

FORMATION OF THE LAND MARKET AS A PREREQUISITE FOR ENSURING FOOD SECURITY OF A COUNTRY

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Formation of the Land Market as a Prerequisite for Ensuring Food Security of a Country

The article outlines theoretical approaches to the study of the development of land relations and provides the substantiation of the methodological toolkit for the study. A set of legal and economic relations that arise in the course of turnover of land is investigated, namely, transactions of purchase and sale, inheritance, exchange, gift, pledge, lease and emphyteusis. The structure of land transactions and changes in their number over time by designated purpose are analyzed. The use of the Ward's and k-means methods made it possible to divide regions of Ukraine into three cluster groups by level of development of land governance as well as to identify the existing problems. The European practice of the development of land relations and the formation of the agricultural land market is considered. The practice of the EU Member States has proved that a developed and well-institutionalized land market is a necessary prerequisite for ensuring food security of a country and developing its export potential. The analytical review and findings of the study of the features characterizing the evolution of land relations in Bulgaria, Estonia, Latvia, Lithuania, Poland, and Romania made it possible to identify the main elements of the formation of a full-fledged agricultural land market, namely: cadastre, specialized land institutions, market-based land valuation mechanism and state regulation. It is established that effective use of land resources in Ukraine is possible only provided that the land reform is completed and a full-fledged agricultural land market is formed. Only under these conditions the use of the available agricultural land can be intensified, and the food and economic security of the state can be ensured.

Keywords: land governance, land market, food security, cluster analysis, European experience, efficiency.

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Данкевич В. Є., Данкевич Є. М., Шегеда О. В. Формування ринку землі як одна із передумов забезпечення продовольчої безпеки країни

У статті окреслено теоретичні підходи та обґрунтовано методологічний інструментарій дослідження розвитку земельних відносин. Досліджено сукупність юридично-правових і економічних відносин, які виникають в процесі обігу земельних ділянок, а саме транзакцій купівлі-продажу, спадщини, застави, оренди, емфітевзису. Проаналізовано структуру та динаміку кількості транзакцій із земельними ділянками за цільовим призначенням земель. Використання методів «Варда» та «К-середніх» дозволило розподілити області України за рівнем розвитку земельних відносин на три кластерних групи, виокремити наявні проблеми. Досліджено європейський досвід щодо розвитку земельних відносин і формування ринку сільськогосподарських земель. Практика країн – членів ЄС довела, що розвинений і добре інституціоналізований земельний ринок є необхідною передумовою забезпечення продовольчої безпеки країни та формування експортного потенціалу. Аналітичний огляд та результати дослідження еволюційних особливостей процесу

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Данкевич В. Е., Данкевич Е. М., Шегеда А. В. Формирование рынка земли как одна из предпосылок обеспечения продовольственной безопасности страны

В статье обозначены теоретические подходы, и обоснован методологический инструментарий исследования развития земельных отношений. Исследована совокупность юридически-правовых и экономических отношений, возникающих в процессе оборота земельных участков, а именно транзакций купли-продажи, наследства, залога, аренды, эмфитевзиса. Проанализированы структура и динамика количества транзакций с земельными участками по целевому назначению земель. Использование методов «Варда» и «К-средних» позволило распределить области Украины по уровню развития земельных отношений на три кластерные группы, выделить имеющиеся проблемы. Исследованы европейский опыт развития земельных отношений и специфика формирования рынка сельскохозяйственных земель. Практика стран – членов ЕС доказала, что развитый и хорошо институционализированный земельный рынок является необходимым условием обеспечения продовольственной безопасности страны и формирования экспорт-

трансформації земельних відносин у Болгарії, Естонії, Латвії, Литві, Польщі та Румунії дозволили виділити основні елементи формування повноцінного ринку сільськогосподарських земель, а саме: кадастр, спеціалізовані земельні установи, ринковий механізм оцінки землі, орендні відносини та державне регулювання. Встановлено, що ефективне використання наявних земельних ресурсів в Україні можливе лише в умовах завершення земельної реформи та формування повноцінного ринку сільськогосподарських земель. Лише при цьому можна підвищити інтенсивність використання наявних сільськогосподарських земель, забезпечити продовольчу та економічну безпеку держави.

Ключові слова: земельні відносини, ринок землі, продовольча безпека, кластерний аналіз, європейський досвід, ефективність.

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ного потенціала. Аналітичний обзор и результаты исследования эволюционных особенностей процесса трансформации земельных отношений в Болгарии, Эстонии, Латвии, Литве, Польше и Румынии позволили выделить основные элементы формирования полноценного рынка сельскохозяйственных земель, а именно: кадастр, специализированные земельные учреждения, рыночный механизм оценки земли, арендные отношения и государственное регулирование. Установлено, что эффективное использование имеющихся земельных ресурсов в Украине возможно только в условиях завершения земельной реформы и формирования полноценного рынка сельскохозяйственных земель. Только при этом можно повысить интенсивность использования имеющихся сельскохозяйственных земель, обеспечить продовольственную и экономическую безопасность государства.

Ключевые слова: земельные отношения, рынок земли, продовольственная безопасность, кластерный анализ, европейский опыт, эффективность.

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Introduction

1. Theory of the land governance development and food security

Is possible to provide the population with food and, accordingly, to form the food security by means of manufacturing products or importing them. There are three key issues that need to be considered in order to provide food to the population by means of own production:

- 1) How much land is required to produce food in order to ensure scientific standards of population consumption?
- 2) What should the productivity and structure of agricultural production be like?
- 3) What reforms and transformations are needed in the field of land relations?

Our research will focus on the third aspect, namely the search for answers to the following questions: Does the current state of land relations contribute to ensuring food security? Is the formation of the land market one of the prerequisites for ensuring food security of a country?

French physiocrats were the first to consider land as the object of economic analysis. In their opinion, land was the only

productive resource while the work of a farmer was seen as the only substance for the development and increase of social wealth [1]. These views can be explained by the fact that the development of the physiocratic theory coincides with the period when the feudal-agrarian system dominated in France (mid-18th century). A characteristic feature of this period was the emergence of a new class of entrepreneurs who were interested in changing the feudal system which hindered the economic development and in the formation of new economic land relations [11; 18].

A representative of the physiocrats F. Quesnay believed that the wealth of nations or “net product” was a gift of nature and was derived only from agriculture. The source of the net product was land along with labor of people engaged in agricultural production. As a matter of fact, F. Quesnay logically completed W. Petty’s idea that labor was the father of material wealth, while land was its mother [24].

A. Smith emphasized in his scholarly works that land rent was “enters into the composition of the price of commodities in a different way from wages and profit. High or low wages and profit are the causes of high or low price; high or low rent is the effect of it” [13].

D. Ricardo made a great contribution to the development of these problems. In fact, he became the founder of the theory of land rent. D. Ricardo defined the rent as “that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil” [6].

K. Marx carried out quite an in-depth research in his writings, which later became socially significant. He emphasized the low efficiency of small landowners and the impossibility of their employing achievements of scientific and technological progress [12]. In the third volume of *Capital*, K. Marx developed and described the theory of ground-rent. K. Marx concluded that the land nationalization and the subsequent creation of a state-owned land conglomerate was one of the most effective forms of its use. Although practice has not confirmed his conclusions (collectivization), today the idea of land conglomeration is observed in activities of agricultural holdings. They concentrate powerful financial and production resources in a single center, which enables them to use the latest achievements of science (GMO, IT, GIS) and technology (the latest and most powerful technologies of the world's most famous brands). Besides, according to Marx's theory, land can have no value, and private land ownership is unnecessary for the economy and it only has a negative impact on the development of both the economic system as a whole and the social system of the country.

Representatives of the marginalist school of economic thought (the end of the 19th century), whose ideas are widely used in the analysis of economic processes and laws of marginal value, viewed the land along with other natural resources only in terms of utility of the consumer wealth. However, given the fact that land resources are limited and the planet's population is growing, its price would increase despite a gradual decline in its fertility. Proponents of the marginalist theory considered capital and labor as the most important factors of production while ignoring the land in general as a production category [14; 22].

Johann Heinrich von Thünen presented fundamentally different views on the land. In his work *The Isolated State*, he used the distance from the city as a central concept. He developed the concept of agricultural production around the central (regional) city in an isolated state. The concept rests on principles for determining the price for or rental rate on land, which is formed on the basis of the profit that farmers make from products grown on the land plot. As a result of his scientific research, a pattern of concentric rings was developed. Within it, bulky or perishable goods are manufactured closer to the city where these goods are consumed or processed, and accordingly, valuable (capital-intensive) or long-term storage commodities are produced or grown in areas remote from the city. Eventually, von Thünen came to the same conclusions as Ricardo did, noting that the differences in the soil quality determined the price for or rental rate on land in the same way as its proximity to the central city [24].

Classical economists proposed an aggregate production function, which can be represented as the equation:

$$Y = f(L, K, P),$$

where Y – aggregate output, L – land, K – capital, P – labor.

The economic thought changed starting from the second half of the 20th century; land or environmental resources

were completely removed from the production function and included into capital or labor force. International trade, which was based not on resource-intensive but capital-intensive products, played an important role in this process. A group of scientists (P. Ciaian, D. A. Kancs, J. Swinnen, and others) [4] were the first to theoretically and analytically substantiate this concept. These scientists developed the factor endowment theory, which explains the scheme of comparative advantages of interstate differences in the relative allocation of the main factors of production – capital and labor. Similarly, R. M. Solow, in his work *A Contribution to the Theory of Economic Growth*, did not include land in the production function, which had the following form:

$$Y = f(K, N),$$

where K – capital, N – labor.

However, in the later Solow model (1974), where he explored the long-term prospects for the development of the economy which uses exhaustible natural resources, the production function took the form:

$$Y = f(D, K, N),$$

where D – exhaustible natural resources. In later studies, scientists generally reduced the production function only to capital:

$$Y = f(K).$$

A specific feature of this function is that capital as a production factor absorbed labor and exhaustible natural resources, since labor productivity is highly correlated with investments in labor in the form of staff training and development. Some researchers called this function “finite resource”. However, another scientific direction started to develop along with these views. It was elaborated by H. J. Barnett and Ch. Morse, who believed that the main production factor was knowledge in the form of scientific and technological development. In their view, the cumulation of knowledge and technological progress were automatic and self-reproductive phenomena and obeyed a law of increasing returns [24].

Summarizing the results of the development of various schools of economic thoughts and the place of land resources in their studies, it should be noted that the land has been considered from different points of view and included in different subgroups of production factors. The main idea underlying modern scientific views is that economic entities involved in the production process are guided by their own interests, which is determined by the utility or profit maximization. Thus, production decisions regarding distribution or use of land as a production factor are taken in order to maximize profits, with regard to the state of technological development (society, industry, enterprise), available resources, and state policy. At the same time, it is important to maximize the inclusion of land transactions in the market environment. Only this in conjunction with attracting investments and modern technologies will make it possible to increase the efficiency of agricultural production.

The world population studies show that, in the future, humanity will face the following three trends: 1) growth of urban poverty and the number of landless rural residents who need food at affordable prices; 2) climate change and increasing demand for arable agricultural land; 3) extension of crop areas in order to produce biofuel, and rising prices for fossil fuels.

The combined effect of these three factors will inevitably lead to an increase in prices for food, threat of food scarcity, and shortage of land.

The literature review makes it possible to state that the most reliable way to solve the global food problem is to increase food production, which is possible in two ways. One of them is extensive, implying a further expansion of arable, pasture and other land; while the other one is intensive, involving an increase in biological productivity of the already existing land.

At present, the focus on extensive way of farming is not promising. We should lean toward the intensive method by applying the latest agricultural technologies that are the basis of sustainable agricultural development. However, the intensive use of available land resources is possible only provided that the land reform is completed.

Research methodology

The research methodology is based on the following economic methods: monographic (studying the experience of different countries of the world in the development of land governance [7; 8; 17; 23; 26]), systems analysis (comparing the changes in the number of different agricultural land transactions [3; 5; 10; 15]), statistical method (analyzing the structure of land plot transactions and changes in their number over time [16,20]), graphical (schematic and tabular representation of the research results), cluster analysis (grouping Ukrainian regions with regard to the specific features of agricultural land transactions [9; 21; 25]).

The concept of land governance covers a wide range of issues of economic (production) and legal nature. The category of land ownership is the basis of land governance. Therefore, the change and development of land governance are associated with the change and development of forms of land ownership. At the same time, land governance as a component of production relations can be both stimulating (given the functioning of the private property institution and market turnover of land) and discouraging factor in the development of productive forces (given the artificial restraint on agricultural land transactions).

Subjects of land governance include citizens, legal entities, local self-government authorities and state authorities. Objects of land governance are land within the territory of Ukraine, land plots and property rights to them, including property rights to land allotments (shares).

Efficient use of land resources is possible in the context of a civilized land market and is a means of restoring social justice regarding the possibility of rural residents (especially the elderly) to dispose land and increasing investment attractiveness of agricultural production.

Within the framework of this research, agricultural land market is interpreted as the system of legal, organizational and economic relations that are established in the process of turnover of land plots on the basis of determining the market value of these plots. In this research, the land market will be investigated through studying transactions (purchase and sale, inheritance, exchange and gifts, mortgage and pledge, lease and emphyteusis), their structure and changes in their number over time in comparison with the EU Member States where the land market operates. It should be noted that there is no agricultural land market in Ukraine as well as in Zimbabwe, Venezuela, North Korea, and Tajikistan.

The specific character and peculiarities of the development of land governance in Ukraine were investigated using clustering, which included several stages. At the first stage ("Selection of indicators"), the state of development of land governance is analyzed through studying changes in the number of agricultural land transactions over time. At the second stage ("Selection of clustering method"), the most rational clustering method for studying regional features of land governance is determined: 1) the Ward's method, which uses methods of dispersion analysis to estimate distances between clusters; 2) the method of k-means, which refers to non-hierarchical ones. At the third stage ("Number of clusters"), using the elbow method, the percentage of dispersion is considered, which is explained as a function of the number of clusters. At the fourth stage ("Visualizing results"), groups of regional clusters (regions) are formed according to the state of transactions with agricultural land; graphical interpretation of cluster analysis is carried out with the help of econometric methods using STATA, R statistical software.

The analysis of the development of land relations is made on the basis of studying transactions with agricultural land

The main criterion for the effectiveness of agricultural and land policy is the state of food security of the country that is determined by a wide range of interdependent indicators, which are grouped as shown below and characterized:

1. State of providing the population with quality and safe products.
2. Level of food consumption by the population.
3. Cost of a set of products according to rational consumption norms.
4. Food market sustainability.
5. Level of development of the agro-food sector.
6. Natural resource potential and efficiency of its use.
7. State of development of land relations in the country and trends in the formation of corresponding institutions.

With the current workforce productivity in the Ukrainian plant production and livestock sector, 20.6 million hectares of agricultural land, 12.3 million hectares of arable land, 5.5 million hectares of hayfields, and 2.8 million hectares of pasture land are needed to provide the country with food by means of its own production. Therefore, in order to solve the problem of food security while organizing agricultural production on an industrial basis, Ukraine has sufficient land resources.

At the same time, an effective use of available land resources is possible only provided that the land reform is completed. Only then the available land resources can be used more effectively in order to meet the needs and form export potential of the country.

We will investigate the state of development of land relations through analyzing transactions with agricultural land.

Land transactions are a set of legal and economic relations that arise in the process of land turnover. Lease accounts for the largest share of all agricultural land transactions (76.1 %), while non-agricultural land is the most actively purchased and sold (36.8 % of transactions). Exchange and gift transactions are also more popular for non-agricultural land (15.3 %), and for agricultural land they amount to only 1.6 %. This is a consequence of the moratorium, which concerns the

alienation of almost all categories of agricultural land. Inheritance transactions are rather widespread for both categories of land – 26.7 % for non-agriculture and 18.3 % for agricultural lands. Mortgage is equally irrelevant for both of them – 1.8 % and 0.1 %, respectively. If with respect to agricultural land such market structure can be explained by the moratorium, with respect to non-agricultural land it is related to the actual absence of mortgage lending (Fig. 1).

Each transaction in the land market has its own characteristic features, which are influenced by a number of economic, political and conjunctural factors. Within the framework of this research, it is proposed to investigate each land transac-

tion, analyze the changes in their number and structure over time.

a) purchase and sale

When analyzing purchase and sale land transactions, it should be noted that these are civil agreements in which one party (seller) transfers or undertakes to transfer a land plot to the other party (buyer), and the buyer accepts or undertakes to accept the land plot and pay a certain amount of money for it. Given the fact that market turnover for a certain category of agricultural land is absent in Ukraine, the number of purchase and sale transactions is limited and concerns only the lands of private peasant farms (Fig. 2).

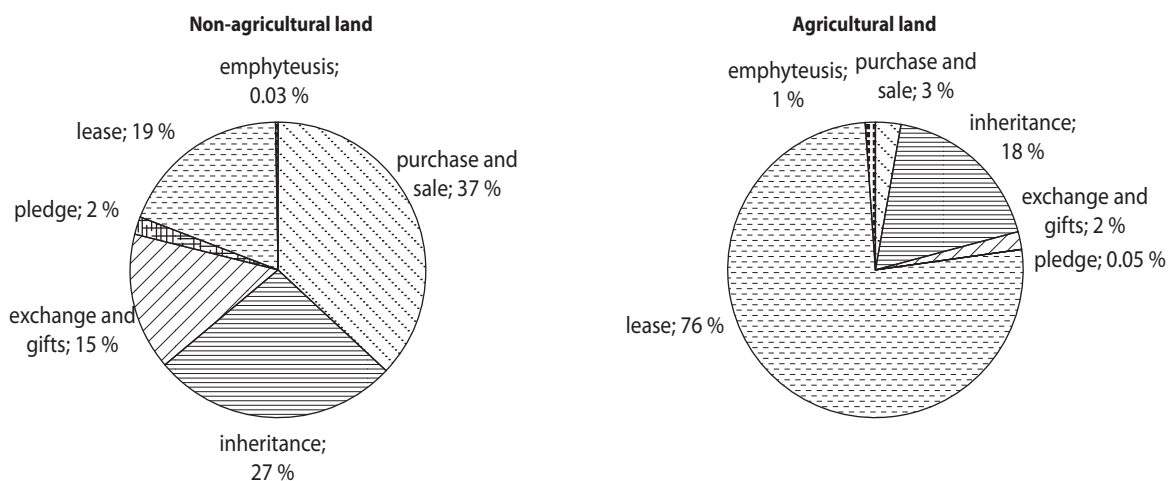


Fig. 1. Structure of the number of land transactions by designated purpose, %, July 2015 – June 2017

Source: developed by the authors based on [19]

The analysis of the data presented in Figure 2 allows us to assert that 66 518 land plots of different categories were sold in Ukraine in the 3rd and 4th quarters of 2015 (7.1 % of all transactions). In four quarters of 2016 their number was 138 097, and in the first two quarters of 2017 it amounted to 66 378 land plots. At the same time, the proportion changed slightly, and

the share of agricultural land increased at first to 42 %, and then to 45 %.

When analyzing land purchase and sale transactions in Western European countries (Austria, Belgium, the Netherlands, Germany, France, Switzerland), it should be noted that the land market is liberalized and open, and there are no abso-

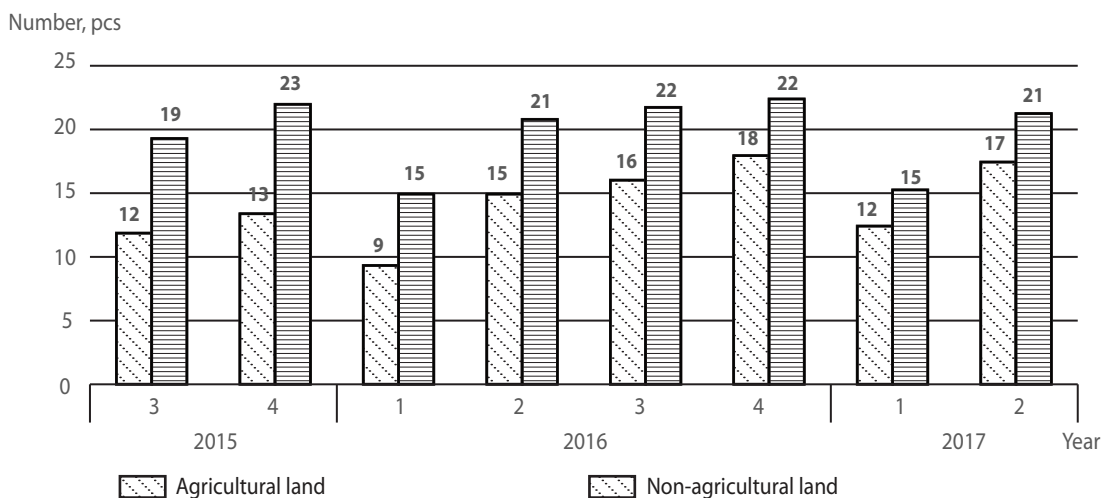


Fig. 2. The number of land purchase and sale transactions by land category, ths

Source: developed by the authors based on [19]

lute restrictions on foreign capital. However, in France, Belgium and Austria, the vast majority of purchase and sale transactions are reviewed and approved by local government authorities, such as SAFER in France. This significantly complicates and delays the purchase and sale process, which negatively affects the attractiveness of the market and trends its development. At the same time, it provides the possibility to control the market.

b) inheritance

Inheritance of a land plot is the transfer of the property rights and liabilities of a deceased citizen to another person connected with the land plot. It is to be noted that there is an increase in the number of inherited agricultural land plots. This is due to the age of owners. Thus, the average age of an allotment owner in Ukraine is 65 (Fig. 3).

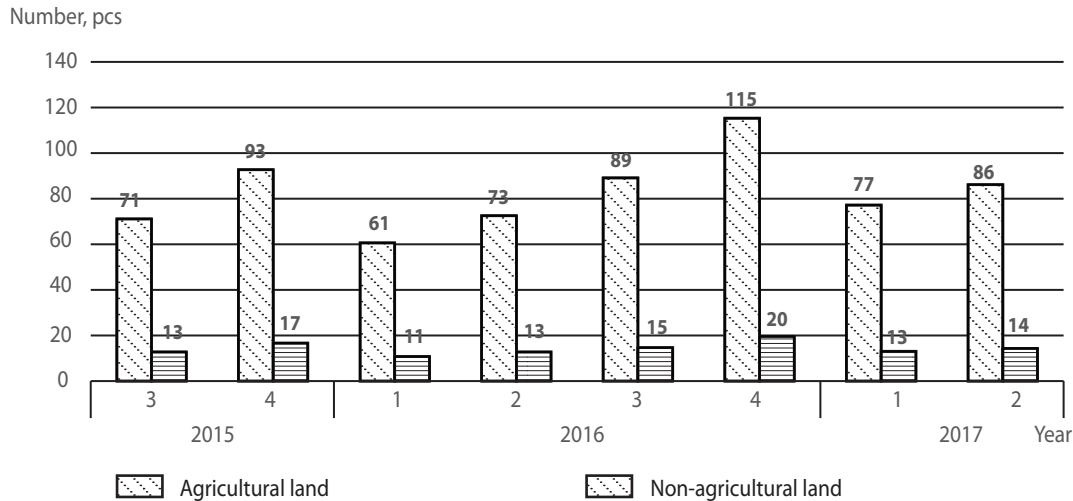


Fig. 3. Total number of inherited land plots across Ukraine, ths

Source: developed by the authors based on [19]

Analysis of the data presented in Figure 3 allows us to assert that 193 184 plots were inherited in Ukraine in the 3rd and 4th quarters of 2015, of which 85 % was accounted for by agricultural land, 15 % – non-agricultural land. In 2016, this proportion stayed the same, and the number amounted to 395 256. In the first two quarters of 2017 it was 190 682, and the proportion changed slightly in favor of agricultural land – 86 % versus 14 %.

c) exchange and gifts

Taking into account the specific character of agricultural production, there is a need for exchanging land plots in order to improve the efficiency of technological operations with agri-

cultural land. An exchange agreement is a civil agreement, according to which each party undertakes to transfer one good in exchange for another one to the ownership of the other party. 30 541 land plots were exchanged/gifted in Ukraine in the 3rd and 4th quarters of 2015, of which 41 % were agricultural, 59 % were non-agricultural plots.

In 2016, the share of agricultural land increased to 46 % (the total number in both categories of land amounted to 62 626 plots). And in the first two quarters of 2017, the situation changed in general in favor of agricultural land plots, the share of which increased to 54 % out of 31 425 exchanged/gifted ones (Fig. 4).

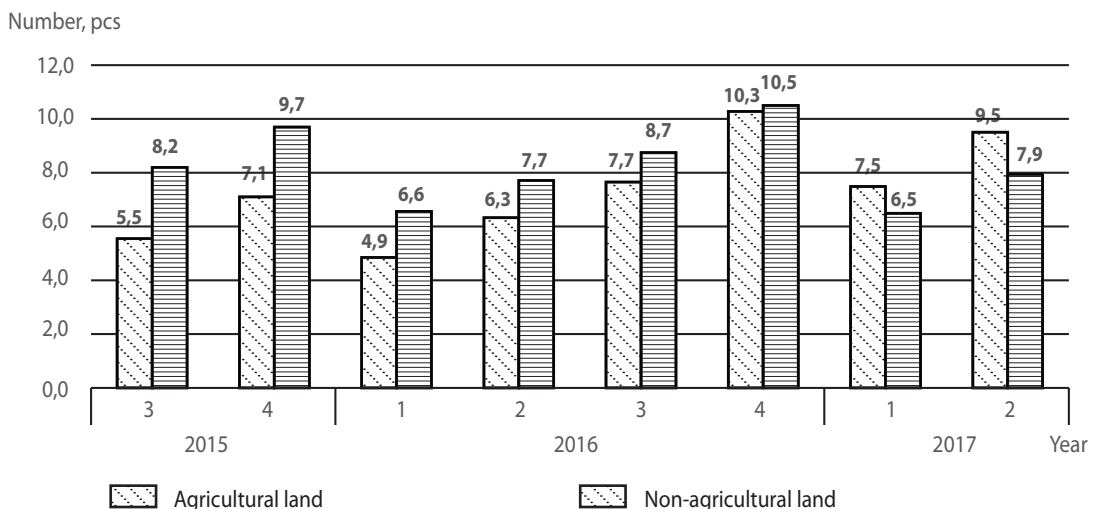


Fig. 4. The total number of exchanged/gifted land plots, ths

Source: developed by the authors based on [19]

d) *pledge*

Real estate has always been valued in banking as a reliable guarantee of loan repayment. A pledge of land and real estate to obtain a long-term loan in a bank is called a mortgage. Mortgage is a kind of pledge of immovable property (land, enterprises, constructions, buildings, other objects directly related to land) in order to obtain a loan. In case of loan default, the pledged immovable property is sold, and the debt is paid off at the expense of the proceeds. The experience of mortgage lending is actively used in EU Member States. Individual govern-

ments in European countries are trying to implement programs intended to reduce the cost of loans for agricultural producers. For example, in Europe, where the average interest rate on business loans varies from 5 to 6 %, they are trying to achieve a reduction in the cost of loans to farmers to 3 %.

One of the reasons why commodity producers in Ukraine do not credit resources actively is the lack of assets that can be used as collateral. In the context of moratorium on the sale of agricultural land, this asset is not interesting for banking institutions (Fig. 5).

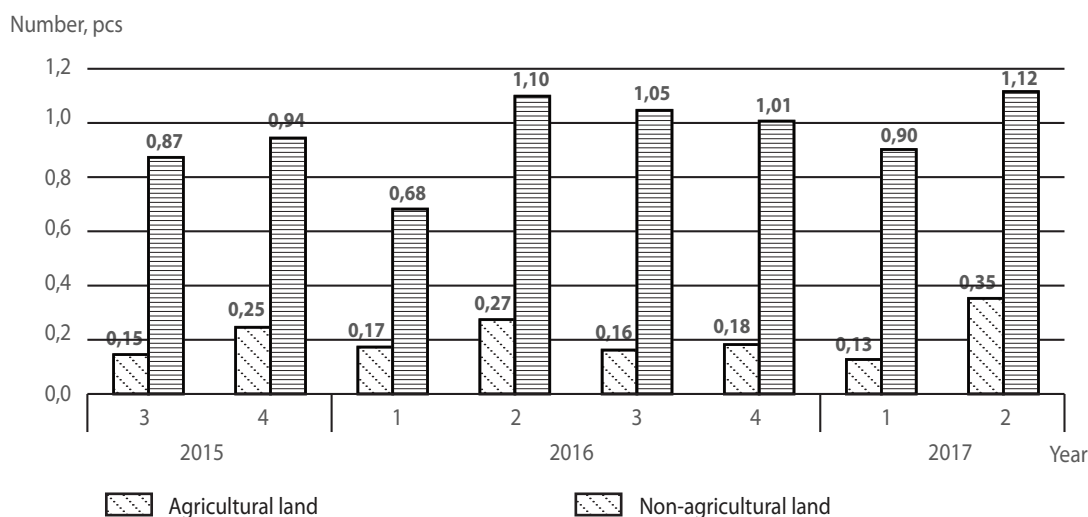


Fig. 5. The number of pledged or mortgaged land plots by land category, ths

Source: developed by the authors based on [19]

A small number of registered transactions related to the transfer of land under pledge or mortgage for the period from July 2015 to June 2017 indicates an insufficient level of development of this market. In 2016 and in the 1st and 2nd quarters of 2017 the trends in using non-agricultural land as a pledge preserved in Ukraine. The total number of such cases amounted to 4 626 and 2 498, respectively, while the share of non-agricultural land was 83 % and 81 % (accordingly, agricultural land was taken as a pledge only in 17 % and 19 % of cases).

The state should urge commercial banks to reduce interest rates for small and medium-sized commodity producers, who often have a shortage of current assets. In such cases, European governments allocate certain amounts from the budget to achieve this goal. At the same time, the loan will be issued on the pledge of land or any other liquid assets. The main task of the state is to make it possible for farmers to get a relatively low interest on a loan, regardless of what they own.

e) *lease*

Land lease is a contractual fixed-term paid ownership and use of a land plot, which a land tenant requires in order to do business and other activities. The Law of Ukraine “On Amendments to Certain Legislative Acts of Ukraine on Business Environment Simplification Task (Deregulation)” established a minimum term for lease of land plots for commercial agricultural production, farming, and a private peasant farm of 7 years. 640 175 registered land plots of various categories were leased in Ukraine in the 3rd and 4th quarters of 2015, of

which 96 % was accounted for by agricultural land. In 2016, their number was 1 488 078, and in the 1st and 2nd quarters of 2017 it was 719 518; in both cases the share of agricultural land amounted for 97 % (Fig. 6).

Lease is the main tool for increasing land use in EU Member States. The share of leased land ranges from 60 % (Hungary, Estonia) to 90 % (Bulgaria) within the scope of land mass. In general, leased land accounts for 53 % of the total area of land use in European countries; and the share tends to increase due to market transactions with agricultural land. The mandatory condition in a lease agreement is administrative liability for the deterioration of land.

f) *emphyteusis*

Emphyteusis is a long-term, alienated and inherited real property right to property of another, which is intended to provide a person with the use of a land plot of another person for agricultural purposes in order to obtain yield and make profit with the obligation to use it effectively in accordance with the designated purpose. The emphyteusis rights were registered for 3 944, 11 290 and 10 390 land plots in Ukraine in the 3rd and 4th quarters of 2015, in 2016 and in the 1st and 2nd quarters of 2017, respectively.

The analysis of extreme values as regards land transactions allows to state that the number of transactions is increasing, mostly lease and emphyteusis, and least of all mortgages. That is, if the conditions remain unchanged (first of all, if the moratorium on the purchase and sale of agricultural land is in

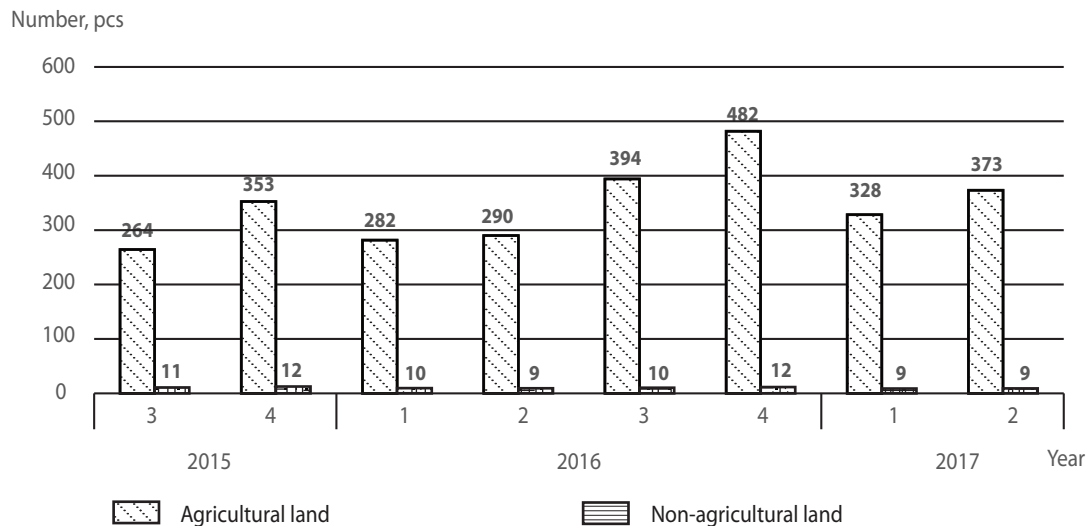


Fig. 6. The number of registered leased land plots, ths

Source: developed by the authors based on [19]

effect), changes in the structure of the Ukrainian agricultural land market are not expected. A similar trend is also observed for all transactions with non-agricultural lands, i.e., a slight growth in the number and high quarterly fluctuations, especially as regards purchase and sale, and inheritance transactions.

3. European experience in the development of land governance through the lens of agricultural land transactions

Agricultural land markets in the EU countries are relatively stable and not very active, which is reflected in the changes in the number and structure of agricultural land transactions. For example, in France, between 1993 and 2005, agreements were concluded on an average in respect of 280 000 hectares annually. This was about 1 % of the total agricultural land. In Italy, the purchase and sale agreements were concluded in respect of about 1-2 % of the agricultural land area. In Ireland, this share was about 3 %; in Spain, Sweden and the United Kingdom – only 0.6 % [2].

As for the new EU members, the sale of agricultural land in Bulgaria was less than 2.5 % of the total land area before the country's EU accession. This area increased by 45 % between 2006 and 2008. In Romania, this share was even lower before its EU accession, on average less than 1.5 % annually. The area of agricultural land sold increased more than threefold between 2005 and 2009. In Poland, about 0.9 % of land was sold at public auction, and a similar amount was sold privately. In the Czech Republic, the annual turnover of land acquired privately amounted to about 0.2-0.3 % of the total agricultural land in the period 1993-2001 and 1.5 % between 2002 and 2004 and reached 3.3 % in 2005. This increase was caused (among other reasons) by launching a program of cheaper mortgage loans.

As regards lease transactions, the highest rent rates are recorded in Greece, Ireland, and Austria (over EUR300 per hectare annually), while the lowest – in Croatia and Estonia (EUR103 and EUR60 per hectare, respectively). In most of the other countries, rental rates are around EUR200 per hectare. The rent rates are mainly determined by the economic returns

on the use of land, i.e., it depends on the value of agricultural products that can be produced on one hectare net of other costs. In this case, the profit from tilling agricultural land depends on the price of agricultural products, agricultural technology, soil fertility and the availability of land (Fig. 7).

When it comes to purchase and sale transactions, prices for agricultural land in neighboring countries and EU countries are very different. The highest prices are recorded in the Netherlands and Italy (EUR33 500 and EUR68 200 per hectare). In most Western European countries, prices range from EUR15 000 to EUR30 000 per hectare, and in Eastern Europe – from EUR2 000 to EUR5 000 per hectare (Fig. 8). Prices with the highest growth rates were recorded in 2011-2017 in the new EU member states: Czechia – 252 %, Lithuania – 195 %, Estonia – 172 %, Bulgaria – 119 % [2].

If in Ukraine the ratio of rental rates and prices is the same as in the EU, it should be expected that the average price of land will be USD 2 990 per hectare (with a 95 % confidence interval from USD1 480 per hectare to USD6 030 per hectare).

There was an increase in prices for agricultural land absolutely in all EU Member States after the reform of the market. And in Romania, which has one of the most liberalized and open markets among the countries of this group, there was the greatest price increase during the transition period. Between 2002 and 2012, CAGR (compound annual growth rate of investments over a period of time), agricultural land prices in Romania amounted to 37.5 %, and in 2005, before the country's accession to the EU, the price of land increased almost threefold in comparison with the previous year. In general, the experience of the new EU Member States is very useful and relevant for Ukraine.

Given that in the 1990s they happened to be in circumstances similar to those of Ukraine, but they chose a faster and more radical method for the development of the agricultural land market. This, in turn, led to a difference in today's indicators of socioeconomic development of Ukraine and the new EU Member States. It should be noted that the speed of the reform and the liberalization of agricultural land market is di-

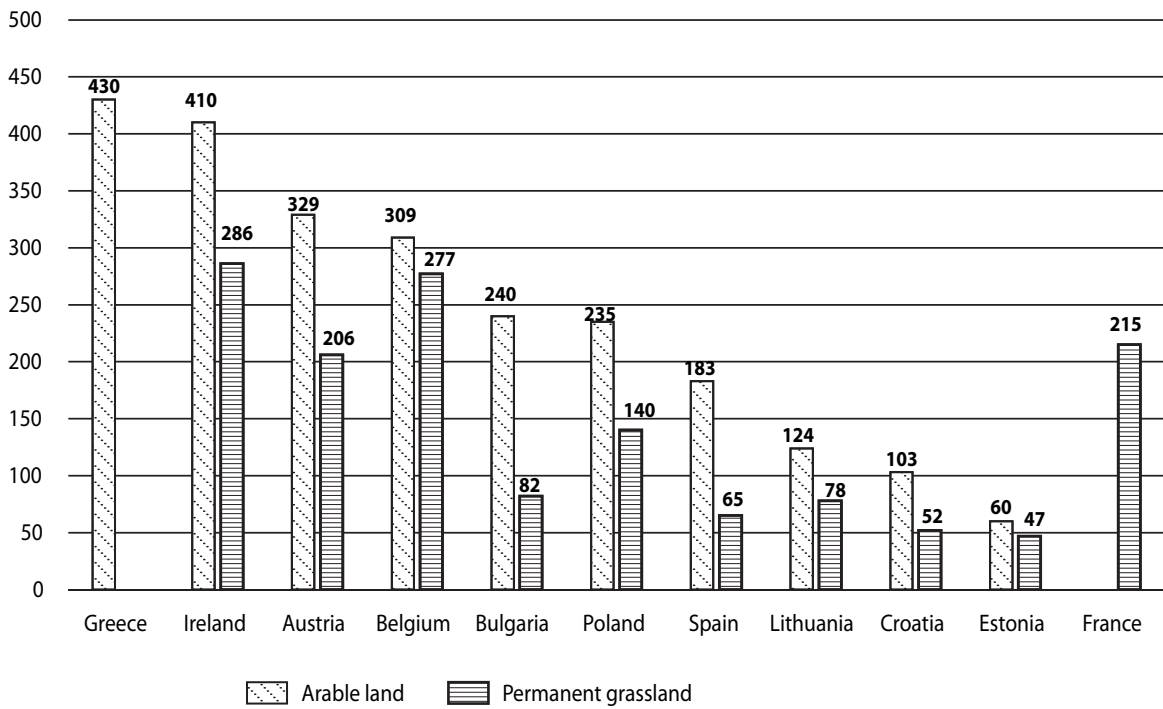


Fig. 7. Agricultural land renting prices, euro per hectare, 2017

Source: [2]

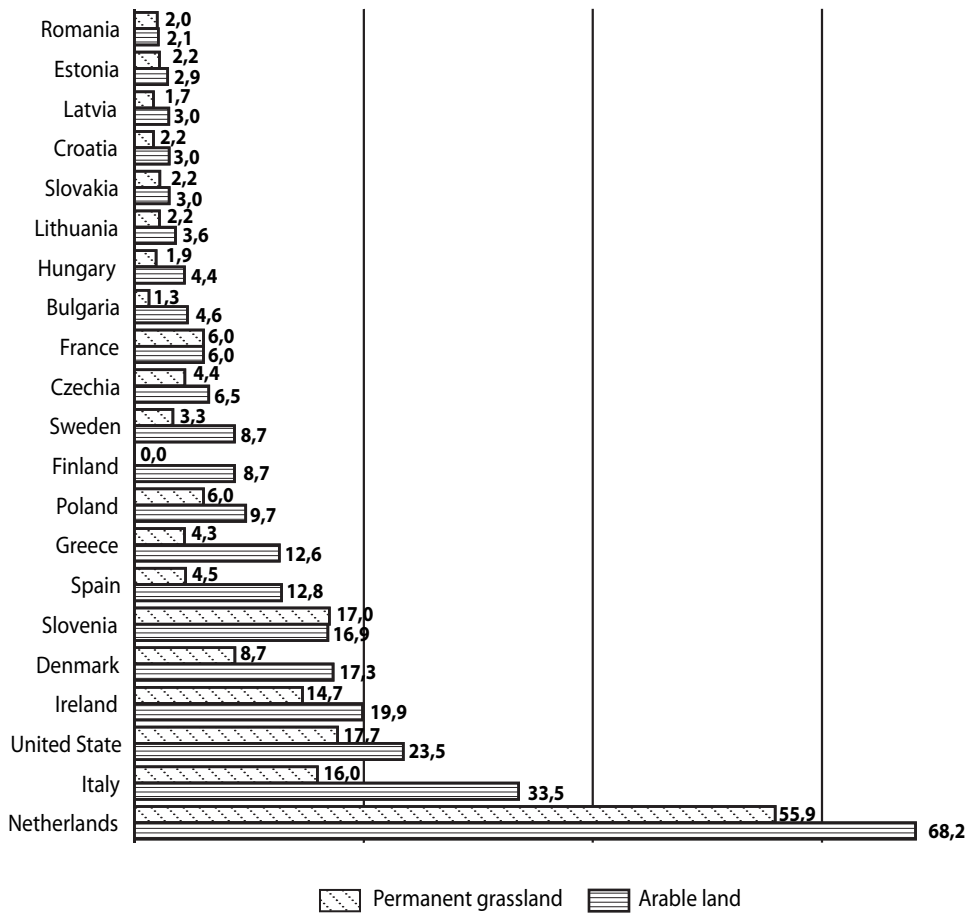


Fig. 8. Agricultural land prices, thousands of euro per hectare

Source: [2]

rectly proportional to the growth of the economy and welfare of the EU population.

The EU Member States (Bulgaria, Estonia, Latvia, Lithuania, Poland, Romania), which had a model of agricultural sector development similar to the Ukrainian one, which rests upon collectivization or state-owned production, carried out land reform in the early 1990's of the last century. It is based on restitution – the return of land to former owners – and auction distribution of land with subsequent phased liberalization of foreign capital access to them. Private property and the agricultural land market in each of the EU Member States were formed with the stated objectives to ensure a high level of efficiency of agricultural production (Latvia, Lithuania, Bulgaria), to develop a mechanism for social protection of the population living in rural areas (Poland, Hungary).

4. Cluster analysis of the land governance development through the lens of transactions

The obtained information on transactions at the regional level provides an understanding of the market performance, its response to micro- and macroeconomic factors, introduction and implementation of government programs, etc. These indicators also testify to the capacity and flexibility of the market and are the most sensitive indicator of changes. Transactions with land plots make it possible to assess the aggregate of legal and economic relations that arise in the process of land plots turnover. The analysis of transactions allows us to determine the influence of the reforms carried out in the country and to

study the regional features of land governance development as well as the efficiency of the land use.

The number of land transactions in the context of regions became the basis for the cluster analysis of the level of land governance development in different regions of Ukraine. The selected transactions were purchase and sale, inheritance, exchange and gifts, lease, mortgage and pledge, emphyteusis.

As a result of using the elbow method, the optimal number of clusters was determined for further use in the k-means and Ward's methods (dendrogram). It was established that the formation of 3 clusters is optimal for a further analysis.

With the help of the Ward method, the regions of Ukraine were divided into three cluster groups by the number of agricultural land transactions: 3rd cluster (Volyn, Transcarpathian, Zaporizhzhia, Ivano-Frankivsk, Luhansk, Mykolaiv, Rivne, Kherson, Vinnytsia, Dnipropetrovsk, Donetsk, Zhytomyr, Kirovohrad, Lviv, Odesa, Kharkiv, Chernihiv regions, and the city of Kyiv); 2nd cluster (Poltava, Sumy, Ternopil, Khmelnytskyi, Cherkasy, Chernivtsi regions); 1st cluster (Kyiv region). When applying the k-means method, the results obtained in the previous study using Ward's method were confirmed. Cartographic results visualization of cluster analysis of agricultural land transactions is presented in Figure 9.

The obtained results of cluster analysis allow us to conclude that the number of transactions is increasing – mostly lease and emphyteusis, and least of all mortgages. That is, if the conditions remain unchanged (first of all, if a moratorium on

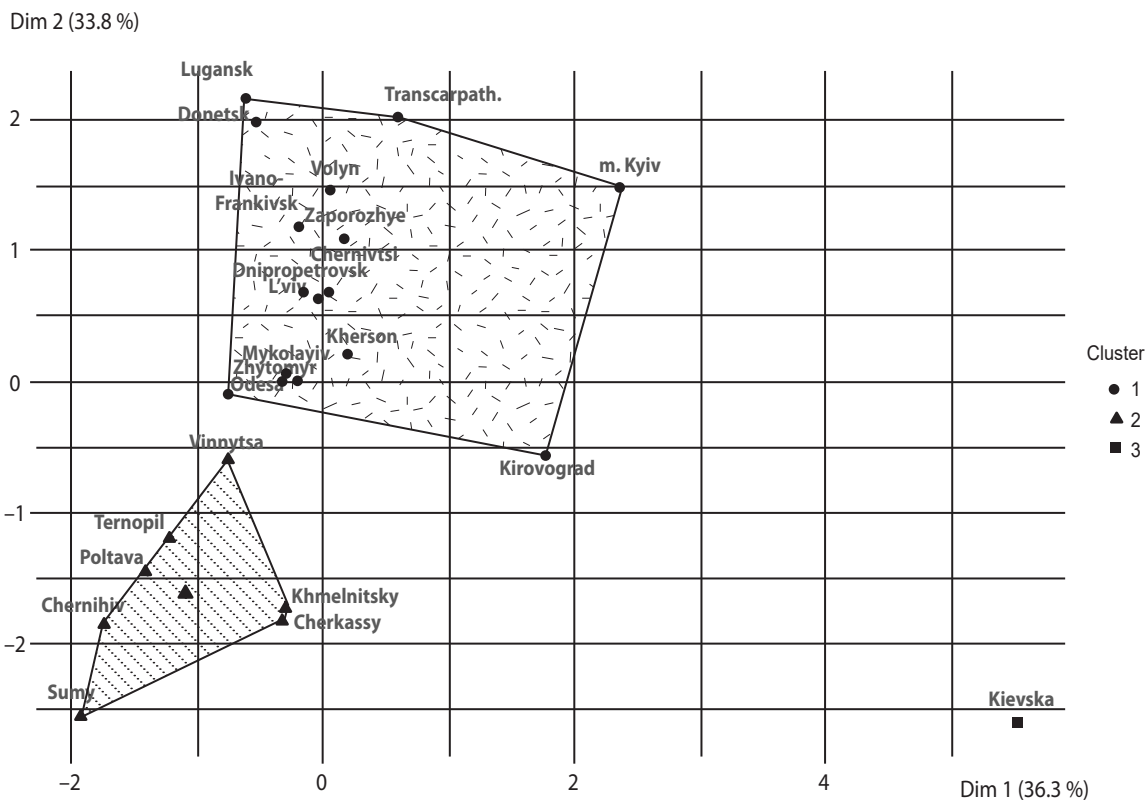


Fig. 9. Graphical interpretation of the cluster analysis of the distribution of Ukraine's regions by the level of land governance development through the lens of transactions (k-means method)

Source: developed by the authors

the purchase and sale of agricultural land is in effect), changes in the structure of the Ukrainian agricultural land market are not expected. A similar trend is also observed for all transactions with non-agricultural lands, i.e., a slight growth in the number

and high quarterly fluctuations. Cartographic interpretation of the cluster analysis of the distribution of Ukraine's regions by level of development of agricultural land transactions makes it possible to clearly single out three cluster groups (Fig. 10)



Fig. 10. Cartographic interpretation of clustering Ukraine's regions by level of land governance development through the lens of transactions

Source: developed by the authors

Each cluster has its own features determined by the geographical location, economic development of the regions, as well as their climatic and natural peculiarities.

The first cluster, which includes only Kyiv region, significantly differs from all others in terms of level of land governance development and land transactions. Thus, the number of purchase and sale transactions is by 10 percentage points higher than the average in Ukraine. In addition, 24 % of all purchase and sale transactions fall on this cluster. In the regions of the second cluster, the share of lease transactions is by 2 percentage points higher than the total for Ukraine. On average, one region is accounted for by 84 thousand lease transactions, while in the first cluster this figure amounts to 79 thousand, and in the third one – 51 thousand. This feature indicates the functioning of the inadequate land market, which is at the final stage of formation. The third cluster is characterized by the accordance of its indicators with the averaged ones throughout Ukraine. This cluster comprises 17 regions. They have the largest share of inheritance transactions (18 %), a high share of lease transactions (77 %), and the smallest number of purchase and sale transactions – 1.9 thousand on average per region.

Conclusions and prospects for further research.

A characteristic trend for the domestic agricultural sector is an increase in the number of agricultural land transactions. The

land market in Ukraine is functioning. At the same time, the structure of agricultural land transactions is deformed under the influence of the moratorium on the purchase and sale of agricultural land. During the period under investigation, the number of all transactions related to agricultural land tended to increase. The highest growth was mostly observed among lease and emphyteusis transactions, and the lowest among mortgages. A similar trend is also observed for all transactions with non-agricultural lands, i.e. a slight growth in the number and high quarterly fluctuations, especially for purchase and sale, and inheritance transactions.

With the help of cluster analysis, three clusters were distinguished according to the level of land governance development using a range of agricultural land transactions. Taking into account the results obtained, the following conclusions can be drawn: lease prevails in the structure of transactions in the vast majority of Ukrainian regions. This is a consequence of the presence of an artificial fuse element for a further development of land governance in the form of a moratorium on the purchase and sale of agricultural land and the absence of the Law of Ukraine on market turnover of agricultural land.

The practice of EU Member States proved that a well-developed and well-institutionalized land market ensures the distribution of land ownership rights in such a way that a sound

use of land resources and related economic assets is achieved. The analytical review and the results of the study of the evolutionary characteristics of the process of land governance transformation in Bulgaria, Estonia, Latvia, Lithuania, Poland, and Romania allowed highlighting the main elements of the formation of a full-fledged agricultural land market. They include a cadaster, specialized land agencies, a market mechanism for land valuation, lease relations, and state regulation. The availability of market infrastructure and proper institutional provision for purchase and sale of agricultural land enabled the countries under investigation to liberalize the market and make it free from regulatory restrictions.

The conducted study makes it possible to conclude that the most reliable way to solve the global food problem is to increase the food production through raising biological productivity of the already existing land. The intensification of agriculture in developing countries is associated with biotechnology, the use of new high-yielding varieties and new methods of tillage, a further development of mechanization, the use of chemicals, melioration. Accordingly, the completion of land reform is required.

Undoubtedly, the adoption of a law on the turnover of agricultural land in 2020 is an important historical and, especially, psychological event for Ukraine. However, in order to create a full-fledged and transparent land market, a number of other land-related bills should be adopted as soon as possible.

The land reform is not limited to bill No. 2178-10 on the turnover of agricultural land. Now it contains a package of 8 bills and a set of measures aimed at increasing the transparency of land management. This includes the development of the Land Relations Monitoring System and the Agricultural Register, the creation of a Credit Guarantee Fund. All this needs to be approved and implemented so that the land market could operate in a transparent way and with a maximum effect for Ukraine.

Thus, only systemic reforms will lead to positive results in the agricultural sector, ensure the country's food and economic security and form its export potential.

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