.00
Moldova	32.11	22.00	17.15	26.10	25.67	32.29	28.36	31.15
Romania	167.90	301.10	326.30	330.51	315.74	270.88	259.26	295.17
Russia	78.50	144.30	606.98	505.17	603.22	741.41	670.45	876.72
Slovakia	145.50	161.90	189.00	176.80	194.16	195.35	205.36	203.54
Ukraine	270.19	393.40	309.10	422.73	425.41	432.88	409.72	344.11
Eastern Europe	*1660.78*	*2355.60*	*2795.09*	*2827.48*	*2927.50*	*3013.97*	*3006.04*	*3180.41*

Source: Calculated and completed by the authors based on the data of FAOSTAT [23].

However, innovative technologies for growing crops are also used in organic farming. According to the World Intellectual Property Organization, the Innovation Feeding the World study in 127 countries has shown that the Global Innovation Index 2017 was as follows: Belarus (29.98), Bulgaria (42.84), the Czech Republic (50.98), Hungary (41.74), Poland (41.99), Moldova (36.84), Romania (39.16), Russia (38.76), Slovakia (43.43), and Ukraine (37.62) [26]. In addition, there is annually conducted global study of innovation development, according to the methodology of the International Business School INSEAD. It contains 82 different indicators divided into the two groups: the available resources and conditions for innovation (Innovation Input) and the achieved practical results of innovation (Innovation Output). Therefore, the final index is the ratio of costs and effects, which allows providing an objective assessment of the effectiveness of innovation efforts in each country. The Global Innovation Index 2020 was as follows: Belarus (31.3), Bulgaria (40.0), the Czech Republic (48.3), Hungary (41.5), Poland (40.0), Moldova (33.0), Romania (36.0), Russia (35.6), Slovakia (39.7), and Ukraine (36.3) [18]. We conclude that the introduction of information technology in agriculture helps farmers to make methodological adjustments to the methods of sowing and tillage. These include GIS technology in agriculture and GPS agriculture, satellite imagery, aerial photography, information technology (Crop Monitoring) and online data, a combination of data sets. We found that the Food Valley program implements the following measures for farmers: free access to scientific bases and research centers, selection work for stable filling of seed stock, introduction of organic production, development of new consumer products and methods of their production, introduction of program "Smart farming", agriculture digitalization.

4. MODELING OF RATING ASSESSMENT OF AGRICULTURAL PRODUCTION IN EASTERN EUROPE

Each country in Eastern Europe has its own resource potential for the development of the national economy. The main resource of each state is the land

Table 2. **The Main Resource and Production Indicators of Eastern Europe as of 2018**

Country	Total area	Area of agricultural land	Arable land area	Population	Cereal production	The share of agricultural land in the total area	Plowing
	%						
Belarus	1.1	2.7	3.0	3.2	2.1	41	68
Bulgaria	0.6	1.6	1.8	2.4	3.6	45	69
Czech	0.4	1.1	1.3	3.6	2.5	45	71
Hungary	0.5	1.7	2.2	3.3	5.3	57	82
Poland	1.7	4.7	5.7	12.9	9.3	46	76
Moldova	0.2	0.7	0.9	1.4	1.2	67	75
Romania	1.3	4.3	4.5	6.6	11.2	56	65
Russia	90.8	69.2	62.9	49.6	38.9	13	56
Slovakia	0.3	0.6	0.7	1.9	1.4	39	71
Ukraine	3.2	13.3	17.0	15.1	24.5	68	80
Eastern Europe	*100*	*100.00*	*100.00*	*100.0*	*100.0*	*17*	*62*

Source: Calculated and completed by the authors according to the data of FAOSTAT [23]

fund, and especially agricultural land, which is used for agricultural production. The smallest countries (Moldova, Slovakia, the Czech Republic, Hungary, and Bulgaria), which occupy less than 1% of the territory of Eastern Europe, have the smallest areas of agricultural land. However, the average size of countries (Belarus, Romania, and Poland) that occupy 1—2% of the territory of Eastern Europe, own agricultural land in the range of 2—6%. Furthermore, Ukraine (3.2%) and Russia (90.8%) have the largest size among Eastern European countries, having the largest areas of agricultural land in the study group — 13.3% and 69.2%, respectively. The increase in the area of agricultural land in some countries is completely absent or possible in small quantities at the expense of reserve lands or those that are not provided in the property. The countries of Eastern Europe have a convenient territorial location that is characterized by favorable natural climatic conditions for the development of all branches of agriculture, suitable for growing crops soils and skilled labor. Grain production shows the state's ability to provide its own population with food and ensure the country's food security. With the smallest arable land (up to 2% among Eastern European countries), Slovakia, Moldova, the Czech Republic and Bulgaria have a small volume of grain production (1.2—3.6%) (Table 2).

With the largest arable land, Ukraine (17%) and Russia (62.9%) produce the largest amount of grain crops, 24.5% and 38.9%, respectively, although wheat yields in Russia are the lowest in Europe. Hungary, Belarus, Romania, and Poland have the medium arable land area (from 2% to 6%) and produce medium amount of grain crops. In 2018, the lowest wheat yields among Eastern European countries were observed in Russia (27.3 c/ha) and Belarus (27.5 c/ha), while the highest one was reported for the Czech Republic (53.9 c/ha) and Hungary (51.2 c/ha). In Slovakia, Romania, and Bulgaria, the wheat yield ranged from 47.8—49.1 c/ha, whereas in Moldova, Ukraine, and Poland it varied from 21.2 c/ha to 39.9 c/ha.

The agricultural lands suitable for the economic use play an important role in the organization of agricultural production. Although Russia occupies the largest area among Eastern European countries, it has the smallest share of agricultural land (13%). However, in the countries with smaller territories, the area of land suitable for agriculture is gradually increasing. Ukraine (68%), Moldova (67%), Hungary (57%) and Romania (56%) have the largest area of agricultural land. The medium size of agricultural land is in Slovakia (39%), Belarus (41%), Bulgaria (45%), the Czech Republic (45%), and Poland (46%). This index is 17% on average in Eastern Europe. Demand for agricultural products requires a constant expansion of the area under crops, which leads to an increase in the share in the structure of agricultural land. High plowing of the agricultural landscape contributes to the development of degradation processes that negatively affect the ecological state of the environment. The lowest plowing is observed in Russia (56%), while the largest one is reported for Hungary (82%) and Ukraine (80%). Plowing in other countries ranges within 65—76%, which indicates a high proportion of arable land in the structure of agricultural land. Actually, this figure is at a high level (62%) on average in Eastern Europe. In the process of analyzing the dependencies between the level of plowing of agricultural land and grain production, based on the minimum plowing rate in Russia (56%) with the largest arable land (121,649 thousand ha) and the highest grain production (109832.18 thousand tons) and the maximum plowing rate in Hungary (82%) with an arable land area of 4324 thousand ha and the production of cereals 14885.53 thousand tons, we conclude that it is absent. At the same time, there is an influence of the size of cultivated areas of arable land on the grain production. In 2018, Eastern European agriculture amounted to USD 109.9 billion of which Russia has 47%, Poland and Ukraine have 12% each, while the share of Romania is 10% and other countries have less than 5%. The agricultural production amounted to USD 52.2 billion in Belarus, USD 2.2 billion in Bulgaria, USD 4.8 billion in the Czech Republic, USD 5.5 billion in Hungary, USD

13.7 billion in Poland, USD 1.2 billion in Moldova, Romania — 10.5 billion dollars, Russia — 52.2 billion dollars, Slovakia — 2.5 billion dollars, Ukraine — 13.3 billion dollars. The weight of agriculture in Eastern Europe in the world was 3.2%, and in Europe — 30.1%. Per capita agriculture in Eastern Europe in 2018 was $ 374.2 per capita that is by 70 dollars less than agriculture per capita in the world (444.2 dollars/person). At the same time, in some countries, per capita agricultural production was as follows: USD 418.5 per capita in Belarus, USD 316.5 per capita in Bulgaria, USD 451.9 per capita in the Czech Republic, USD 570.6 per capita in Hungary, USD 362.2 per capita in Poland, USD 290.5 per capita in Moldova, USD 539.7 per capita in Romania, USD 357.9 per capita in Russia, USD 461.3 per capita in Slovakia, USD 300.0 per capita in Ukraine. The highest rates of agricultural production per capita are in Hungary and Romania, while the lowest one is in Moldova. The growth of agriculture was 2.5%. The share of agriculture in the economies of Eastern Europe was 4.1% that is by 5.3% less than in 1970 [27].The gross domestic product of Eastern Europe is closely linked to trade relations, which manifests itself by large mutual export of products. The gross product size is influenced by the level of exports, which reduces the impetus for the development of domestic production and public procurement. The stability of GDP depends on government support purposed for government goals (restriction of imports of goods, forced saturation of the market with domestic products). In 2018, the share of agriculture in gross domestic product (GDP) is as follows: Belarus (7.7%), Bulgaria (4.0%), the Czech Republic (2.2%), Hungary (4.2%), Poland (2.7%), Moldova (11.9%), Romania (4.8%), Russia (3.5%), Slovakia (2.6%), and Ukraine (12.0%) [28]. Over the last ten years (2010—2018), the share of agriculture in the gross domestic product decreased by 24% in Belarus, by 13% in Bulgaria, by 18% in Poland, by 8% in Moldova, by 14% in Romania. At the same time, it increased by 29% in the Czech Republic, by 17% in Hungary, by 37% in Slovakia, and by 43% in Ukraine. In Russia, the value has remained unchanged. The territorial and sectoral components of agricultural produc-

Table 3. **Model for Estimating the Level of Agricultural Production in Eastern Europe as of 2018**

Country	Component						Complex index, Ci	The level of agricultural production
	Territorial		Crop production		Livestock			
	Area of agricultural lands, thousand ha	Rating, score	Cost of gross output, thousand dollars	Rating, score	Cost of gross output, thousand dollars	Rating, score		
Belarus	8453.00	5	3721215	6	4755371	5	2.719	average
Bulgaria	5030.00	7	3279985	7	1014541	8	3.806	average
Czech	3523.00	8	2541911	8	2111782	7	4.350	low
Hungary	5296.00	6	4814485	5	2625900	6	3.263	average
Poland	14512.00	3	10084353	4	13006919	2	1.631	high
Moldova	2257.10	9	1194826	10	409771	10	5.438	low
Romania	13414.00	4	13487567	3	5136728	4	2.175	average
Russia	215494.00	1	41713280	1	42955382	1	0.544	high
Slovakia	1889.00	10	1229823	9	610453	9	4.894	low
Ukraine	41329.00	2	24205391	2	6860721	3	1.088	high
Eastern Europe	311197.10	55	106272836	55	79487568	55		

Source: Calculated and completed by the authors according to the data of FAOSTAT [23].

tion in Eastern Europe have been analyzed to assess the level of agricultural production. As a result, a high level of agricultural production in Russia, Ukraine, and Poland was determined. Although Russia ranks first in all aspects, this is due to the presence of large areas of agricultural land suitable for growing crops, rather than because of their high yields, as the grain yield in 2018 was 26.2 kg/ha. Ukraine and Poland have smaller areas of agricultural land, but higher grain yields (48.5 c/ha and 33.7 c/ha, respectively) (Table 3).

Alternatively, Belarus, Bulgaria, Hungary, Romania have an average level of agricultural production. Without large land potential, these countries are increasing the intensity of existing use. This trend can be traced to the yield of grain crops: Bulgaria (55.6 c/ha), Romania (59.9 c/ha), Hungary (62.9 c/ha). The grain yields are too low in Belarus (27.2 c/ha). At the same time, the Czech Republic, Slovakia, and Moldova have a satisfactory level of agricultural production. In the Czech Republic and Slovakia, a small fund of agricultural land is compensated by raising the efficiency of agricultural production. In these countries, the yield of cereals is 52.1 c/ha (the Czech Republic), 54.1 c/ha (Slovakia). In Moldova, it amounts to 36.8 c/ha, because of socio-economic problems in the country. Thus, the development of agricultural production in Eastern Europe is stimulated by the land use system. Moreover, countries with large areas of agricultural land are satisfied with low crop yields, which does not prevent them from occupying a leading position. At the same time, countries with small areas are trying to apply the latest technologies for growing crops and thus compensate for the provision of high quality food, ensuring food security.

5. INVESTMENT ATTRACTIVENESS OF EASTERN EUROPEAN COUNTRIES AND PROSPECTS FOR THE DEVELOPMENT OF THEIR AGRICULTURAL PRODUCTION

Investments in agriculture contribute to the restoration of production potential and growth of the industry. Therefore, investment activity is the basis of expanded reproduction. The importance of agriculture in the economy of each Eastern European country is emphasized by a significant percentage of the employed population in this area, because new jobs are created, unemployment is eliminated. The population of rural areas is as follows: Belarus (21%), Bulgaria (25%), the Czech Republic (26%), Hungary (29%), Poland (40%), Moldova (57%), Romania (46%), Russia (25%), Slovakia (46%), Ukraine (30%), and Eastern Europe (30%). If the population of rural areas is constantly declining, it indicates a lack of new jobs in agriculture, migration to urban agglomerations, low level of socio-economic development and engineering and transport infrastructure, low quality of life and wages in rural areas. During the study period 2009—2018, the rural population decreased by 17%in Belarus, by16% in Bulgaria, by 12% in Hungary, by 7% in Ukraine, by 6% in Romania, by 2% in Russia, and by 1% in Moldova. The stability of the rural population is observed in the Czech Republic. There are positive trends in rural development with an increase in the rural population in Poland (2%) and Slovakia (4%). In general, the dynamics of the rural population has a negative sign of a decrease of 4% over the study period in Eastern Europe. The investment climate in Eastern Europe is average. Thus, experts from the World Bank and the International Finance Corporation prepare an annual Doing Business rating based on an analysis of doing business in 190 countries. Favorable business conditions are assessed on a scale of 100 points. The higher score, the better business development conditions: Belarus (49), Bulgaria (61), the Czech Republic (41), Hungary (52), Poland (40), Moldova (48), Romania (55), Russia (28), Slovakia (45), and Ukraine (64). Therefore, the best conditions for doing business in Russia, and the worst — in Ukraine. Russia's superiority is because the process of paying taxes has been simplified by reducing the time taken by tax authorities to process tax returns for value added tax and by improving the 1C computer

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program that is used to calculate taxes and salaries. Comparing the rating results in 2019—2020, we conclude that the improvement of the investment climate is observed in Belarus (0.1%) and Poland (0.5%). Business stability is typical for the Czech Republic, for which no changes were reported in the last year. Deterioration of doing business was reported for Slovakia, Bulgaria, Hungary (by 0.2%), Romania, Russia (by 0.8%), Ukraine (by 1.1%), and Moldova (by 1.3%) [25]. Each Eastern European country is implementing reforms for improving the investment climate, strengthening legal institutions and improving the effective business environment based by 10 aspects. The latest area of research for this World Bank program has been the Government Contracting Indicator that characterizes the efficiency, quality, and transparency of public procurement systems.

Foreign direct investment contributes to the development of the country's economy, attracting high-performance technologies and equipment. Analyzing the country's rating of foreign direct investment, we conclude that the largest investment flow is in Poland, while the smallest one is in Hungary. According to the results of 2018, the countries are rated as follows: Belarus (73), Bulgaria (60), the Czech Republic (33), Hungary (199), Poland (25), Moldova (131), Romania (34), Russia (31), Slovakia (61), and Ukraine (62). In monetary terms, foreign direct investment amount to: USD 1.47 billion in Belarus, USD 2.58 billion in Bulgaria, USD 8.49 billion in the Czech Republic, USD — 72.83 billion in Hungary, USD 12.03 billion in Poland, USD 0.23 billion in Moldova, USD 6.88 billion in Romania, USD 8.78 billion in Russia, USD 2.55 billion in Slovakia, and USD 2.48 billion in Ukraine [18]. For many Eastern European countries, agriculture is a sector that receives a small amount of financial resources due to a long payback period and a small amount of state support. This slows down the development of the industry. Government subsidies do not increase the efficiency of the industry. The use of foreign direct investment that attracts the state-of-the-art technologies and logistics results in improving product quality and decreasing cost. In the modern world, the main reasons for attracting more and more investors in agriculture are rising prices for agricultural products and land resources, maintaining their own water supplies and providing food security, active use of biofuels. The positive aspects of using foreign direct investment are the creation of new jobs, the introduction of advanced technologies, sustainable development of land use, free access to international markets, training of employees, expanding international economic relations, transparency of doing business. The negative consequences of foreign direct investment are the liquidation of small farms and seizure of land by agricultural holdings, reduction of food products in local markets, speculative market traps, violation of environmental requirements and lack of social balance, monopolization of activities, large purchasing power of big business. Lending to agricultural enterprises is provided by various sources of financial institutions. An obstacle to credit relations between banks and agricultural enterprises is the increased risk of profitable results of their production activities. Therefore, most of the profits of agricultural enterprises deducted for loan repayment. In 2014—2018, lending to the agricultural sector increased in only two countries, the Czech Republic (by 20%) and Slovakia (by 15%), while in other countries it decreased by 48% in Ukraine, by 35% in Belarus, by 28% in Russia, by 27% in Moldova, by 5% in Hungary, and by 2% in Bulgaria [23]. Therefore, it is necessary to reduce the cost of loans, which helps to overcome the crisis situation regarding lending to agricultural production.

The prospects for the development of agricultural production in Eastern Europe are as follows:

1. Improving the agricultural land market through determining the place of land in the system of economic turnover, implementing citizens' land ownership, and developing the land market infrastructure. Developing a system of favorable loans to entrepreneurs, for the establishment of farms

to build efficient production, ensures the sale of products at favorable prices and enables upgrading the outdated material and technical base.

2. Selling agricultural products in the European and international markets provides a significant inflow of foreign currency, which supports the economic stability of each country and Eastern Europe as a whole. The export potential of agricultural products may be raised through making mutually beneficial agreements and preferentially promoting unimpeded trade in the markets of the European Union for non-member countries.

3. Developing innovation through the introduction of modern technologies of agricultural production to increase the productivity of crops while reducing the cost per unit of output and strengthening its competitiveness in the global and European market of agricultural products. For these purpose, it is necessary to attract highly qualified personnel, to increase the environmental safety of agricultural products, to stimulate organic farming, and to produce high-yielding varieties of crops and new highly productive breeds of domestic animals.

4. Developing organic farming helps to increase the high level of food security of each Eastern European country, to ensure the proper nutrition of citizens, to preserve the health of the nation and the fertility of the soil for the future generations. For supporting organic farming, it is necessary to ensure stable financing of ecologically clean products by providing government subsidies, preferential taxation, and favorable lending conditions.

5. Encouraging the lending and banking sector to participate in investment projects in the agricultural sphere by stimulating investor confidence in the legal protection of their activities and improving the investment climate through expanding tax benefits and insurance guarantees. Foreign direct investment as an element of attracting foreign capital facilitates the development of export relations between countries and economic transformations. It is realized through acquiring equipment, receiving patents for the upgrade of the material and technical base, implementing the cutting-edge resource-saving and ecologically safe technologies.

The resource potential of Eastern Europe is very strong, but varies from country to country. Russia and Ukraine have the largest land resources, while Moldova and Slovakia have the smallest ones. The smallest area of arable land per capita is in the Czech Republic, while the largest one is in Russia. In all Eastern European countries, the land use changed after the reform of land relations and the introduction of the institution of private land ownership. During the land reform, the land fund was redistributed between peasants or former owners (restitution). In some countries, these processes have been completed, whereas other countries have been trying to implement them. However, after the fragmentation of the land fund, the restoration of property rights and land consolidation have become important priorities. Eastern Europe is characterized by an extensive farming that is characterized by the expansion of arable land to increase grain production. The exceptions are the Czech Republic, Hungary, Poland, and Romania, where there is an intensive trend in farming based on the use of high-yielding varieties of crops, cutting-edge means of production and advanced technologies for their cultivation. The growth in the gross output of agriculture contributes to strengthening the economy of each state. In 1994—2018, the gross output increased by 23%, with crop production increasing by 51% and animal husbandry decreasing by 2%. Crop production remains the leading branch of agriculture in Bulgaria, the Czech Republic, Hungary, Moldova, Romania, Slovakia, and Ukraine, while animal husbandry is that in Belarus, Poland, and Russia.The prospects for the development of agricultural production are to improve the market of agricultural land, to increase export potential, to develop innovation and organic farming, and to intensify the activities of domestic and foreign investors.

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АГРАРНЕ ВИРОБНИЦТВО СХІДНОЇ ЄВРОПИ: ІСТОРІЯ, СЬОГОДЕННЯ ТА ПЕРСПЕКТИВИ РОЗВИТКУ ІННОВАЦІЙ

Вступ. Сільськогосподарське виробництво є передумовою економічного розвитку країн Східної Європи, що забезпечує продовольчу безпеку громадян в умовах постійних змін економічного середовища.

Проблематика. Головною умовою розвитку аграрного сектора є налагоджена система реалізації продукції за високими цінами, тому його оцінка потребує поглибленого аналізу, а потреба в органічних та якісних продуктах харчування робить цю проблему надзвичайно актуальною.

Мета. Вивчення сучасного стану агропродовольчого виробництва, забезпечення продовольчої безпеки країн Східної Європи і сировинних потреб взаємопов'язаних галузей національної економіки, які можуть стати рушійною силою розвитку сільських територій та оцінка інвестиційної привабливості аграрного сектору, а також визначення перспектив розвитку агропродовольчого виробництва у Східній Європі.

Матеріали й методи. Використано системний підхід, порівняльний аналіз, узагальнення, синтез та аналіз. Джерелами є статистичні звіти міжнародних установ, державних і приватних організацій, наукові публікації зарубіжних і вітчизняних вчених.

Результати. Виділено п'ять елементів агропродовольчого виробництва у Східній Європі: наявність ресурсів, придатних для сільського господарства; трансформація земельних відносин; структура валової продукції за галузями сільського господарства; розвиток органічного землеробства; інвестиційна привабливість досліджуваних країн. Описано виклики аграрного сектору, які виникли на середньому та нижчому рівнях сільського господарства.

Висновки. Ключовими перспективами розвитку сільськогосподарського виробництва у Східній Європі є: покращення ринку сільськогосподарських земель, збут сільськогосподарської продукції на європейському та міжнародному ринках, розвиток інноваційної діяльності шляхом впровадження сучасних технологій сільськогосподарського виробництва, розвиток органічного землеробства, підвищення інтересу сектору кредитно-банківських послуг до інвестиційних проєктів у сільськогосподарському виробництві.

Ключові слова: агропродовольче виробництво, продовольча безпека, органічне землеробство, інвестиційна привабливість, сільська місцевість.