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INTEGRAL ASSESSMENT OF ENTERPRISES` RESOURCE POTENTIAL SUPPLY OF AGRICULTURAL INDUSTRIAL PRODUCTION

Abstract. The article considers the main components of resource potential. The methodical approach to assessing enterprises` resource potential supply of agricultural industrial production in view of their belonging to certain spheres of agribusiness is offered. Such structuring of resource potential involves a chain evaluation of its sectoral components, including within individual regions. This indicator integrates into itself the characteristics of the internal environment of the production process, taking into account the main resources of participants in agro-industrial production: land, logistical, financial, labor, innovative, informational. Provision of enterprises` resource potential in a separate sphere of agribusiness is calculated through the calculation of the weighting factors of each type of resource and their factor indicators, followed by the calculation of the generalizing integral indicator. For each type of resources involved in agrarian-industrial production, the differentials of their weighting determined by the method of expert assessments using the parameters of qualitative assessment of the resource potential components. The differential of experts` competence optimized in order to assess the degree of their qualification in the studied field of knowledge. The method of determining the factor indicators of the components of the resource potential is based on a differentiated approach to the formation of their base of comparison. The scheme of implementation of an integrated assessment of the resource potential availability of agro-industrial enterprises is presented, which describes the rotation of stages of its implementation. On the basis of the proposed method, the growth of the integral index in Cherkasy region was diagnosed, indicating an increase in the resource potential of agro-industrial enterprises. The purpose of the article is to develop a methodology for assessing enterprises` resource potential supply of agricultural industrial production, which will provide an opportunity to assess the degree of resources` attraction, their development and the efficiency of investment in economic turnover and also solves the problem of setting indicators with different units of measurement to a single generalization.

Keywords: resource potential, enterprises of agro-industrial production, assessment, integral index, resource availability.

JEL Classification C13, L2, M21

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ІНТЕГРАЛЬНА ОЦІНКА ЗАБЕЗПЕЧЕНОСТІ РЕСУРСНИМ ПОТЕНЦІАЛОМ ПІДПРИЄМСТВ АГРАРНО-ПРОМИСЛОВОГО ВИРОБНИЦТВА

Анотація. Розглянуто основні складові елементи ресурсного потенціалу. Запропоновано методичний підхід до оцінювання забезпеченості ресурсним потенціалом підприємств аграрно-промислового виробництва з огляду їх належності до окремих сфер агробізнесу. Таке структурування ресурсного потенціалу передбачає ланцюгову оцінку його галузевих складових, у тому числі в межах окремих регіонів. Цей показник інтегрує характеристики внутрішнього середовища виробничого процесу, враховуючи основні ресурси учасників аграрно-промислового виробництва: земельні, матеріально-технічні, фінансові, трудові, інноваційні, інформаційні. Забезпеченість ресурсним потенціалом підприємств окремої сфери агробізнесу обчислюється через розрахунок коефіцієнтів вагомості кожного виду ресурсу та їхніх факторних показників із подальшим розрахунком узагальнювального інтегрального показника. Для кожного виду ресурсів, що задіяні в аграрно-промисловому виробництві, коефіцієнти їхньої вагомості визначено методом експертних оцінок із використанням параметрів якісної оцінки складових ресурсного потенціалу. Розраховано коефіцієнт компетентності експертів з метою оцінки ступеня їхньої кваліфікації в досліджуваній галузі знань. Методика визначення факторних показників складових ресурсного потенціалу побудована на диференційованому підході щодо формування бази їх порівняння. Представлена схема здійснення інтегральної оцінки забезпеченості ресурсним потенціалом підприємств аграрно-промислового виробництва, яка описує послідовність етапів її проведення. На основі запропонованої методики діагностовано зростання інтегрального показника в Черкаській області, що вказує на нарощування ресурсного потенціалу підприємств аграрно-промислового виробництва. Метою статті є розроблення методики оцінки забезпеченості ресурсним потенціалом підприємств аграрно-промислового виробництва, яка надасть можливість оцінити ступінь залучення ресурсів, їхній розвиток та ефективність вкладення в господарський оборот, а також розв'яже проблему зведення показників із різними одиницями виміру до єдиного узагальнювального.

Ключові слова: ресурсний потенціал, підприємства аграрно-промислового виробництва, оцінка, інтегральний показник, забезпеченість ресурсами.

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ИНТЕГРАЛЬНАЯ ОЦЕНКА ОБЕСПЕЧЕННОСТИ РЕСУРСНЫМ ПОТЕНЦИАЛОМ ПРЕДПРИЯТИЙ АГРАРНО-ПРОМЫШЛЕННОГО ПРОИЗВОДСТВА

Аннотация. Предложен методический подход к оценке ресурсного потенциала предприятий аграрно-промышленного производства с учетом их принадлежности к отдельным сферам агробизнеса. Такое структурирование ресурсного потенциала предусматривает цепную оценку его отраслевых составляющих, в том числе в рамках отдельных регионов. Разработан алгоритм интегральной оценки обеспеченности ресурсным потенциалом, применение которого позволяет свести разнокачественные показатели к единому обобщающему. Этот показатель интегрирует в себе характеристики внутренней среды производственного процесса, учитывая основные ресурсы предприятий. Диагностирован рост исследуемого интегрального показателя, указывающий на наращивание ресурсного потенциала предприятий аграрно-промышленного производства.

Ключевые слова: ресурсный потенциал, предприятия аграрно-промышленного производства, оценка, интегральный показатель, обеспеченность ресурсами.

Формул: 4; рис.: 2; табл.: 4; библи.: 11.

Introduction. Ensuring successful development of enterprises of agro-industrial production is possible to provide the complex and systematic use of production factors, such as resources, their availability, interaction, combination and interdependence. The transition to intensive management practices poses a fundamentally new task for enterprises to ensure the effective functioning of business entities. This calls for an assessment of their resource capabilities [1]. However, not all components of the resource potential are directly measurable. Therefore, it is necessary to summarize them in a single indicator. In this aspect, an integral assessment of the enterprises` resource potential supply of agricultural industrial production of individual enterprises and integrated agro-industrial formations becomes relevant, which plays a significant role not only in improving the efficiency of management but in an important qualitative characteristic of the state and level of resource use.

Analysis of research and problem of statement. The methodological aspects of the formation and use of enterprises` resource potential are highlighted in publications by A.E. Yuzefovich, A.M. Vishnevskaya, D. Epstein, G. Hokman, N.S. Krasnokutskaya, O.V. Ulyanchenko, G.M. Pidlisetskogo, M.I. Tolkach, A.V. Ulezka, A. Boschini, J. Pettersson, J. Roine, O.A. Zvyagintseva, D. Khodos, Yu.O. Nesterchuk, N.V. Butko, T. Shatalova made an important contribution to the definition of the resource potential components, their interaction and interdependence. The works of A.V. Artyomova, L. Schneider, E. Schuler-Hainsch, M. Berger, O. Bessonova, O.V. Kuzmenko and others are devoted to the study of the complex potential resource assessment. In spite of significant scientific achievements within the framework of theoretical and practical research, there is a need to develop a methodological approach to the integrated assessment of the resource potential in the spheres of agrarian and industrial production for the purpose of bringing together the indicators with different units of measurement to a single value.

The purpose of the work is to develop a methodology for assessing the supply of resource potential of agro-industrial enterprises with the use of an appropriate algorithm for its calculation, which will provide an opportunity to assess the degree of resources attraction, their development and the efficiency of investment in economic turnover.

Research results. Against the backdrop of incompleteness of agrarian reform, limited opportunities for the majority of small agricultural commodity producers to expand on an innovative basis, the development of completed food chains and the establishment of integration

links between their participants, within which the financial, technical and technological possibilities of formation and effective use of resource potential in separate agribusiness structures, industries and regions.

The enterprises' resource potential of agro-industrial production is considered as a set of land, material, technical, financial, labor, innovative and information resources in the required amount and quality, which ensure the production and technological process of economic entities [2; 3].

Agrarian and industrial formations now form the basis of food subcomplexes, serve as structural components in the spheres of the agricultural sector of Ukraine, forming a branch of the national economy. In order to provide an exploratory purpose, we will consider agro-industrial production as a four-sphere model, in which:

the first sphere is the branches of industry, which provide the means of production for agriculture and other branches of the agrosphere, providing their production-technological services.

the second sphere — unites all producers of crop and livestock products;

the third sphere — includes the sectors involved in harvesting, storage, processing of agricultural products and bringing them to the consumer.

the fourth sphere is the trade in agro-industrial products, foodstuffs, as well as public catering.

The four-sphere structure of agro-industrial production provides an opportunity for a more complete disclosure of its elements and provides for a detailed analysis of the resource potential assessment of agricultural, industrial, commercial and other enterprises. Ensuring the resource potential of the subjects of agrarian-industrial production (ZRP) in general is possible due to the assessment of the resources' supply of its four areas:

$$\sum ZRP = ZRPs_1 + ZRPs_2 + ZRPs_3 + ZRPs_4 . \quad (1)$$

Such structuring of the resource potential of participants in agrarian-industrial production involves a chain evaluation of its industry components, including within the region, with the obligatory further calculation of the generalizing integral index of the provision of resource potential (*IntZRP*) by the method of the arithmetic mean:

$$IntZRP = \frac{\sum_{i=1}^n ZRPs_i}{n} , \quad (2)$$

where $ZRPs_i$ — the supply of resource potential i - that one sphere of agrarian-industrial production; n -the number of spheres of agro-industrial production.

The proposed methodological approach to assessing the supply of resource potential is based on the consideration of branch features of the agro-industrial enterprises' functioning, which form the technological chain from cultivating agricultural crops to the sale of agro-food products.

Taking into account the main resources of participants in agro-industrial production: land (LR), material and technical (MTR), financial (FR), labor (WR), innovative (InR), informational (IR), the supply of resource potential of enterprises in certain its spheres ($ZRPs_i$) should be determined by the formula:

$$ZRPs_i = (a_1 \times LR) + (a_2 \times MTR) + (a_3 \times FR) + (a_4 \times WR) + (a_5 \times InR) + (a_6 \times IR) , \quad (3)$$

$a_1...a_6$ — coefficients of factor indicators weight of resource potential supply.

Note that weighted coefficients take values from 0 to 1, and their sum for all types of resources is equal to one.

The weighting factors for each type of resources involved in agro-industrial production and determined by the method of expert evaluations based on the questionnaire of students (heads and specialists of agricultural enterprises, farms of Cherkasy, Kirovograd, Vinnytsia regions) of the Institute of Pre-University Preparation and Postgraduate Education of Bogdan Khmelnytsky National University of Cherkasy and the Institute of Postgraduate Education and Advice of the Uman National University of Horticulture based on the composition of their parameters (Table 1).

Table 1

Parameters of qualitative assessment of the resource potential components
of agrarian-industrial production

| Kind of resources | Components of evaluation |
|------------------------|---|
| Land | Condition of resources (for agricultural enterprises) by type of soil, humus content, acid medium, erosion, pH, soil salinity |
| Material and technical | The availability, possibility and rationality of the use of productional equipment, the level of its modernization and reconstruction |
| Financial | Availability, placement and rational use of resources, achieving the optimal ratio of own and borrowed funds, compliance with the accounting and credit discipline |
| Labor | Possibility, reliability and efficiency of the work production and management personnel of the subjects of entrepreneurship, their level of education and attestation |
| Innovative | Introduction and application of innovations through the production of a new product; the introduction of a new production method; involvement in the production process new sources of raw materials; development of a new market; introduction of new organizational forms |
| Informational | Sufficiency, reliability, authenticity, transparency, relevance of information about the external environment of the subject of economic activity, as well as the possibility of expanding and increasing the listed parameters |

Source: compiled using [4—6].

Responses of respondents in determining the share of the resource potential components in the respective field of activity indicate that for each sphere of agro-industrial production they are of different importance from the point of view of the production process (Fig. 1). However, the most important among them are: for the first sphere — logistical, labor and financial; for the second one — land and logistical; for the third one — material, technical and financial; for the fourth — labor, financial and informational resources. Such a division is directly related to the tasks performed by enterprises operating within individual spheres of agro-industrial production.

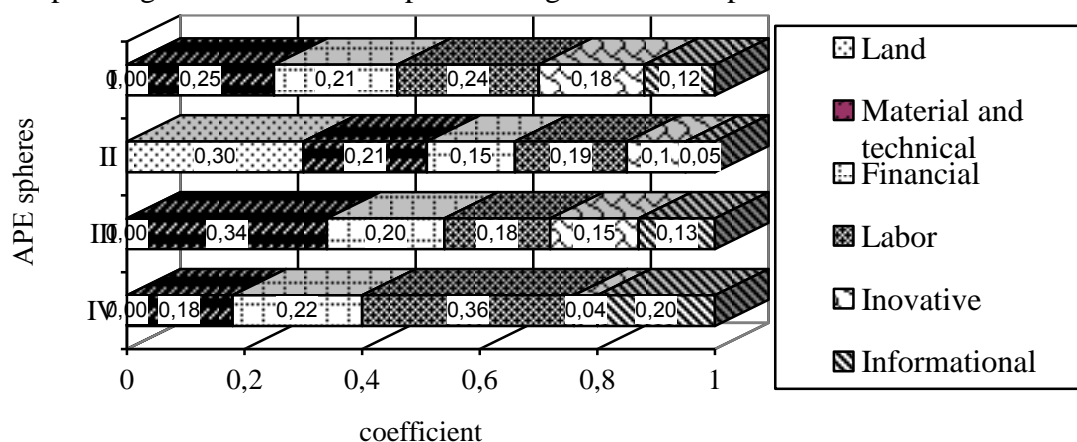


Fig. 1. Distribution of the respondents' responses to determine the share of components of resource potential

Source: own authorship research.

Involving the survey of enterprise managers and specialists of different levels updated the need to use the coefficient of competence in order to assess the degree of correspondence (qualifications) of experts in the field of knowledge.

For a questionnaire, the coefficient of competence (k_a) is determined by the formula [7]:

$$k_a = \frac{\sum_i \sum_j g_{ij}}{\sum_i g_i}, \quad (4)$$

where g_{ij} — weight j characteristics (highlighted by the evaluated expert) in i grades in points; g_i — maximum weight i grades in points.

The results of competence indicators for assessing the components of resource potential are presented in Table 2, while using the Harrington scale [8], which is a developed table of correspondences between physical and psychophysical relationships of parameters.

Table 2

Expert indicators of competence assessment of resource potential components

| Assessment of competency coefficients | Qualitative characteristic of the evaluation of criteria of competence | Number of experts, people |
|---------------------------------------|--|---------------------------|
| 1,00 — 0,80 | The optimal level of competence | 47 |
| 0,80 — 0,63 | Moderate level of competence | 59 |
| 0,63 — 0,37 | Normal level of competence | 8 |
| 0,37 — 0,20 | Insignificant level of competence | 3 |
| 0,20 — 0,00 | Unacceptable level of competence | 1 |
| Total | — | 118 |

Source: calculated and grouped by authors

The optimal level of competence are 39.8% of respondents, moderate — 50.0%, acceptable — 6.8%, only 3.4% of experts are insignificant when assessing the importance of the components of the resource potential of agrosphere enterprises.

The specificity of the resources involved in the agrarian-industrial production process requires a differentiated approach to the formation of the basis of quantitative values comparison to the components of the resource potential calculated by means of the proposed methodology. Therefore, the degree of availability of the certain types in the resource potential is determined for each type separately (Tabl. 3).

Table 3

Methodology for determination of the resource potential factor indices of agrarian and industrial enterprises

| Resource | The order of determination of factor indicators by the components of resource potential |
|------------------------|--|
| Land | an expert assessment of their status for each sphere of agrarian-industrial production in the range of values: from 0 to 0.40 — low level; from 0.41 to 0.80 - average level; from 0.81 to 1.20 is the corresponding high level |
| Material and technical | by dividing the average annual actual availability of fixed and circulating assets for enterprises of a separate sphere of agrarian-industrial production to their norm |
| Financial | the ratio of the amount of own and borrowed capital in fact and the necessary for the corresponding field of the agro-sector |
| Labor | the share from the division of the average number of employees to their required number in a certain area of agro-industrial production |
| Innovative | the ratio of the value of enterprises objects (resources) that are considered innovative to the total cost of all objects that provide economic activity within a separate sphere of production |
| Informational | expert assessment of the transparency and availability of information within agrosphere spheres in the range of values: from 0 to 0.40 - low level; from 0.41 to 0.80 - average level; from 0.81 to 1.20 is the corresponding high level |

Source: formed with the use of [9, p. 105—106].

The general scheme of the implementation of an integrated assessment of the resource potential supply of agro-industrial enterprises is based on the logical sequence of stages of its implementation (Fig. 2). It is important that at all stages of the evaluation, complete and substantiated its implementation in order to increase the reliability of the calculations.

Thus, based on the proposed method was implemented calculation of integral indicator of resource potential businesses in Cherkasy region agrosphere method by the arithmetic land evaluation, logistical, financial, employment, innovation, information resources.

The starting data for conducting calculations is the consolidated statistical data on enterprises within the boundaries of certain spheres of agrarian and industrial production in Cherkasy region.

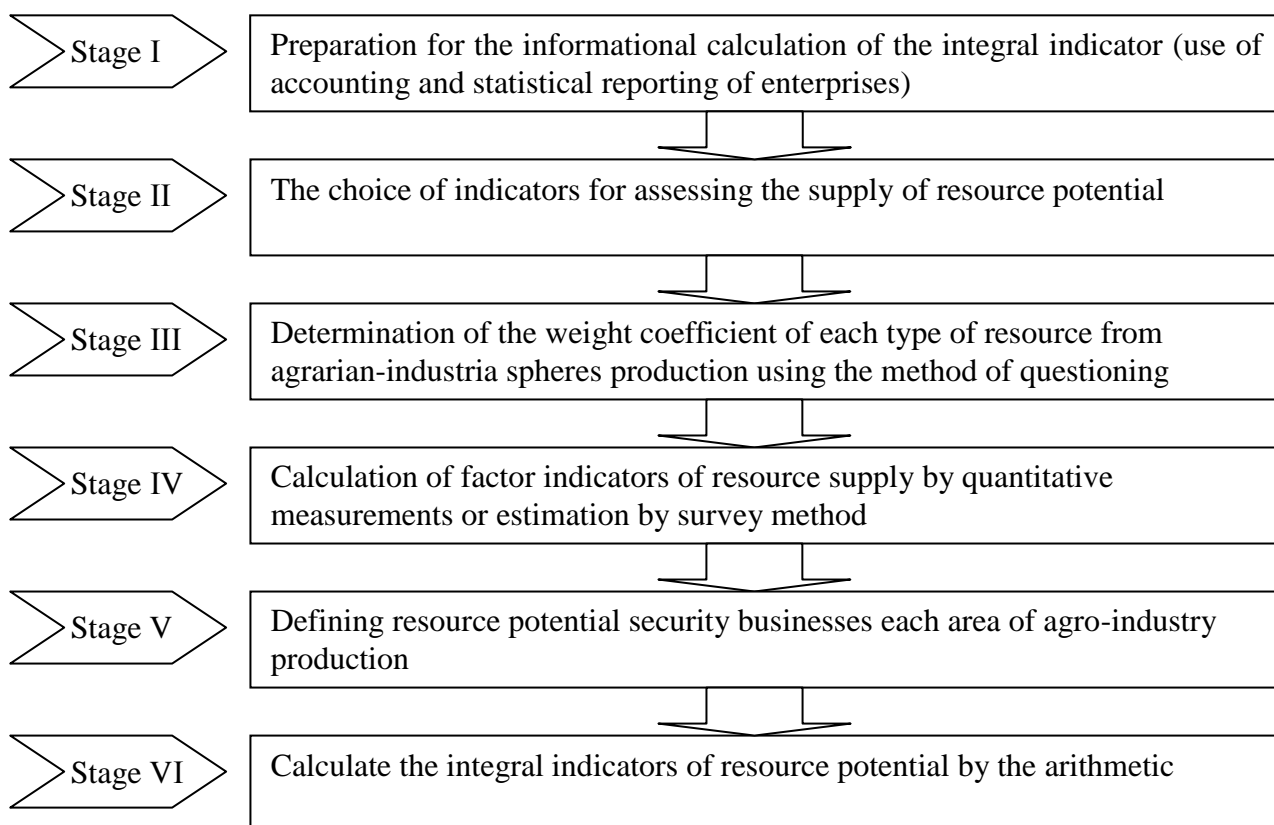


Fig. 2. Stages integral assessing resource potential of the enterprises of agro-industrial production
Source: author development.

According to Tabl. 4, throughout the research period a tendency towards an increase in the integral indicator of the enterprises' resource potential supply of agricultural industrial production is characterized on the one hand, by the positive process of its increase — on the other, indicating the discrepancy of individual groups of resources with the needs of modern, innovative agrarian and industrial production.

Table 4

Integral indicator of resource potential supply

| Years | Provision of resource potential of spheres in agro-industrial production | | | | Integral indicator of resource potential supply |
|-------|--|-----------|-----------|-----------|---|
| | I | II | III | IV | |
| | ZRP_s_1 | ZRP_s_2 | ZRP_s_3 | ZRP_s_4 | $IntZRP$ |
| 2008 | 0,4649 | 0,5229 | 0,4683 | 0,3965 | 0,4632 |
| 2009 | 0,4291 | 0,5053 | 0,4982 | 0,4410 | 0,4684 |
| 2010 | 0,4777 | 0,5526 | 0,5046 | 0,4663 | 0,5003 |
| 2011 | 0,4849 | 0,5421 | 0,4987 | 0,4912 | 0,5042 |
| 2012 | 0,4795 | 0,5554 | 0,5102 | 0,4910 | 0,5090 |
| 2013 | 0,5074 | 0,5626 | 0,5145 | 0,4795 | 0,5160 |
| 2014 | 0,4847 | 0,5629 | 0,5089 | 0,4865 | 0,5108 |
| 2015 | 0,4698 | 0,5751 | 0,5182 | 0,5073 | 0,5176 |
| 2016 | 0,4897 | 0,5834 | 0,5146 | 0,4986 | 0,5216 |

Source: calculated using [10].

Thus, in the last survey year, the generalized indicator grew by 12.6% against the level of 2008 due to increased resources supply of the first sphere of the agrarian sector by 5.3%, the second — by 11.6%, the third — by 9.9%, and the fourth — by 25.6%. This state of affairs is connected with the intensity of the development of integration links in recent years and the management of integrated formations [11], which ensure the increase of resource potential for joint enterprises in all spheres of their functioning.

Distribution of enterprises' resources, depending on their supply, is characterized by the importance of forming and using specific types of them within certain spheres of agrarian-industrial production. Knowing the tendencies of development of resource potential in a certain region it is possible to draw conclusions about the course of economic processes and carry out the forecasting of the necessary economic indicators for the near future.

Conclusions. Thus, efficient functioning of enterprises within the agrarian sector and separate agribusiness structures becomes possible only if there is a qualitative and economically justified resource potential that is at their disposal. Accordingly, the growth of financial and technological opportunities for the formation and effective usage of resource potential due to the development of completed product chains and the establishment of integration links between the participants in agro-industrial production. In order to evaluate their development in conditions of incomplete economic and agrarian reforms, there is a need for the development and application of new methodical tools for the integrated assessment of the availability resource potential of agricultural, industrial, commercial and other enterprises within the four-sector structure of the agro-sector. That's why the calculation of the integral indicator enterprises' resource potential supply of agricultural industrial production solves the problem of the construction of indicators with different units of measurement to a single generalization. With the help of it it's possible to estimate the contribution of each component in the development of the resource potential of the agrosphere as a whole or enterprises within one sphere in particular. The use of such data in the process of development of long-term plans for the development of agro-industrial enterprises, integrated structures, and individual regions will make it possible to increase the efficiency of agribusiness on the micro, meso- and macro levels on the basis of the principle of resource saving and the synergistic effect of the resources use in all spheres of agro-industrial production. A consideration of the integrated assessment of resource potential availability will make it possible to influence the current state and trends of enterprise development, as well as to serve as a criterion for the effectiveness of the resource potential, which will provide quantitative measurement of the level and tribal ownership of its change. Future research needs a resource support of agro-industrial enterprises that are developing on an innovative basis.

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