EFFICIENT USE OF THE AGRICULTURAL LAND RESOURCES

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Abstract. The given paper suggests an author’s approach to classification of the factors determining the efficiency of agricultural land resources use by agrarian enterprises. These factors can be grouped into two major categories: the internal (objective and subjective) and the external (relatively objective and subjective shareware). The index of “capital-labor ratio of logistics systems” is highlighted by author for the first time. The method of determining the ranking of enterprises in terms of the influence of factors affecting the efficiency of agricultural land use is proposed, as well as the methodological approach for the selection of strategic alternatives of agrarian enterprises development is described in the paper, including consolidation in an unstable external environment. The application of the proposed methods in practice will facilitate the adoption of management decisions, especially the collegial ones about the prospects for the economic development in the agrarian sphere, important to both owners and potential investors.

Key words: management, efficiency, agriculture, agrarian enterprise, land resources, factor classification system, ranking, alternative, consolidation, correction factor, the level of significance attached to the factor, expert evaluation.

Introduction
Under conditions of uncertainty and risk, which are the quintessential features in the agricultural sector of the Ukrainian economy, there is a need to use the adaptive methods for the determination of the economic efficiency of the land use, which is considered to be one of the most important resources in agriculture sector. In recent years, these methods were improved by such famous researchers as I. Dorosh (Dorosh, 2012), N.Kuosmanen (Kuosmanen, 2010), V. Rusan (Rusan, 2009) and I. Yatsiv (Iatsiv, 2011) mainly due to the specific characteristics, including economic, environmental and social efficiency. According to I. Hale, H.Asbjornsen, A. Brito, K. Broders, A. Grandy, R. Rowe, R. Smith, W.Wollheim (Hale, 2014), V. Hudz’, Y.Mishchenko, I. Ryhlibs’ky, I. Shuvar, A. Unyk (Gudz, 2014), these measures require additional classifications, based on the effect on the efficiency. That is why the most burning problem of nowadays is the development of the classification of factors of the agricultural land resources efficient use, which should be not only sensitive to possible changes, but also related to the activities of the agrarian enterprises.

Method
Within the present study we understand that there are many different ways that research could be done. However, what all research has in common is that it embraces a sequence or set of activities that are highly interrelated and that together generate the research process. Various studies have found that the ordinary activities in the research process usually follow a straight order, but it’s quite possible to describe and explain the common pattern. The research is a flexible cyclical process, because the main research findings often create new issues and ideas that need to be further investigated. The main research methods used in this paper are as follows: monographic method, necessary to prepare the critical review of the scientific literature related to the possible ways of increasing the efficiency of the agricultural land resources use, abstract-logical method, required to formulate the main stages of scientific research, and, finally, economic and statistical method, able to demonstrate the process of the determination of the key results of the study.

Results
According to the results obtained, among the main factors determining the efficiency of agriculture land use should be highlighted the following ones:
I. Domestic factors:
1.1. Objective:

1.1.1. Qualitative characteristics of the soil, characterized by a wide range of agrochemical characteristics, including the soil bonitet score, which takes into account the natural and artificial soil fertility, as well as its amino-acid composition, and the inherent soil macro- and micronutrient concentration (Dieresperov, 2010).

1.1.2. The structure of agricultural land fund by the type of land use – the percentage share of arable land, hayfields and pastures, perennial plantations and deposits in the total farmland area. Obviously, it is advisable to analyze the structure of agricultural land in terms of its transformation, which is calculated as the ratio of the current level of the average cost of farmland per hectare and the previous level of this indicator.

1.1.3. The dimensions of land use in an agricultural context, which must comply with scientifically sound parameters through the operation of economies of scale, and greatly depends on the level of concentration of agricultural production and the type of farmland with the highest species diversity.

1.1.4. The ability to ensure the organic agricultural production – the percentage of the area of the agricultural land, potentially suitable for the production of organic products, and the total area of farmland.

1.1.5. Relief and the configuration of the fields, which has a direct impact not only on the uniformity of crops and the complexity of mechanized tillage operations, but also the production costs level.

1.2. Subjective factors:

1.2.1. Capital-labor ratio – insufficient level reduces the share of depreciation charges from specific capital costs, but does not allow to carry out the high quality farming practices, reduces the quantity and quality of the products obtained.

1.2.2. The organic structure of the capital, which is determined as the ratio of fixed and working capital. It is quite evident that this indicator is inappropriate or inapplicable today, because the cost of fixed assets does not include the cost of land.

1.2.3. Land reclamation state – shows us the state of the irrigation / drainage in a certain area.

1.2.4. The level of capital-workers – insufficient level of this index indicated a lack of capital and imperfect industrial structure, in particular the lack of development of the most labor-intensive areas of agriculture (seed breeding, olericulture, fruit-growing, livestock farming etc.).

1.2.5. Current status of the work with agro-chemical soil analysis – shows the results of the laboratory and analytical work, concerned with the determination of the soil agrochemical condition.

II. Exterior factors:

2.1. Conditionally objective factors, independent from business activity:

2.1.1. Dynamics of prices for agricultural products is always positive and has a slight fluctuation during the year. The predicted dynamics in the short-, medium- and long-term period is positive due to a significant increase in the volume of external market and a substantial exhaustion of extensive factors of agricultural production.

2.1.2. Dynamics of prices for seeds, fertilizers, agricultural machinery, spare parts and electricity is always positive. According to the recent official statistic data (1), the growth rate of this indicator in Ukraine is more than the growth rate of prices for agricultural products.

2.1.3. The length of the river shipping routes, which can be used for the agricultural products transportation.

2.1.4. Geographical location – the proximity to road and railways, river and sea ports, elevators, processing plants and other infrastructure.

2.1.5. The current status of foreign economic activity – the impact of this factor is estimated by the ratio of domestic and foreign sale prices of products and the rent for agricultural land area in Ukraine and abroad.

2.2. Conditionally subjective factors amenable to change:

2.2.1. The capacity of the river and sea ports – it should be analyzed not only in physical terms, but also dynamic ones, i.e. per area of farmland.

2.2.2. Capacity of port facilities – this factor should be considered in the dynamics of indicators per area of farmland.

2.2.3. Capital-labor ratio of logistics systems – the value and power of the fixed assets, serving agricultural production, including special road transport for the various types of agricultural products (grain, milk, flour, sunflower oil etc.), special railway transport, inland waterway transport fleet, sea transport, elevators and so on.

2.2.4. The presence and power of the processing enterprises – the analysis of the indicators should be
based on the area of arable land or livestock in conventional heads.

2.2.5. The monopolization of the agrarian market – a market share of the largest producers. The impact is estimated by comparing the dynamic and statistic value for the retail price of the implementation of major food commodities in purchase prices for agricultural raw materials (bread / grain, oil / sunflower seeds, animal oil / milk, sausage / cattle etc.).

Applied value of the proposed classification can be demonstrated on the example of the determination of the agricultural enterprises ranking in terms of the influence of factors determining the efficiency of the agricultural land use.

The estimation of the internal objective and subjective factors should be based on a 100-point scale (from 1 to 100). To conduct the relevant research in the current year for the total amount of the agrarian enterprises in a certain region it is necessary to allocate, for example, at least 20 enterprises according to the following criteria: enterprise should not be highly specialized, its agricultural area should be no less 1000 hectares and not more 10 000 hectares, the number of employees should be no less than 10 person etc.

Further analysis should be carried out in several stages.

Stage I. The agrarian enterprises, selected for the detailed analysis, should be structured according to the specific gravity in commercial products revenue from sales of agricultural products, which is decisive indicator for classification as agricultural or non-agricultural enterprises. The sample should include all the possible categories according to the level of agricultural specialization, namely: category I – crop farming; category II – crop-livestock farming; category III – the livestock-crop farming; category IV – livestock farming.

Furthermore, it should be prepared a brief description of the characterization of agricultural land resources, laboratory data and other analytical information that is not considered as a trade secret (Stage II).

Stage III is concerned with the identifying of experts, who meet the following requirements:
1. Understanding the activities of the proposed objects of study.
2. The experience in the specialty, particularly in the field of land resources management.
3. The impartiality of experts, the lack of affiliations with the enterprises’ management as the objects of research.

It was determined that all of the selected experts previously must fill out a proposed form (Stage IV). According to this form the final objects of the research should be clarified (for example, only 15 objects), the list of efficiency factors (for example, 10 factors, which can be grouped into two similar blocks with the same number of factors). Moreover, it is necessary to clarify the range of experts, intend to intensify their efforts at this area of research. Final selection of experts should be structured, for example, according to the following profiles: the first type of estimation may include only scientists (for example, 5 persons), the second one may include the practitioners (for instance, 5 persons), and finally, the third type of estimation may include only civil servants (just 5 persons). All these experts should have clear procedural instructions for completing the forms (particular for each of the 15 research subjects) (Table 1).

The fifth stage of the study is concerned with the filling out the forms, and the next (Stage VI) is related to their processing and tabulation. The final evaluation parameters are differentiated according to the scale agreed with the experts themselves, for example:
1) the negative impact of factors affecting the efficiency - up to 35 points;
2) regarding the positive impact of factors affecting the effectiveness - from 36 to 70 points;
3) the positive impact of factors affecting the efficiency – from 71 to 100 points.

Points, obtained in the both blocks of issues have to be assessed as positive numbers. If there are disincentives among the factors, the scores for them should be assessed by the basic formula:

\[ C = 10 - P, \]

where \( C = \) score calculations;
10 = the highest possible level of the points;
P = actual score, put by the expert.

The study should be repeated in subsequent years. The data must be averaged with the definition of certain consistent patterns. The final step (VII) is concerned with the study of the results by experts and the management of the enterprises and the identification of priority areas for the implementation of scientific development in the field of land management practices.
Table 1

Ranking of the agrarian enterprises in terms of the influence of factors determining the efficiency of agricultural land use (positive answer in each line of the table below is indicated as “X”)

<table>
<thead>
<tr>
<th>The main criteria for the valuation of enterprises</th>
<th>Scale</th>
<th>Total scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Block I. The inner objective factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.1. How do you assess the quality characteristics of the soil?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.2. Is the structure of farmland as optimal as possible?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.3. Does the size of the land area correspond to the level of concentration of production?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.4. Are the features of organic orientation of production used?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.5. Can relief and field configuration ensure the efficient use of land resources?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The significance level of the Block</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0,40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (Score on the Block I)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block II. Domestic subjective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.1. Is the capital-labor ratio optimal?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.2. Is the organic capital structure optimal?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.3. Is the level of ameliorative condition of the company sufficient?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.4. Is the level of capital-labor optimal?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.5. Is the work for the agrochemical analysis of soil sufficient?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The significance level of the Block</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0,60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (Score on the Block II)</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score (Score on the Block I and the Block II)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The external factors can be used in the case of the selection of strategic alternatives of the further enterprises’ development, including their consolidation. Obviously most of these factors are determined by market conditions and the intensity of enterprise development (N):

\[ N = \bar{Q} \times K, \]  \hspace{1cm} (2)

where \( \bar{Q} \) – the rate of growth of income of the enterprise from products sales (prior to consolidation), %;
\( K \) – adjustment coefficient of the enterprise potential development;

Coefficient K can be determined by expert assessments based on external factors of the previously proposed classification (Table 2).

Thus, both internal and external factors are of great practical importance.
Table 2

<table>
<thead>
<tr>
<th>List of the main criteria necessary for the evaluation of the factors</th>
<th>Scores</th>
<th>Total score (+, V)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>low value of the factor</td>
<td>below-average value of the factor (above and below standard value)</td>
<td>the average (standard) value of the factor</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Block I. Conventionally objective external factors

| 2.1.1 | | | | | + |
| 2.1.2 | | | | | - |

Score

The significance level of the Block 0,40

Total (Score on the Block I)

Block II. Conventionally subjective external factors

| 2.2.1 | | | | | + |
| 2.2.2 | | | | | - |

Score

The significance level of the Block 0,60

Total (Score on the Block II)

Total score (TS)

Adjusment coefficient TS /50

*+ stimulators, - disincentives

Discussion

The proposed classification allows us to determine the dynamics of the impact of internal and external factors on the development of efficient land use by the agrarian enterprises. An important role of these factors may be increased by long-term analysis based on the results of expert assessments and management decisions on the impact of the factors that usually cannot be displayed with the help of partial or integral value. The content of the author’s research is enhanced by the distribution of the subjective and objective factors. This allows to assess the impact of factors under the control and beyond the control of the business entity, respectively distributing algorithm for implementation of management decisions on the macro, meso- and micro level. Further research should focus on the impact of separate presentation and combination of economic, environmental and social kinds of efficiency of land in accordance with the proposed classification.

References:


