“Managing the efficiency of enterprises based on assessment of the land resource potential”

AUTHORS	Raisa Kozhukhivska http://orcid.org/0000-0003-4066-4170 Volodymyr Kulbitsky Iryna Kyryliuk https://orcid.org/0000-0001-9814-195X http://www.researcherid.com/rid/F-9440-2018 Liudmyla Maliuga http://orcid.org/0000-0002-4057-2404 Svitlana Podzigun

ARTICLE INFO	Raisa Kozhukhivska, Volodymyr Kulbitsky, Iryna Kyryliuk, Liudmyla Maliuga and Svitlana Podzigun (2018). Managing the efficiency of enterprises based on assessment of the land resource potential. *Problems and Perspectives in Management*, *16*(2), 164-178. doi: 10.21511/ppm.16(2).2018.15
DOI	http://dx.doi.org/10.21511/ppm.16(2).2018.15
RELEASED ON	Friday, 11 May 2018
RECEIVED ON	Friday, 02 March 2018
ACCEPTED ON	Wednesday, 02 May 2018

JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
27	3	6

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10, Sumy, 40022, Ukraine

www.businessperspectives.org

Raisa Kozhukhivska (Ukraine), **Volodymyr Kulbitsky** (Ukraine), **Iryna Kyryliuk** (Ukraine), **Liudmyla Maliuga** (Ukraine), **Svitlana Podzigun** (Ukraine)

MANAGING THE EFFICIENCY OF ENTERPRISES BASED ON ASSESSMENT OF THE LAND RESOURCE POTENTIAL

Abstract

Modern economics is a complex multi component system where management is aimed, first of all, at solving problems of optimal use of land, labor and material and technical resources in order to increase the efficiency of production.

Land is the basis of agricultural development. If in all other branches of production land plays mainly a passive role, it is an active element in agriculture. In this branch, it is simultaneously an object of labor and a means of production due to which a man grows necessary crops.

The purpose of the article is to analyze the use of land resources and determine indicators to improve of the efficiency of land resource potential for improving the management system of resource potential of enterprises.

The conducted research made it possible to conclude that enterprise's land resources are interdependent and interconnected and balanced optimal correlation between them opens up opportunities for developing an innovative economic system which is characterized by maximum productivity.

As a result of the study, it has been established that the process of managing land resource potential of enterprises should be based on the use of a systematic approach, which involves evaluating land resource opportunities and their rational use in the conditions prevailing.

The practical value of the research is to carry out an assessment of the land resource potential of enterprises on the basis of the use of the index estimation method. The evaluation of quantitative and qualitative characteristics of structural components of the land potential of the territory allows us to analyze the level of development of the regional economy, identify disparities between individual elements of the potential, as well as to define priority areas of regional policy in the field of land use.

The assessment made it possible to determine main criteria for improving the efficiency and potential use of land resources of enterprises. As a basis the indicator of potential yields can be used.

Keywords land, resource, potential, efficiency, assessment, management, enterprise

JEL Classification O13, O18, Q12, R14

Received on: 2nd of March, 2018
Accepted on: 2nd of May, 2018

Raisa Kozhukhivska, Ph.D. (Economics), Associate Professor, Uman National University of Horticulture, Ukraine.

Volodymyr Kulbitsky, Ph.D. (Agricultural Sciences), Associate Professor, Uman National University of Horticulture, Ukraine.

Iryna Kyryliuk, Ph.D. (Economics), Associate Professor, Pavlo Tychyna Uman State Pedagogical University, Ukraine.

Liudmyla Maliuga, Ph.D. (Economics), Associate Professor, Uman National University of Horticulture, Ukraine.

Svitlana Podzigun, Ph.D. (Economics), Associate Professor, Pavlo Tychyna Uman State Pedagogical University, Ukraine.

INTRODUCTION

Successful functioning and development of enterprises depends on the level of their resource support. However, the decisive role belongs to land. Land is the main means of agricultural production and, therefore, the main task today is the rational use of land resource potential in production, which needs proper scientific support. Under such conditions, the issue of specific management and increase in the efficiency of use of land resource potential of enterprises becomes of particular urgency.

Despite a large number of works and economic studies in enterprise resource management, currently, there is a problem regarding the

study of peculiarities of the management system and specifics of land use and land resource potential of agricultural enterprises of Ukraine at the regional level.

Efficiency of land resource potential as a system is developed and implemented in the agricultural enterprise as a means to ensure implementation of a specific policy and achieve the goal taking into account specific activities and specifics of the enterprise. The improved efficiency system of land resource potential should provide maximum productivity of land resources, which are used in the process of achieving the goals set by the enterprise taking into account possible changes due to instability of the economic environment under the conditions of increased competition.

The main task of the management system of land resource potential of enterprises is, first of all, to improve principles of using land resources and increase their efficiency. Therefore, some aspects of management and use of land resource potential of enterprises require further study and innovative research.

1. LITERATURE REVIEW

Land is the greatest natural resource that a man uses to provide his needs for material goods: food, industrial goods, services and conditions. Among land categories, agricultural lands, that is, those provided for agricultural needs, have the most important economic value. According to Article 22, Paragraph 5 of Land Code of Ukraine ("Agricultural lands", 2017), agricultural lands include: agricultural lands (arable lands, perennial plantations, hayfields, pastures and lealands); non-agricultural lands (general service pathways and trails, field safeguarding forest belts and other securing stands, except designated forest lands, lands for economic buildings and yards, lands for the infrastructure of wholesale markets of agricultural products and conservation reserve lands).

Land is the object, tools and means of labor and industrial relations that arise in the process of its use and appropriation of labor results. It is the natural environment in which there are a man, natural matter, territorial space of the existence and development of human society and material basis of production (Mocherniy et al., 2003).

Land is the main means of production in agricultural enterprises. It cannot be replaced by another means. It has its own peculiarities in comparison with other means. Firstly, land is created by nature itself and not by human labor, as other means of production (buildings, structures, cars, etc.). Secondly, unlike other means of production, land does not wear out and in case of rational use, its fertility increases. Thirdly, it is not expanding, so it must be treated carefully. Fourthly, at the same time, land is an object of labor, because work of people is directed at it and a means of labor, because it helps people influence plants to obtain harvest (Rudenko, 1994). Land is an active factor in the labor process (Oliynyk, 2006) and is the main means of production in agriculture (Gorlachuk, 2006).

The definition of the essence of the term "land resources" can be found in works of many famous scientists. For example, Mints (1972) believes that land resources are agricultural resources that include a complex set of components of the natural landscape and represent a specific combination of soil, relief and climate used for growing crops and fattening cattle. Gutsulyak (1991) characterizes land resources as one of the bases for development and placement of the national economy. From a geographic point of view, land resources are a surface of land characterized by various natural and historical conditions: soil, relief, vegetation, waters, etc. From an economic point of view, land resources are a combination of land showing the form of land use as a means of production and nature of employment of the territory (the economic purpose or other function). Andriyishin and Shuleykin (1969) give such a definition to the concept of land resources as "this is the main type of natural resources that at this level of development of productive forces and their level of study are used or can be used as means of production in agriculture and forestry and is or may be a spatial basis for placement and development of all branches of the national econo-

my". Consequently, land resources are complex system formations that form their own land resource potential.

It is expedient to apply the economic category "resource potential" to evaluate the resource efficiency. The term "resource potential" in scientific research is used mainly in relation to regions, large economic regions and the country as a whole. Since one of main components of the resource potential of these entities is the enterprises that provide production of goods and services, therefore we can apply this term also in relation to the enterprise.

Grishina, Yefimova, Grishina (2011) propose to name the resource potential as the aggregate capacity of economic resources available within the region to provide production of the maximum possible volume of material goods and services that meet the needs of society at this stage of development. Consequently, land resources are complex system formations, which form their own land resource potential. Land resource potential is: 1) the aggregate productivity of all land resources that are used or can be used as means of production and consumer goods, expressed in their total social value; the most important component of natural resource potential; 2) land ability to produce certain economic products or to be the spatial basis of society's life in specific socio-economic and historical boundaries of methods and forms of land use (Rudenko, 1994).

According to Avramenko (2006), the concept of "land resource potential" is characterized by a combination of resources of the land, which determine environmental conditions of life, human settlement, can be used to accommodate means of production and have biological productivity for economic activity. Thus, the land resource potential is all land resources that are used or can be used as means of production in agriculture and forestry and is or may be a spatial basis for placement and development of all branches of the national economy.

Improving efficiency the land resource potential provides a systematic approach in relation to each of the above definitions. In this regard, it is necessary to study the issue of evaluation and effectiveness of use of land resource potential of agricultural enterprises, optimal combination of its elements and their rational use in relation to the conditions in the agricultural sector.

2. DATA AND METHODS

Methodological bases for calculating of efficiency of land resource use can be represented according to formulae 1-14 (Parmakli & Babiy, 2008):

A. Gross output in non-monetary and cost estimation for the production of one crop in one year:

$$P_l = \frac{\sum_{i=1}^{n} Y_i \cdot S_i}{\sum_{i=1}^{n} S_i}, \quad (1)$$

$$P_l = \frac{\sum_{i=1}^{n} B_i \cdot S_i \cdot P_c}{\sum_{i=1}^{n} S_i}, \quad (2)$$

where P_l is land productivity (c/ha, UAH/ha); Y_i is crop yield in i plot (c/ha); S_i is i plot area (ha); P_c is crop current price (UAH/c); n is number of plots.

B. Gross output in non-monetary and cost estimation for the production of one crop in the period of years:

$$P_1 = \frac{\sum_{j=1}^{k} Y_j \cdot S_j}{\sum_{j=1}^{k} S_j}, \quad (3)$$

$$P_l = \frac{\sum_{j=1}^{k} B_j \cdot S_j \cdot P_c}{\sum_{j=1}^{k} S_j}, \quad (4)$$

where P_1 is land productivity (c/ha, UAH/ha); Y_j is crop yield in j year (c/ha); S_j is crop plot area in j year (ha); P_c is crop comparable price (UAH/c); k is number of cultivation years.

C. Gross output in value estimation for the production of a group of crops or all crops for one year:

$$P_1 = \frac{\sum_{j=1}^{n} Y_{jy} \cdot S_{jy} \cdot P_{cy}}{\sum_{j=1}^{n} S_{jy}}, \quad (5)$$

where Y_{jy} is *y*-crop yield in *j* plot (*c*/ ha); S_{jy} is *y*-crop plot area in j plot area (ha); P_{cy} is current selling price of *y*-crop (UAH/c).

D. Gross output in value estimation for the production of a group of crops or all crops over a period of years:

$$P_1 = \frac{\sum_{j=1}^{k} Y_{jy} \cdot S_{jy} \cdot P_{cy}}{\sum_{j=1}^{k} S_{jy}}, \quad (6)$$

where Y_{jy} is *y*-crop yield in j year (c/ha); S_{jy} is plot area in *y* year (ha); P_{cy} is comparable price of *y*-crop (UAH/c); k is number of years of cultivating crops.

2.1. Analysis of the factors affecting land productivity

The study of factors affecting land productivity makes it possible to determine the exact dependence of the cost of cultivated crops on the yield level. There is a reverse dependence between them. Thus, the increase in yield leads to the decrease in production cost, and vice versa, the decline in yield is associated with rising costs per unit of output.

Total costs (TC) associated with the production and sale of products are divided into fixed charges (FC) and variable charges (VC). The latter, in contrast to fixed charges, are characterized by the fact that their value depends on the production volume. These include mainly the costs associated with collection and sale of products. Cost per unit (Z) can be expressed by the formula:

$$Z = ATC = \frac{FC}{g} + AVC, \quad (7)$$

where FC is fixed charges per 1 hectare of area, UAH; AVC is variable charges per unit of product, UAH/ person; g is yield, c/ha.

In agriculture, unlike other sectors of economy, semi-fixed costs have high share in the cost structure (by 60-90%). This is why it is important to get the maximum output from the investment.

For land users, it is very important to know how the profit amount varies depending on the level of land productivity for each crop.

Profit per one centner of production $\left(P_p\right)$ and one hectare of land $\left(P_{land}\right)$ are determined by the formulas:

$$P_p = p - AVC - \frac{FC}{g} = d - \frac{FC}{g}, \quad (8)$$

$$P_{land} = g \cdot \left(p - AVC\right) - FC = g \cdot d - FC, \quad (9)$$

where d is marginal revenue per unit of output, UAH/c $\left(d = p - AVC\right)$; p is sales price, UAH/c.

Only by improving quality of technological operations on cultivating and harvesting (under other equal conditions), it is possible to achieve greater output of products per unit area, and, hence, higher profits. So, profit growth $\left(\Delta P_{land}\right)$ will be:

$$\Delta P_{land} = \left(p - AVC\right) \cdot \left(g_n - g_b\right), \quad (10)$$

where g_n and g_b are yield of new and basic options, c/ha.

On the one hand, the experience of developed countries to limit the amount of cultivated crops by one economy (specialization in the production of one or two crops) and, on the other hand, the need to use natural resources of the region rationally in the direction of finding ways to grow and produce different types of products are of interest.

Given the fact that the territory of Cherkasy region is located in the temperate zone, in our opinion, it would be necessary to increase crops and cultivation of legumes, for example, soybeans of the Slavic species.

2.2. Determining the coefficient of using the potential of land productivity

In agriculture, the coefficient of using the potential of land productivity is determined by the ratio of the actual yield level to the potential one:

$$C_{pu} = \frac{ga}{gp}. \quad (11)$$

Potential productivity level of land resources is defined as the actual yield and real reserve of its growth:

$$g = ga + \Delta g. \quad (12)$$

So,

$$C_{pu} = \frac{ga}{ga + \Delta g} = \frac{1}{1 + \frac{\Delta g}{ga}} = \frac{1}{1 + \beta}, \quad (13)$$

where

$$\beta = \frac{\Delta g}{ga}. \quad (14)$$

Land resources of the enterprise are interdependent and interconnected and the balanced optimal correlation between them opens opportunities for developing an innovative economic system that differs in maximum productivity.

3. RESULTS AND DISCUSSION

Throughout the history of mankind, land played, plays and will play a very important role in the development of production. It is a prerequisite for the existence of human society. Rational use of land resources is of great importance in the economy of agriculture and the country as a whole.

3.1. Land – as a means of production

Land is an object of labor when a man influences the soil and creates necessary conditions for the growth and development of agricultural crops. Land is also an instrument of labor in the cultivation of plants in which mechanical, physical and biological properties of the soil are used for production. Consequently, land becomes an active means of production in agriculture. Land belongs to non-reproducible means of production in agriculture. It is a special, unique, original and indispensable means of production. Well-known economist William Petty (1662) in the work "Treatise on Taxes and Duties" said about the role of land: "... labor is the father of material wealth, the earth [die Erde] is its mother....".

Summarizing the above, it should be noted that land is a necessary material precondition of the labor process and one of important real factors of production.

3.2. Principles of effective management of land resource potential

Agriculture is a strategic sector that forms economic, food, energy and environmental security, ensures the development of technologically related sectors of the national economy and creation of social and economic conditions for rural development. The crisis of market relations in Ukraine determines a change in the views on mechanisms of management and nature of agricultural production management. The market defines fundamentally new relations for enterprises of the agricultural sector with state organizations, production and other contractors and workers in relation to the formation and use of resource potential.

Since the external environment is constantly changing and complicated, the system of managing resource potential of the agricultural sector of the economy should acquire new qualities, expanding its capabilities. Consequently, changes in the business environment of domestic agricultural enterprises are associated with the development of competition, information technologies, business globalization and other factors and necessitate the improvement of resource management resource management system aimed at efficient use of resources.

The system of effective management of land and resource potential of enterprises makes it possible to determine which of its internal characteristics weaken effectiveness of achieving efficiency in the management of resource potential. Efficiency is achieved through the implementation of sequential actions that are carried out during management.

Source: Proposed by the author on the basis of the study.

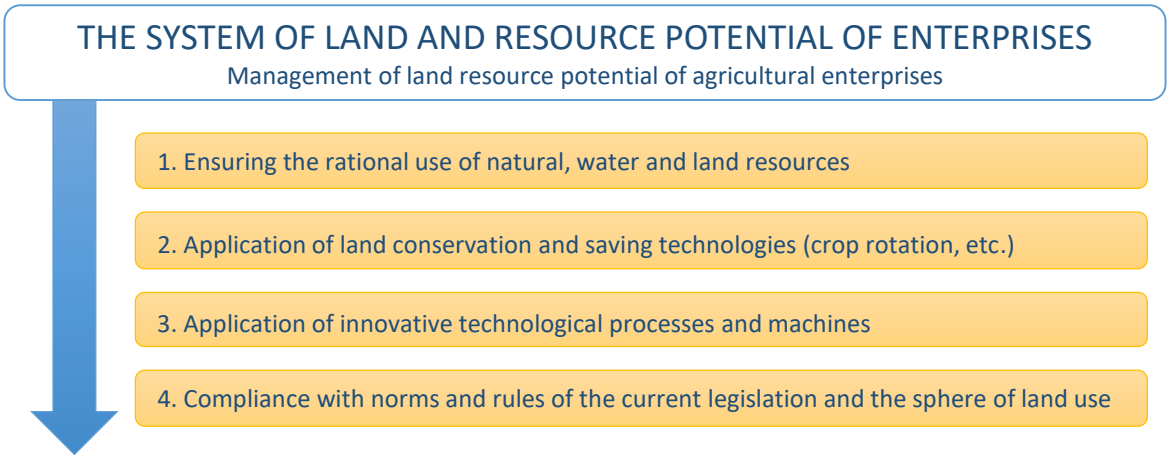

Figure 1. Scheme of formation of the system of land resource potential of enterprises

Figure 1 shows the scheme of effective management of land and resource potential in enterprises, the main principles of which are ensuring the rational use of natural, water and land resources; application of land conservation and saving technologies (crop rotations, etc.); application of innovative technological processes and machines.

Improving the efficiency of land management and use in agriculture depends on the effectiveness of regulating land relations. From the analysis of views of scientists Albeschenko (2012), Dorosh et al. (2011), Zinchenko (2010), Tsarenko, Chupis (2001) and Kapitanets (2011) on the economic content of regulating land relations in agriculture, it can be concluded that their understanding as a set of organizational, legal and economic measures aimed at ensuring rational and efficient use of agricultural lands is general. Improving the land use system, including preserving soil fertility, requires

Source: Proposed by the author.

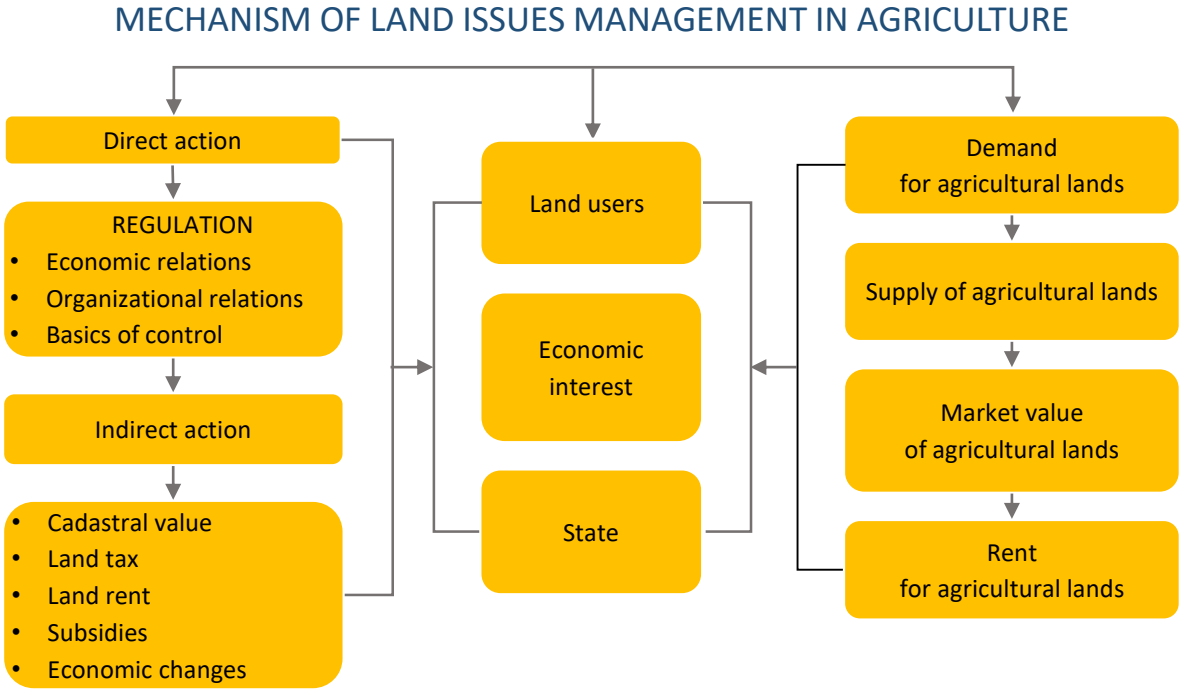

Figure 2. Elements of the mechanism of land issues management in agriculture

Table 1. Land distribution of Ukraine by categories as of January 1, 2017

Source: Proposed on the basis of data analysis of The State Geographical Cadaster of Ukraine.

Land categories	1996		2003		2010		2017	
	Area, thousand hectares	%	Area, thousand hectares	%	Area, thousand hectares	%	Area, thousand hectares	%
Agricultural lands	41890.4	69.4	41763.8	69.2	41650.0	69.0	41511.7	68.8
Forested areas	10331	17.1	10475.9	17.3	10556.3	17.5	10630.3	17.6
Built-up lands	2386.2	4.0	2458.3	4.1	2476.6	4.1	2550.4	4.2
Open wetlands	920.8	1.5	957.1	1.6	975.8	1.6	982.6	1.6
Open lands without plant cover or with insignificant vegetation cover	1105.6	1.8	1039.0	1.7	1038.2	1.7	1015.8	1.7
Other lands	1301.2	2.2	1239.6	2.1	1236.3	2.1	1237.7	2.1
Water	2419.6	4.0	2421.1	4.0	2421.6	4.0	2426.4	4.0
Total	60354.8	100.0	60354.8	100.0	60354.8	100.0	60354.9	100.0

balanced work of the elements of land relations built into the regulation mechanism.

In our opinion, elements of land relations include forms of land ownership, relations of economic use, forms of management of land resources and methods for regulating these relations (Figure 2).

In our opinion, the basis of the mechanism of land relation management in agriculture should be based on such principles: optimal balance of interests of the state and land users; incentives for the careful use, conservation and restoration of land resources; priority of environmental requirements over economic interests; balance in work of direct levers (organizational relations of regulation and economic relations) and indirect influence (land rent payments, subsidies and economic changes). Thus, the mechanism of management of the land relation system should meet economic interests of landowners, land users and the state, improving land management with a view to stimulating their more efficient use and raising interest of land users in improving the quality of agricultural lands.

Land is an active factor in production in agriculture. At the level of the agricultural enterprise, there are such concepts as the total land area and the area of agricultural lands, that is, lands of a certain agricultural use: arable lands, meadows, pastures, perennials, etc. These lands are directly related to the production of agricultural products. They form a group of agricultural lands. However, agricultural production cannot exist without roads, entrances to fields, meadows, buildings and structures outside of settlements. Lands under these objects are also agricultural lands. The same category includes lands outside settlements as ravines and swamps. Thus, the total land area is the territory used by the agricultural enterprise. The part of the total land area directly used for the production of agricultural products is the area of agricultural lands.

The total territory of Ukraine, as of January 1, 2017 amounted to 60354.9 thousand hectares of which 41511.7 thousand hectares or 68.8% are agricultural lands (State Geographical Cadaster of Ukraine, 2017). The entire territory of Ukraine is divided into seven categories of lands differing in their intended purpose.

The distribution of lands in Ukraine by categories as of January 1, 2017 is given in Table 1.

Thus, Table 1 shows that the area of agricultural lands has decreased by 378.7 thousand hectares or by 0.6% in 2017, compared to 1996. The decrease in the area of agricultural lands is due to the economic situation in the agricultural sector of the country and implementation of measures of National Land Conservation Program.

The current state and perspective directions of land use, their structure, distribution by categories and forms of ownership are related to peculiarities of the development of the economy of nature use at the regional level. The main role of territorial development of the area or region is to analyze the existing system of agricultural land use. The objective need for this analysis is possibility of further rational purposeful management of land resources of the territorial subdivision.

The production in agriculture is associated with quality standards of lands, nature and conditions of their use. It is an important productive force without which the process of agricultural production is impossible.

3.3. Analysis of the use of agricultural land in the Cherkasy region

Cherkasy region was chosen for the analysis of the agricultural land use, since by the number of agricultural enterprises, it is among dozens of the most developed agricultural areas of Ukraine (Table 2).

Cherkasy region is located in the central forest-steppe part of Ukraine. The area of Cherkasy region is 20.9 thousand km^2 which is 3.5% of the state (18th place in Ukraine) (Analytical and descriptive part of Cherkasy region development strategy, 2017).

Cherkasy region is a part of central economic region, which is important in the economy due to the agricultural complex.

According to the positioning of Cherkasy region among the Ukrainian regions, assessing the situation in the region, comparing the main indicators of the region's development with neighboring regions and separate regions belonging to the same group, is taken into account (Table 3).

Table 2. Number of agricultural enterprises in Ukraine and the area of agricultural lands in their use by regions[1, 2]

Source: The State Statistics Committee of Ukraine.

Region name	All agricultural enterprises			Farm enterprises		
	Quantity, units	Area of agricultural lands, thousand hectares	Including arable lands, thousand hectares	Quantity, units	Area of agricultural lands, thousand hectares	Including arable lands, thousand hectares
Ukraine	47697	19821.2	19010.0	33682	4437.9	4297.7
Vinnytsia	2668	1112.1	1094.5	1894	250.3	245.4
Volyn	909	251.6	231.6	600	55.2	51.7
Dnipro	4111	1330.7	1307.9	3194	455.2	449.0
Donetsk	1326	754.0	724.6	956	181.4	173.6
Zhytomyr	1103	531.1	508.6	586	68.8	66.4
Zakarpattia	1084	38.1	30.3	939	9.8	8.7
Zaporizhzhia	2790	1232.9	1168.1	2046	346.6	333.1
Ivano-Frankivsk	759	211.6	203.1	507	29.1	27.1
Kyiv	2212	1096.9	1058.3	1221	151.8	144.8
Kirovograd	3229	1232.9	1221.5	2550	417.3	413.7
Lugansk	1062	687.9	653.1	802	227.7	215.1
Lviv	1209	390.3	351.8	788	55.4	51.0
Mykolaiv	4040	1007.7	979.2	3373	352.2	345.9
Odesa	5107	1371.8	1323.0	3966	399.6	391.0
Poltava	2443	1268.2	1230.9	1804	242.8	238.6
Rivne	629	260.5	246.3	371	30.8	29.7
Sumy	1089	884.7	830.2	639	120.2	115.3
Ternopil	1079	519.0	511.4	620	67.7	66.1
Kharkiv	1967	1256.8	1227.4	1211	264.7	258.9
Kherson	2644	982.1	938.6	2047	275.3	261.5
Khmelnytsky	1573	818.9	804.5	1095	134.1	130.4
Cherkasy	2000	980.4	930.9	1274	156.3	146.4
Chernivtsi	832	124.5	114.0	596	29.4	26.0
Chernigiv	1120	1137.3	995.9	598	115.4	107.5
Kyiv city	712	339.5	324.3	5	0.8	0.8

Notes: [1] Excluding the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and parts of the ATO zone. [2] Data as of December 1, 2017.

Table 3. Comparative characteristic of Cherkasy region by main indicators of the economic development as of January 1, 2017

Source: Proposed on the basis of analytical and descriptive data to Development Strategy of Cherkasy region; Main Department of Statistics in Cherkasy region; The State Statistics Service of Ukraine.

Territory	Area, thousand, m2	Population, thousand people	City population, %	Village population, %	Population growth per 1 thousand people	GRP (2016), UAH million	GRP per person (2016), UAH	The region's share in GRP formation, %
Ukraine	603.5	45426.2	68.7	31.3	–3.5	1459096	32002	100
Cherkasy	20.9	1260.0	56.3	43.7	–6.6	31265	24558	2.1
Zhytomyr	29.9	1262.5	58.6	41.4	–4.6	24849	19551	1.7
Rivne	20.1	1158.8	47.8	52.2	2.5	21795	18860	1.5
Khmelnytskyi	20.6	1307.0	55.8	44.2	–4.6	26237	19920	1.8
Kirovohrad	24.6	987.6	62.4	37.6	–6.0	22056	22082	1.5
Kyiv	28.1	1725.5	61.6	38.4	–3.9	69663	40483	4.8
Poltava	28.8	1458.2	61.7	38.3	–6.8	56580	38424	3.9
Vinnytsia	26.5	1618.3	50.4	49.6	–5.0	33024	20253	2.3

Agricultural lands are 1486.9 thousand hectares of the total area of Cherkasy region (2091.6 thousand hectares). Agricultural lands are 1450.8 thousand hectares (69.4% of the total area of the territory), including arable lands – 1270.7 thousand hectares (87.6%), laylands – 9.0 thousand hectares (0.6%), perennial plantations – 27.4 thousand hectares (1.9%), hayfields – 65.1 thousand hectares (4.5%), pastures – 78.6 thousand hectares (5.4%) and other agricultural lands – 36.1 thousand hectares (Analytical and descriptive part of Cherkasy region development strategy, 2017).

Designated forest lands occupy 338.6 thousand hectares of which land protective belts and other securing stands are 28.7 thousand hectares. 318.3 thousand hectares perform a protective function of all the forests and forest cover areas. The area of built-up areas of the region is 84.5 thousand hectares, including open works, open-cut mining, mines and similar structures (2.4 thousand hectares), residential construction (11.9 thousand hectares), industry (6.7 thousand hectares), transport and communications (17.5 thousand hectares), technical infrastructure (3.2 thousand hectares), recreation lands (34.6 thousand hectares) and lands of other use (8.2 thousand hectares). In the region, there are 15.5 thousand hectares of land without plant cover or with insignificant vegetation cover, including granitic places (0.5 thousand hectares), sand (including beaches) (4.5 thousand hectares), ravines (5.6 thousand hectares) and others (4.9 thousand hectares). There are 135.8 thousand hectares under the water, including 2.5 thousand hectares of artificial stream flows, 3.8 thousand hectares of rivers and streams, 18.5 thousand hectares of lakes, closed reservoirs and ponds, 111.0 thousand hectares of artificial reservoirs. Open wetlands amount to 30.4 thousand hectares (Figure 3).

Typical black soils and strongly regraded black soils prevail in the soil cover of the region, occupying 53.7%. Dark gray podzolized regraded soils and weakly regraded podzolized black soils occupy 28.9% and light gray and gray podzolized soils are 7.3% (Analytical and descriptive part of Cherkasy region development strategy, 2017).

Due to irrational use of soils, there is a depletion of their natural fertility, which leads to deterioration of quality standards of soils. Main fertility losses of soils are related to the high degree of land cultivation and increase of erosion processes; violation of the structure of a crop rotation; increase in the deficit of the balance of nutrients and organic matter and, therefore, depletion of their reserves in the soil; weakening of the microbiological activity in the soil; presence of acid soils; increase in the soil density and decrease in its water-holding capacity; slow introduction of modern soil protection technologies of cultivation. First of all, the soil fertility level is estimated by the content of organic matter. The more humus in the soil, the richer it is in main nutrients, since it contains 92-98% of nitrogen, 60% of phosphorus, 80% of sulfur and a large number of other macro- and microelements. According to the latest agro-chemical

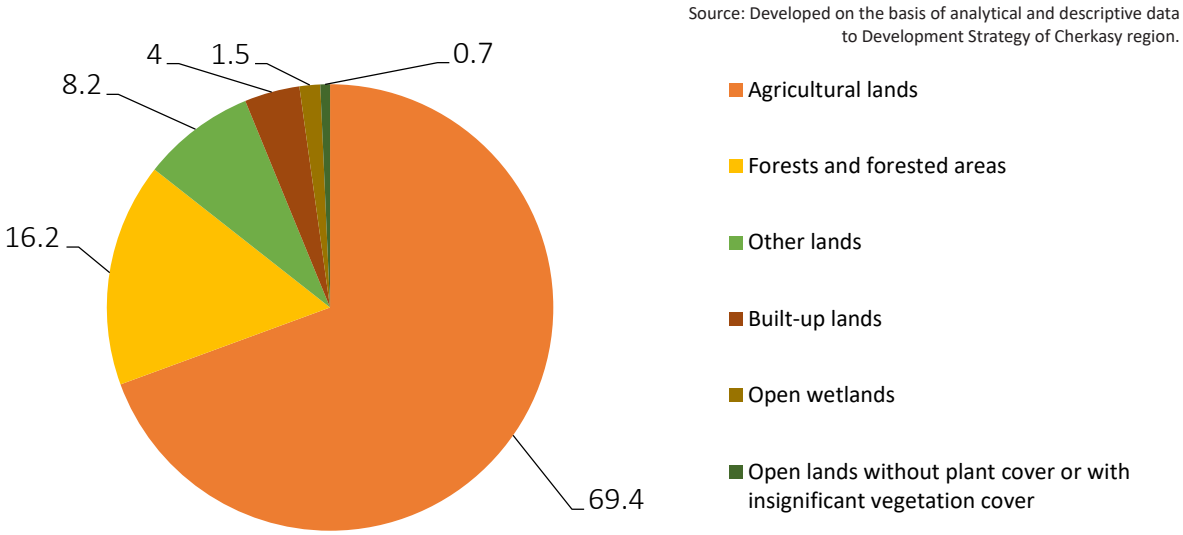

Figure 3. Structure of the land fund of Cherkasy region

survey, the average indicator of humus content in soils of Cherkasy region is 3.05% which is more than in the ninth-round survey by 0.01%.

Certainly, one of the main reasons for the decline in fertility and crop shortfall is a large number of acidic soils in the region. Acidic soils (pH < 5.5) occupy the area of 223.46 thousand hectares or 20.9%. The average agro-chemical productivity class of arable lands in the region is 55.3 points. Enterprises of such districts have the highest productivity class as Khrystynivka – 64.3 points, Monastyrysche – 61.1 points, Mankivka – 62.0 points and Zhashkiv – 63.0 points. Strongly regraded soils of such districts as Chygyryn – 42.8 points, Kaniv – 44.6 points and Smila – 49.7 points are the lowest estimated (Table 4).

Table 4. Quality of agricultural soils within Cherkasy region

Source: Developed on the basis of analytical and descriptive data to Development Strategy of Cherkasy region.

No	District name	Humus content, %	Average weighted nitrogen content, mg/kg	Phosphorus content, mg/kg	Potassium content, mg/kg	% acid soils (pHKCl 4.0-5.5)	Ecological and agrochemical assessment, point
1	Gorodysche	2.99	105.1	143.0	72.0	17.3	56.0
2	Drabiv	3.83	137.8	112.0	66.0	2.9	57.6
3	Zhashkiv	3.39	133.9	133.0	94.0	4.7	63.0
4	Zvenyhorodka	2.80	110.1	137.0	90.0	38.5	55.7
5	Zolotonosha	2.97	120.8	127.0	68.0	12.7	54.7
6	Kamianka	2.79	115.2	131.0	80.0	13.4	55.6
7	Kaniv	2.29	84.6	126.0	60.0	32.6	44.6
8	Katerynopil	3.37	126.2	108.6	93.2	20.4	55.9
9	Korsun-Shevchenkivskyi	2.30	85.9	146.0	70.0	30.5	51.1
10	Lysianka	3.09	120.4	125.9	87.6	14.5	57.9
11	Mankivka	2.88	119.9	153.0	108.0	22.8	62.0
12	Monastyrysche	3.21	128.1	153.0	89.0	36.3	61.1
13	Smila	2.58	98.3	126.0	87.0	23.4	49.7
14	Talne	3.38	135.9	110.0	98.7	9.2	60.5
15	Uman	3.29	145.7	121.1	109.6	37.1	62.0
16	Khrystynivka	3.26	131.5	148.0	94.0	27.4	64.3
17	Cherkasy	2.42	93.2	158.0	62.0	42.0	50.5
18	Chyhyryn	2.27	101.2	99.0	66.0	39.6	42.8
19	Chornobay	3.23	122.1	102.0	66.0	13.1	52.1

Table 5. Index assessment of the economic situation of land resource potential of some agricultural enterprises in Cherkasy region in 2016

Source: Developed on the basis of financial and analytical data of enterprises.

Enterprise name	Index				Indicator of land resource potential
	Productivity class of agricultural lands	Technological properties	Distance	Total land rent	
FE Prestige Agrolux	0.82	0.99	1.18	0.88	0.97
AgrofirmBais-Agro	1.04	1.03	0.96	1.06	1.02
Agrofirm Kolos	1.21	1.04	0.84	1.21	1.07
LLC Progress	0.93	1.02	1.06	0.99	1.00
LLCSvitanok	0.95	1.01	1.04	0.97	0.99
Agrofirm Hliborob	1.14	1.02	0.88	1.11	1.04
PAE Dovira	0.84	0.82	1.16	0.80	0.91
CJSC Druzhba	0.91	1.04	1.06	0.99	1.00
CJSCVerhniachka-Agro	0.91	0.99	1.08	0.96	0.99
PRAT Lira-Chygyryn	1.18	0.97	0.86	1.12	1.03
PEDmytrushky	0.86	0.95	1.14	0.91	0.96
LTD AC Step	0.86	0.92	1.14	0.78	0.93
CJSCVidrodzhennia	1.07	1.05	0.93	1.11	1.04
STS Lns Agro	1.21	1.01	0.84	1.13	1.05
CJSCSmilaAgro Union	0.95	1.01	1.04	0.97	0.99
On average	1.00	1.00	1.00	1.00	1.00

There are 361.8 thousand hectares of degraded and 108.8 thousand hectares of unproductive lands in the region. Land conservation was not carried out in the territory of Cherkasy region in the period 2012–2016. 139.2 thousand hectares of degraded and unproductive lands require conservation (Analytical and descriptive part of Cherkasy region development strategy, 2017).

The agricultural complex of Cherkasy region has a multi sector structure that combines production, processing and marketing of agricultural products. First of all, peculiarities of natural and climatic conditions, processes of agro-complex development profitability of production and other factors influence the organization of agricultural land use in Cherkasy region. A feature of land resources of agricultural enterprises is their involvement in the production process and market relations. In this case, an objective assessment of value and quality of this resource is required for the analysis and evaluation of agricultural production efficiency.

Given that the use of agricultural lands for production involves the use of resources, the limits of their permissible spending should be known, that is the size of land resources owned, used, leased, their suitability for use, environmental status and actual land use conditions. That is, the whole land-resource potential of agricultural enterprises of the territory should be evaluated in accordance with the existing state of the economy. The effectiveness of agricultural enterprises is determined by a system of indicators that characterize the use of land resources in general and agricultural lands in particular, fixed by the economy. The use effectiveness is largely due not so much to the area of used lands, but to its direct quality, with regard to agricultural production requirements.

According to the data of The Main Department of Statistics of Cherkasy region (2017) and sample on the rating of economic activity, we evaluated the land resource potential of 15 most economically developed agricultural enterprises of Cherkasy region.

We used the method of index estimation to evaluate the land resource potential of agricultural enterprises. The method of index estimation makes it possible to bring a system of indicators characterizing positive and negative aspects of the economic and landscape ecological state of lands in agricultural enterprises of the region to the single relative indicators (Table 5).

In the economic assessment, the only indicator is the indicator of land resource potential and in the

ecological assessment, it is the landscape ecological index. Individual indices characterizing land resource potential and landscape-ecological load on lands are calculated as the ratio of the value of the indicator of a particular farm to its average level.

The indicator of land resource potential characterizes the economic condition of lands and we named it 1. The index > 1 speaks about increasing the potential of land use. The index < 1 indicates its disadvantages.

Analyzing the data obtained in Table 5, we can say that the largest land resource potential is noted in eight analyzed agricultural enterprises of Cherkasy region. Its value ranges from 1.00 to 1.07. Seven enterprises show insufficient quality of land resources. From the economic point of view, PAE Dovira and LTD AC Step are the most unreliable and their indicator of land resource potential is 0.91 and 0.93, respectively.

Having analyzed indices of agricultural production in Table 6, it is possible to judge the degree of use of land resource potential and reserves for the further development of enterprises.

Analyzing the data in Table 6, it can be said that the average grain yield in Cherkasy region was 17.8 centners per hectare. The highest yield is observed at LLC Progress, Agrofirm Kolos, STS Lns Agro, CJSC Druzhba, PAE Dovira – 24.8, 23.6, 21.8, 21.3 and 20.2 c/ha, respectively. There are enterprises where grain yield is less than the regional average value, from 11.1 to 16.5 centners per hectare. Among them are Agrofirm Hliborob, PRAT Lira-Chygyryn and FE Prestige Agrolux. These indicators show that the abovementioned enterprises have the least anthropogenic load on the territory with high land resource potential indicating its insufficient use.

The quantitative and qualitative characteristics of structural components of the land potential of the territory allow us to analyze the level of development of the regional economy, to identify disparities between individual elements of the potential, as well as to define priority areas of regional policy in the field of land use. Soil fertility, air temperature, rainfall, sunny days and other natural conditions have a great influence on the results of agricultural activity. In this respect, in favorable years, yield and volume of gross output are increasing and in unfavorable years, they are significantly reducing.

Economic efficiency of resource potential management in agricultural enterprises is characterized by a system of indicators: natural and value, absolute and relative (Rusnak, 2008).

Table 6. Estimation of agricultural production results of some agricultural enterprises in Cherkasy region in 2017

Source: Developed on the basis of analytical data of enterprises.

Enterprise name	Cereal crop yield, c/ha	Indicator of land resource potential	Landscape ecological index
FE Prestige Agrolux	16.2	0.97	0.90
Agrofirm Bais-Agro	16.5	1.02	1.26
Agrofirm Kolos	23.6	1.07	1.12
LLC Progress	24.8	1.00	0.75
LLC Svitanok	18.8	0.99	0.77
Agrofirm Hliborob	11.1	1.00	0.61
PAE Dovira	20.2	1.04	1.09
CJSC Druzhba	21.3	0.99	2.96
CJSC Verhniachka-Agro	18.5	1.03	0.64
PRAT Lira-Chygyryn	16.5	0.96	0.38
PE Dmytrushky	10.4	0.91	0.67
LTD AC Step	10.5	0.93	0.35
CJSC Vidrodzhennia	17.5	1.04	0.58
STS Lns Agro	21.8	1.05	0.41
CJSC Smila Agro Union	17.9	0.99	0.42
On average	17.8	1.00	1.00

Natural indicators reflect the output of an area unit or all land resources in natural units of measurement: tons, feed units and others. Natural units of measurement are used in assessing the output of homogeneous products, for example, grain, fruit, vegetables, technical and other crops. Value indicators are used in case of necessity to reveal the quality of produced products or estimate the output of diverse products, such as grain, fruit and other products.

The main natural indicators are gross production (t); volume of sales (t); land productivity in the production of certain types of crop production – yield (c/ha); yield of feed units per hectare of land (fu/ha); production of meat, milk and other livestock products (when the land is used only for feed purposes), (c/ha). Value indicators of land use efficiency include: volume of gross production, total (UAH) and per unit area (UAH/ha); cost of sold products, total (UAH) and per unit area (UAH/ha); cost value of sold products, total (UAH) and per unit of production (UAH/percent); profit, total (UAH) and per unit area (UAH/ha).

Absolute indicators have certain units of measurement (c, t) and relative indicators are dimensionless values and can be expressed in coefficients, indices and percentages. They are calculated by comparing (dividing) one-dimensional absolute values. Relative indicators characterizing land use, (%) are land ratio in processing (arable lands and perennial plantations) in the structure of agricultural lands; average annual growth (decrease) in production and/ or yield of products.

Table 7. Potential yields of main crops in all categories of farms in Cherkasy region (c/ha)

Source: Developed on the basis of analytical and descriptive data to Development Strategy of Cherkasy region and Main Department of Statistics in Cherkasy region.

Crop	Production potential	Actual average value in 2012–2017	% of potential level
Wheat	32.2	21.2	65.8
Corn	26.0	21.6	83.1
Barley	26.0	16.8	64.6
Peas	21.3	11.2	52.6
Sunflower	14.1	13.6	96.5
Soybeans	17.8	17.6	98.9
Rape	84.5	56.0	66.3
Beetroot	44.4	24.6	55.4
Winter wheat	50.2	37.5	74.7

On the basis of the data of Table 7, calculations show that the coefficient of using land productivity potential in wheat K = 21.2:32.2 = 0.66. This means that the reserve for wheat growth is 34.1%, corn – 16.9%, barley – 35.4%, peas – 47.4%, sunflower – 3.5%, soybeans – 1.1%, rape – 33.7%, beetroot – 44.6% and winter wheat – 25.3%.

CONCLUSION

Since Ukraine is an agrarian country, land resources are the main component on which economic, food, production, export, natural resource, infrastructure and regional development are formed. Researching it we confirmed the thesis that the economic efficiency of management of land and resource potential in enterprises is characterized by indicators: natural and value, absolute and relative.

The analysis of structural components of the land potential made it possible to determine the level of development of the regional economy, identify disparities between individual elements of the potential, as well as define priority areas of the regional policy in the field of land use. Taking into account the results of the analysis of land use and land resource potential, it should be noted that highly efficient land use is a crucial condition for the development of agriculture in Cherkasy region.

Taking into account the reporting data of The Main Department of Statistics in Cherkasy Region (2017), we have established that the potential wheat yield in Cherkasy region in 2010–2012 was 32.2 centners per hectare (Analytical and Descriptive Part of Cherkasy Region Development Strategy, 2017). Consequently, this indicator can be used as a constant value. If on average in the period 2012–2017, the actual yield was 21.2 centners/hectare and the reserve for growth is 11.0 centners per hectare. Calculations show that the coefficient of using land productivity potential in wheat

K = 21.2:32.2 = 0.66. This means that the reserve for wheat growth is corn, barley, peas, sunflower, soybeans, rape, beetroot and winter wheat.

The land is of great value, in particular, provide a production base and improve the economic situation. Therefore, rational use of land resources, increase of land resource potential and improvement of the resource potential management will promote further effective activity of agricultural enterprises and development of the branch as a whole.

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