ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ

UDC [631.151.6:311.14]:005

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THEORETICAL AND METHODOLOGICAL FOUNDATION OF MEASUREMENT OF THE INTEGRATION LEVEL IN THE AGRARIAN SECTOR OF THE ECONOMY

Abstract. *Theoretical and practical approaches to measurement of the integration level in the agrarian sector of the economy are systematized. It is shown that estimated indicators are formed depending on the control level (microeconomic or macroeconomic), the type of integration (horizontal or vertical) and the directions of its realization ("forward" or "backward"). The main advantages and shortcomings of the analyzed methodical approaches to measurement of the integration level in the agrarian sector of the economy are defined; thereby the unified theoretical and methodological foundation of the studied issue is created.*

Keywords: *integration; integration level; the agrarian sector of the economy.*

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ТЕОРЕТИКО-МЕТОДОЛОГІЧНІ ЗАСАДИ ОЦІНЮВАННЯ РІВНЯ ІНТЕГРАЦІЇ В АГРАРНОМУ СЕКТОРІ ЕКОНОМІКИ

Анотація. *Систематизовані науково-практичні підходи до оцінювання рівня інтеграції в аграрному секторі економіки. Показано, що оціночні показники формуються залежно від рівня управління (мікроекономічний чи макроекономічний), виду інтеграції (горизонтальна чи вертикальна) та напряму її здійснення («вперед» чи «назад»). Визначені основні переваги і вади проаналізованих методичних підходів до оцінювання рівня інтеграції в аграрному секторі економіки, тим самим сформовано комплексний теоретико-методологічний базис досліджуваної проблеми.*

Ключові слова: *інтеграція; рівень інтеграції; аграрний сектор економіки.*

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ТЕОРЕТИКО-МЕТОДОЛОГИЧЕСКИЕ ОСНОВЫ ОЦЕНИВАНИЯ УРОВНЯ ИНТЕГРАЦИИ В АГРАРНОМ СЕКТОРЕ ЭКОНОМИКИ

Аннотация. *Систематизированы научно-практические подходы к оцениванию уровня интеграции в аграрном секторе экономики. Показано, что оценочные показатели формируются в зависимости от уровня управления (микроэкономический или макроэкономический), вида интеграции (горизонтальная или вертикальная) и направления её осуществления («вперёд» или «назад»). Определены основные преимущества и недостатки проанализированных методических подходов к оцениванию уровня интеграции в аграрном секторе экономики, тем самым сформирован комплексный теоретико-методологический базис исследуемой проблемы.*

Ключевые слова: *интеграция; уровень интеграции, аграрный сектор экономики.*

Urgency of the research. Strategic challenges exacerbate the problem of guaranteeing food security; improve the competitiveness of agricultural producers in the conditions of globalization on the one hand, and lack of state support – on the other. In such circumstances, the only rational way of development of agrarian sector is to develop efficient integration relationship. Such systems of agrarian structure in Ukraine on the principles of integrative multiculturalism take a prominent place in the draft strategy for development of agricultural production in Ukraine in 2025. In scientific terms, the problem is relevant under paragraph 1.3.28 "Integration factors in development of Ukraine" "Basic sci-

entific trends and major issues of basic research in natural, technical and humanities National Academies of Sciences in Ukraine for 2014-2018 ".

Target setting. To provide constant development of integrational relations in the agrarian sector, it requires development and justification of scientific instruments for analyzing and monitoring of achieved level of integration trends of its changes, etc., and determines the choice of the researched topic.

Analysis of recent research and publications. to the works of V. Ambrosov. V. Gusakov, A. Dankevych, G. Yekel, O. Yerankin, M. Zapolskyi, I. Zelisko, M. Kropyvka, Y. Lupenko, M. Malik, Y. Nesterchuk A. Pylypenko, P. Sabluk and many others the research on various aspects of integration relations in the agricultural sector is devoted.. In the world of economics the most significant are the achievements of M. Adelman, A. Benmehaia, M. Blier, R. Bradburd, R. Wilder, S. Davies, E. Eckard, R. Caves, D. Levy, J. MacDonald, S. Martin, I. Tucker.

Uninvestigated parts of general matters defining. Despite the significant amount of scientific work, the problem of scientific support of evaluation system of the level integration remains ignored by domestic scientists. Agrarian sector requires systematization of theoretical and methodological basis of evaluation of integration, the study of influence of the type, form and scale implementation of integration relations in the system of performance indicators so on.

The research objective. The article is a generalization and systematization of theoretical and methodological foundations of evaluation of integration in agrarian sector.

The statement of the basic material. Management solutions system as for development of integration relations in agrarian sector on micro- and macro-levels should be based on appropriate assessments of integration. Considering the nature of integration into the broad and narrow sense, it would be objective to reduce the number of separate companies on a background of the formation of integrated economic and industrial and commercial structures. At the same time, concept of integration relationship, the direction of integration would significantly affect these assessments, would determine the index system and its economic content.

Thus, in our opinion, evaluation of integration should be based on the determination of the assumptions, such as: economic activity scale, concept of integration level of specialization of relevant entities, involved in the integration relations and the type of integration strategy. Depending on the scale of economic activity, it is advisable to carry out calculations on the macro level (the level of the state as a whole expanded the scale of transnational corporations), meso level (the level of a particular industry or region) and micro (level of integrated enterprise). Depending on the integration form, should be separately analyzed the processes of horizontal, vertical or quasi-integration. Specialization of the enterprises has more indirect impact, creating a set of indicators of size and efficiency, especially value added and more. Type of integration strategy (full integration, partial integration quasi-non-integration, integration "forward" or "backward") essentially defines the logic of the evaluation process, because it causes future legal form of association capital, the type of integration relations system of property rights, mechanisms of formation and distribution of surplus value, profits and risks.

The system of evaluation indicators to measure the level of integration includes only the ratios indices, presented be various kinds of coefficients that are calculated based on the primary labor, natural, synthetic and measuring value.

Currently, there are four basic methodological approaches for evaluation of integration. The first is based on the assumption that integration tends to monopolization, so the level can be determined by a system of indicators of market concentration (the criteria Hannah-Kay), the market share of two (CR_2), three (CR_3), four (CR_4) and six (CR_6) largest enterprises Herfindahl-Hirschman index (*HHI*), the Hall-Taydmen index (*HTI*), Lind index (*LI*) and more.

In order to analyze at the micro level J.MacDonald suggested performance of overall (*TVI*) and production (*MVI*) level of integration that defined as the ratio of production of goods (works, services) integrated formation (*TQ*), including production and raw appointment (*TMQ*) and volumes of supplies of resources for integrated enterprise formation (*TI*), including processing (*TMI*) (1) - (2) [1, c. 329].

$$TVI = \frac{TQ}{TI} \qquad 1)$$

$$MVI = \frac{TMQ}{TMI} \quad (2)$$

It caused a close positive correlation between the levels of integration and performance of market concentration on industry enterprise integrated commodity markets, particularly the most statistically significant correlation was with a market share of four largest companies and Herfindahl-Hirschman index.

In case when vertical integration mainly depends on the market power associated with inter-farm buyers and sellers connection, the level of integration (LVI_{CR}), R. Caves and R. Bradburd can be defined by the formula (3) [2, c. 269].

$$LVI_{CR} = SCR_4 \times BCR_4 \times HHI, \quad (3)$$

where SCR_4 – is a market share of the four largest companies with supply (raw material) industry; BCR_4 – is the average market share of the four largest companies manufacturing or processing industries, ordering products in the basic materials, weighted by the share of each customer in sales resources suppliers; *HHI* – Herfindahl-Hirschman index, calculated in terms of supply of basic materials in the processing industry.

With the growth of LVI_{CR}, level of integration increases, and vice versa.

Also, scientists R. Caves and R. Bradburd ground its use as an indicator of integration of production of integrated companies in the total production area [2]. Evaluation of the level of integration at scales of the industry or similar (related) industries scientists believe to be done by the formula (4).

$$LVI_i = \sum_{j=1}^{n} b_{i,j} \frac{NV_{i,j}}{N_{i,j}}, \quad (4)$$

where LVI_i – is the level of integration in the "*i*" industry; $b_{i,j}$ – is the share of *"i"* industry and is realized (consumed) in the *"j"* industry; $NV_{i,j}$ – number of companies that belong to both (conducting the activity) the *"i"* and *"j"* sectors; $N_{i,j}$ – the smallest number of companies belonging to *"i"* and *"j"* sectors.

In an alternative indicator of the level of integration at the meso level scientists from the State Higher Educational Establishment "Vadym Hetman Kyiv National Economic University" indicators of market concentration and globalization of the market was proposed [3, p. 113]. The level of market concentration is calculated as the concentration of commodity production with the assumption that as the share taken by the proportion of single integrated company structure in annual sales (market size) or gross production of a particular type of product in general in Ukraine. Indicator of market of globalization is the ratio of market share "of global companies" size and market certain types of products, which is the same approach R. Caves and R. Bredbourd for calculating market shares of the integrated enterprise specific sector.

The main disadvantages of this methodological approach is its incorrect identification on the of integration base of monopolization of the market as well as restrictions on the scope and the economic content of the received results. Yes, only in case of horizontal integration relations in the form of strategy for the full integration, this process will be heading objectively to the integral formation of monopoly to which the relevant provisions of the antitrust laws can apply, including rules of Methodic of monopoly (dominant) conditions of entities on the market (resolution of the Antimonopoly Committee of Ukraine, № 49 from 05.03.2002). Otherwise integration or relationships either get beyond the industry and the corresponding limits of the market or have no clear design for the correct use of these indicators.

It should also be noted that in order to evaluate the vertical integration correct, the required admission should be taken. At first, the company is a vertically integrated if it is a part of another company (belongs) that has at least one company in vertically related industries. At second, the two industries are vertically related if one of them products required for production of other (on the table "input-output").

The second methodological approach is based on the neoclassical paradigm of integration and the primacy of relations among branches. In this case, the level of integration can be measured through indicators of self-sufficiency in resources as a whole, and at certain stages of the production process (LVI_P) (5).

$$LVI_P = \prod_{i=1}^{n} \frac{QM_i}{QP_i}, \quad (5)$$

where QM_i – output and the "*i*" type of products for integrated enterprise, tones; QP_i – volume processing and the "*i*" type of products for integrated enterprise, tones; *n* – number of products produced and reproduced on an integrated enterprise.

LVI_P index takes values from 0 to 1, indicating a complete non-integration ($LVI_P = 0$) or full integration ($LVI_P = 1$).

Such ratio can be determined either for individual businesses or for the industry as a whole, however, in our opinion, they can not accurately determine the level of integration, show which companies or industries are integrated, and which ones are not, though are able to illustrate incentives for integration interaction, aimed at full and even capacity utilization, cost internalization and more.

The third approach is based on neo-institutional theory of vertical integration and system of competitive advantage formation. The level of vertical integration ($LVI_{VA/TS}$), according to M. Adelman, we can estimate the ratio of value added *(VA)* and the total sales of goods (works, services) (*TS*) (6) [4, p. 281-282].

$$LVI_{VA/TS} = \frac{VA}{TS} \quad (6)$$

Thus, value added quantitatively equal to the difference between total sales and cost of purchased and consumed by industrial and material resources. Another measure of the level of vertical integration ($LVI_{IV/TS}$) M. Adelman considered the value of inventories (*IV*) and total sales (7) [4, p. 283].

$$LVI_{IV/TS} = \frac{IV}{TS} \quad (7)$$

The scientist remarks, that the assessment of the level of vertical integration is universal and suitable for analysis at the level of the individual enterprise and at the level of the whole industry.

The followers of M. Adelman, the economists J. Tucker and R. Wilder noted that the ratio index of value added and total sales has significant methodological flaws [5, p. 83]. In particular, this figure is not suitable for inter-industry comparisons, because it significantly increases the primary sector compared to other at a constant level of actual integration or socialization of production. Another significant flaw of $LVI_{VA/TS}$ is in the economic content of value added, which includes a profit rate which is independent of the level of integration, however, varies by branches of industry. They also assumed that, under other even circumstances, increase of value added and total sales of goods (works, services) demonstrates the increased level of vertical integration [5, p. 82]. Thus, the integration of "back", while preserving sales, value added increased by reducing the cost of consumed material costs. With integration "forward" sales growth rate exceeds (caused by the actions of synergistic effect) the rate of growth of material costs, thereby changing the dynamics of the index $LVI_{VA/TS.}$

In 1979 E. Eckard fairly charged the critics for the concept of M. Adelman and his followers. According to him, $LVI_{VA/TS}$ index is suitable only for trend analysis of integration processes in the industry, and its use in micro level absolutely incorrect because it does not take into account the varieties and forms of integration and transformation features of the means of production and integral property complexes [6, p. 106]. Along with neglecting of horizontal integration, false charging to the integration process of new construction and modernization of existing production facilities, the index $LVI_{VA/TS}$, designed for specific sectors based on balance between industries, will not be identical to the arithmetic sum of corresponding indices for companies that conduct their activities in this industry, as their assignment to specific industries and to individual economic activity in statistical accounting methodologically differ.

Thus, we believe, this index is generally suitable for the analysis of the dynamics of integration level in the agricultural sector at the meso- and macro-level, but is limited with production stages, not allowing to conduct qualitative evaluation of inter-sectoral integration. Also we consider that the correctness of calculations at branch level to use national accounts data appropriate, including the table of "input-output" (at basic prices). In this case, the level of integration ($LVI_{GVA/O}$) will be determined as the ratio of gross value added *(GVA)* to gross output (*O*) (8).

$$LVI_{GVA/O} = \frac{GVA}{O} \quad (8)$$

General approach to the evaluation of integration based on value added ratios comply with the law of vertical integration by S. Gubanov (zero return on all intermediate production) and underlying design of the majority agricultural holding structures. Limiting factor here is the analysis of the condition within a certain sphere of production and industry, without the possibility of generalization to the whole enterprise. In order to solve this problem and, as a major internal mechanisms of formation of competitive advantage, M. Porter substantiated the concept of "value increment chain". Value added creates a micro-level economic value added enterprises (*EVA*) and is at the heart of its economic (market) value (*EV*). On the other hand, to overcome the limitation of production stages within the "chain of increment value" expedient further analyze the cost structure and internal (transfer) prices of integrated agro-industrial enterprises, which are the basis not only motivation for integration, but also the mechanisms of inter-industry relations and redistribution created added value and economic effects.

The fourth approach is based on cross-sector nature of vertical integration without the type of strategies and provides an analysis of macroeconomic indexes on tables "input-output". According to the input-output model of

V. Leontiev in 1981, R. Meddigen proposed indicator of vertical communications sectors (*VIC*) as a measure of vertical integration, which can be performed in the canonical vector form as the formula (9) [7, with. 330].

$$VIC_j = 1 - \left[1 \Big/ \prod_{i=1}^{n} C^i (C^i)^T D_i (D_i)^T \right], \quad (9)$$

where VIC_j – level of vertical connections of "*j*" branch (enterprise); C^i – *"i"* column of the matrix resources in "*j*" branch (enterprise); D_i – *"i"* row of the matrix in output "*j*" branch (enterprise); *n* – number of related fields (or number of industries where "*j*" company conducts its activities); symbol *T* means transposed matrix.

This index takes values from 0 to 1 and demonstrates the lack of vertical integration ties ($VIC_j = 0$, the enterprises functioning only within the same industry) or full vertical integration ($VIC_j = 1$, companies are proportionally across all related industries).

Based on studies of R. Meddigen, English scientists S. Davis and C. Morris improved method of evaluating the level of vertical connections tested it with the example of industry in Grate Britain. However, they are expected as a general indicator of vertical integration (*TLVI*), integration and performance of the "forward" (*FLVI*) and "back" (*BLVI*) for sectors of the economy (10-12) [8, p. 155].

$$TLVI^i = \sum_{j=1}^{R} \sum_{\substack{k=1 \\ k \neq j}}^{R} \frac{X^i_{j,k}}{X^i}, \quad (10)$$

$$FLVI_j = \sum_{\substack{k=1 \\ k \neq j}}^{R} \sum_{i=1}^{N} \frac{X^i_{j,k}}{X_j}, \quad (11)$$

$$BLVI_j = \sum_{\substack{k=1 \\ k \neq j}}^{R} \sum_{i=1}^{N} \frac{X^i_{k,j}}{X_j}, \quad (12)$$

where $TLVI^i$ – is the level of vertical integration *"i"* company; $X^i_{j,k}$ – is the cost of production and the first companies that worked in his capacity as the "*j*" branch and consumed (reproduced) at the strengths *"k"* industry; X^i – total sales of *"i"* company (including the cost of farm production intermediates, but excluding similar intra-flows); $FLVI_j$ and $BLVI_j$ – the level of integration "forward" and "backward" for the "*j*" branch; *N* – number of companies in the economy; *R* – the number of branches in the economy.

In a little modified shape, this approach is presented in paper of S. Martin, who, in order to determine the level of integration, used data tables "input-output" on the volume of production and consumption in every sector of the economy [9].

The main disadvantages of this methodological approach are its practical unsuitability for certain businesses and a certain vagueness interpretations derived ratios on the actual level of integration. Besides, cross-correlation does not allow to assess the level and analyze partial integration in the in-

dustry. One attempt of methodological and practical solutions for the outlined flaws is the calculations of synthetic indicators of integration based on regression, taking into account both the sectoral structure and transaction costs and market conditions. [10]

Conclusions. The study shows that the evaluation methodology of integration level in the agricultural sector is very complex and ambiguous from the point of analyzing the results; is not yet fully formed and determined, and the process of evaluation is determined by a number of factors of integration relations. All analyzed theoretical and methodological approaches have both advantages and disadvantages, and their choice is grounded on analyze and its scale.

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Received for publication 7.11.2016

Бібліографічний опис для цитування :

Gutorov, A. O. Theoretical and methodological foundation of measurement of the integration level in the agrarian sector of the economy / A. O. Gutorov // Науковий вісник Полісся. – 2016. – № 4 (8), ч. 1. – С. 118-123.