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An Integrated Approach to Evaluating the Efficiency of Performance and Development of Regional Food Complex

ABSTRACT

Important issues of a food complex remain an increase of efficiency and competitiveness in both domestic and foreign markets. The necessity to identify strategic areas of agro policy that provides efficient development of food complex as the basis for food security of the population according to rational nutritional standards by improving physical and economic availability of foodstuff of different social groups, requires the development of appropriate methodological and applied bases for performance and development of food complex.

The article focuses on the issue of the possibility of an integrated approach application to evaluating the performance efficiency and development of regional food complex on the basis of the research of the main methodological approaches to this evaluation, taking into account their advantages. Food sector in modern development faced with different challenges and threats represents a strategically important research object both at national and regional levels because it forms a subsistence support of the population. Thus, the correct approach to the evaluation of the regional food complex can substantially accelerate the development of quality of food complex with an emphasis on its timely transformation taking into account the relevance of the integration process.

The basic tasks for the evaluation of food complex efficiency have been defined. Firstly, the task of a tactic level is to effectively perform food supply function in the agricultural sector (food security provision). Secondly, strategic task is the social and economic transformation (restructuring, modernization) of the agricultural sector the leading element of which should be the creation of a new production, market and social infrastructure of agricultural and rural areas, a new entrepreneurial class capable of integration into innovation and investment development in market conditions. Therefore the application of a task-oriented approach as a means to solve the formulated tasks has been investigated.

Moreover, the expedience of the research for identifying the effective instruments of state control and regulation (primarily software-based) through the prism of motivation in food markets of all regions, all agents of agricultural markets.

The basic criteria and indicators of a complex evaluation of efficiency and food complex development have been stated.

Key words: *regional food complex, integrated approach, evaluation of the efficiency, economic efficiency, social efficiency, external economic efficiency, institutional efficiency, overall efficiency.*

Introduction. Methodological approaches to evaluating the efficiency of performance and development of the food complex are the revealed principles, forms and ways of scientific and educational activity in the study of phenomena and processes of the business life directly connected with the food complex of the region and affecting its further development. The methodological basis of this evaluation is dialectical materialism, according to which all processes and phenomena are studied ongoing. Food sector in modern development faced with different challenges and threats represents a strategically important research object both at national and regional levels because it forms a subsistence support of the population. Thus, the correct approach to the evaluation of the regional food complex can substantially accelerate the development of quality of food complex with an emphasis on its timely transformation taking into account the relevance of the integration process.

Review of recent research and publications. Methodological basis for the evaluation of food sector has been widely studied by many scholars, namely A.I. Altuhov, V.G. Andriychuk, Yu.V. Chyrychenko, L.V. Deineko, N.P. Fedorenko, P.I. Gaidutsky, D.A. Kasennov, M.P. Kovalchuk, I.S. Kovarsh, L.E. Kupynets, M.A. Khvesnyk, A.H. Mazur, V.I. Nazarenko, V.V. Rossoha, S.D. Sitash, O.O. Shevchenko, T.A. Shubovych, O.V. Shubrovskya, I.A. Volkov, K.B. Voloshchuk, Zhalilo A.Ya. and others. However, many methodological aspects of theory and practice of performance and development evaluation of regional food complex have to be further investigated.

Purpose. The purpose of the research is the study of an integrated approach to evaluating the efficiency of regional food complex, the selection of basic criteria and system of evaluating indices.

Methodology and methods of evaluation of performance and development efficiency of food complex are based on influence of internal and external factors including: 1) definition of demand and supply; 2) level of development of agricultural sector; 3) level of export and import of foodstuff; 4) market infrastructure formation; 5) level of market relations regulation.

Methodological approach for the evaluation should be based on an integrated approach in the context of the provision of population with food and support of national producers: promotion of domestic agricultural production; effective demand; growth in production and supply; implementation of agricultural protectionism; export promotion and product import restrictions.

Investigation methods applied in evaluation of food complex can be general scientific and specific or special. The first have a wide application and include method of scientific abstraction, method of analysis, inductive and deductive methods, experiment etc.

The method of scientific abstraction is the movement from concrete to abstract and backwards (Mocherny, 2001). Scientific abstraction is the neutralization of external, non-existent characteristics and phenomena and selection of their general, significant features. Abstraction underlies the formation of economic concepts and categories. Abstraction can be more or less deep in character, but it is almost impossible to ignore the essence of economic phenomena.

Evaluating the functioning and development of food complex analysis and synthesis are used. Analysis means differentiation of economic phe-

nomena into their constituent elements and each element is studied sequentially. For example, analyzing the structure of the enterprise, each branch of it can be identified and investigated. But to determine the specialization of the enterprise and its features, to understand the relationship between industries synthesis is to be used, i.e. combination of individual elements of the object (Mocherny, 2001).

Determining the effectiveness of food complex, it is necessary consider that this is foremost a macroeconomic problem associated with the agricultural production.

The efficiency of the agricultural sector and its impact on provision of food security should be identified during planning and forecasting, programming, design and actual results (Khorunzhyy, 2001).

Designing the system of indices can include the cost of production and work, additional production through investments and other measures, return on invested assets. Calculations of the final indices should be based on productivity, costs and labor costs of production; profit and profitability of production; return terms on investment.

Methodology of evaluation of food complex formation includes groups of indicators the main of which can include supply and demand for foodstuff: formation of market potential and market infrastructure; level of market stability. The most important parameters in these groups are considered to be market capacity; dynamic growth of turnover; import level; meeting the demand for food; index of food consumption of domestic producers; level of economic availability for food by the poorest sector of the population; purchase volumes of agricultural products in the state and regional funds (Mazur & Pidvalna, 2005).

Presently to reach the aim of a sustainable development of a regional food sector during its functioning two main tasks are to be studied:

- 1) the task of a tactic level is the efficient food provision in the agricultural sector (food security provision);
- 2) strategic task is the social and economic transformation of the agricultural sector (restructuring, modernization), an important part of which is the creation of a new productive, market and social infrastructure in the agricultural and rural sector, new entrepreneurial layer capable of integration to innovation and investment development in market conditions.

The way to solve these two problems is the use of program-based approach the main issues in the development of regional agricultural systems is:

- support of resource potential of agricultural complex (human resources, land, genetic, industrial, technical, technological, innovation and investment, social);
- development of areas of training, equipment, legal support, public protection;
- social transformation (quality of life, emergence of new forms of business), technological transformation (development of green revolution of livestock breeding, new high-tech machinery etc.);
- organizational transformation: industrial infrastructure, cooperation.

Ensuring food security is closely linked to the motivation of consumer behavior in the food market, which determines an individual approach to the distribution of income within the physiological needs of the population (the lowest level available) and saturation level (maximum). Income increase changes consumption patterns and elasticity of demand to price changes. Non-price determinants of demand are to be counted (Kovarsh).

Producers' behavior in the food market is caused by relative prices and production costs, as well as opportunities to diversify and restructure agricultural production.

Defining in food production tactics during recession and slow economic growth should be reimbursement of costs and benefits of inflation losses. Thus, the main priority problem is support of income of rural sector. In this case the role of intermediaries should not be limited to services only. Wholesale trade and financial institutions should largely divide the risk of losses from illiquidity and conjuncture slump. That is why in all cases an equal target of market interaction must be a stabilized income and loss prevention.

Social and economic strategy of the state in agriculture must be directed to support the equilibrium volume of supply and demand within scientifically grounded and socially constructed physiological norms of consumption. And though the main function of the state is organizational and legal provision, guarantee from the agents of agricultural markets to stick to the rules of market behavior, yet the main problem of state direction and regulation of regional food markets is the provision of balanced regulating transactions: grants, subsidies, compensation, taxes, social support (Volkov, 2010).

Therefore it is reasonable to investigate effective instruments of government direction and regulation (primarily program-based) through activity motivation of all mentioned agents in regional food markets. It is necessary to identify and evaluate possible deformation and forced compromises neutralizing activities of state to solve the food problem, food security provision.

Consumer behavior modeling considering consumer tastes, per capita income, price level, inflation rates will help revealing certain regularities, necessary elements of government direction and regulation of regional agricultural systems, regional food markets and regional food complexes.

Therefore in modern conditions special importance has been given to problem-oriented management of competitiveness, providence and sustainable development of regional agro-food complex, which is consistent development of program-based management and includes all its major components (Shubovych, 2012). The essence of problem-oriented management is the transaction from reactive management to active, forward-looking preventing from problem situations and contradictions in a food complex of regional agricultural systems.

The management system of regional agricultural systems must include efficient methods of project management especially in implementing innovative and investment policy (Voloshchuk, 2012).

Generally evaluation of the state of food security and independence can be defined as physical availability of food, i.e. existence of foodstuff on all the territory of the country at each time moment and necessary assortment and quality; economic availability of food, i.e. level of income regardless of social status and residence of a person which allows to buy foodstuff at physical and scientifically grounded medical norms; food security for consumers, i.e. prevention from production and consumption of low grade, false and harmful products for health and life of the population.

To characterize the food complex it is necessary to analyze consumption of food of a region, physiological needs of the population in calories and nutrients, differentiated by age and sex characteristics and working conditions. Without a detailed study of real consumption of the population and evaluation of food security it is not possible to justify the necessary production volume, planned indicators of food complex development.

Analyzing product consumption it is necessary to study the provision of the population, food supply of the population, production and consumption of food.

The study of the per capita consumption is of primary importance in the analysis of food consumption. Statistic indices characterizing personal food consumption include indices of actual consumption, market consumption or selling, satisfaction of needs of the population.

Defining the scope of consumption the shipment of food from public resources to market and non-market consumers in the region; products from local sources; individual production; increase or decrease in food supplies in wholesale and retail trade link are to be considered.

The volume of food sales calculated per capita characterizes market form of consumption which involves meeting people’s needs by buying and selling products. In case of purchase and sales dynamic sales can have a double meaning: they are an objective source of information as a result of production as well as the consumption of the population. One of the indicators that objectively evaluates production is the degree of satisfaction of needs.

Generalizing the investigated methodological approaches to evaluation of performance and development efficiency of regional food complex and addressing the task-oriented management of competitiveness, thrift and constant development of regional agricultural food complexes the method of integrated evaluation of performance and development efficiency of regional food complex has been provided (Deineko & Sheludko, 2012.; (Chyrychenko, 2012); (Kupynets, 2010).

The system of indices for the evaluation of performance and development efficiency of regional food complex should include five subsystems of indices of economic, social, innovative, institutional and external economic development, which themselves consist of a group of simple indices for the regional development of this area. In such conditions the information block for the detection of efficiency level of a food complex will look like an integrated method of evaluation (Figure 1).

The given method means determination of a group of criteria and indicators which has a quantitative aspect and is a combination of indices. It is very important to stick to four main conditions defining such criteria and substantiating the relevant characteristics.

Firstly, the indices should reveal the consequences of decisions made in increasing the efficiency of regional food complex. Secondly, the level of efficiency of food complex should be evaluated in a strict (static) and enlarged (dynamic) sense with the help of certain indicators. Thirdly, it is appropriate to use these indicators to find the results of interaction of state and agro-industrial structures on a regional level taking into consideration influence from state and economic level. Fourthly, the criteria of evaluation should anticipate the adequate characteristics of development regularity of structural elements of food complex considering the peculiarities of their functioning in certain region.

Generalized characteristics of references focusing on the solution of methodological improvement problem of the evaluation of the performance efficiency and development of regional food complex allow to systematize the generally accepted indicators for definition of economic efficiency of the investigated process.

Studying the constituents of the food complex performance and development efficiency the basic criteria of evaluation of each of the represented efficiencies should be differentiated.

The author suggests that the main criteria of economic efficiency evaluation may by a group of indices which will reveal the dynamic increase of regional food complex. Such indices may include:

- volume indices which indicate the increase of the production volume and selling and also production costs and sales of agricultural products, balance sheet and net income of agricultural entities;

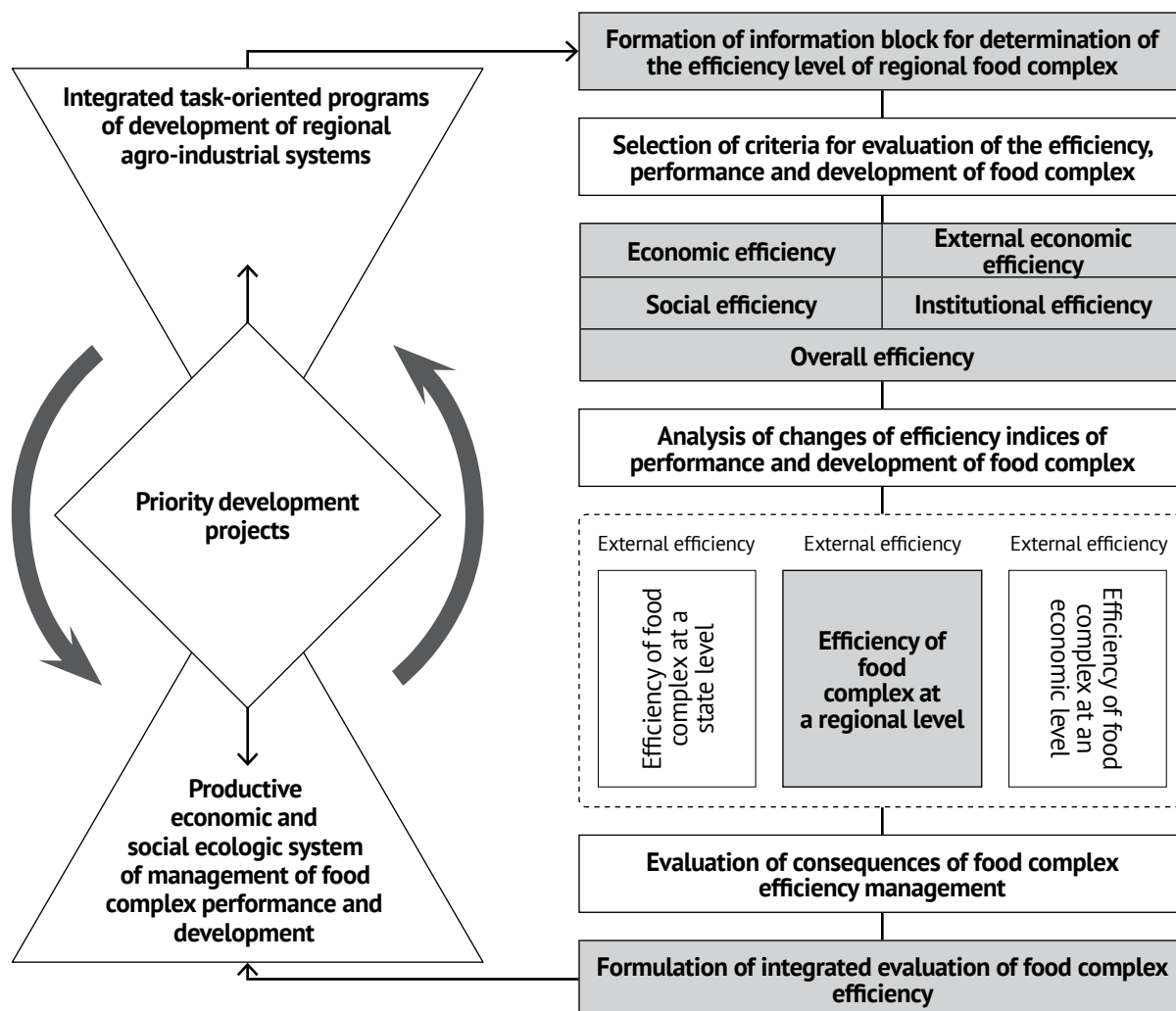


Figure 1. Methods of Integrated Evaluation of a Regional Food Complex Performance and Development Efficiency

– indices presenting the level of production profitability of main types of agricultural raw materials and foodstuff which can be defined using a formula (Zhalilo, Sobkevych, Rusan, & Yurchenko, 2011):

$$Pp = \left(\frac{In}{V} \right) \cdot 100 \quad (1)$$

where In – net income of agricultural entities;

V – sales volume expressed in monetary terms;

– indices characterizing the process of intensification of agricultural production which include indices of value-added gross output and net income in agricultural entities;

– financial and economic indices showing the liquidity, solvency and financial stability of agricultural entities.

To define the growth rate of economic activity it is appropriate to use the general index the calculation of which is based on the geometric middling taking into consideration the sum indices of the above mentioned groups.

A very important part of an integrated efficiency evaluation is its social component; the basic indices of its evaluation are (Rossoha & Pronko, 2010): 1) growth rate of wages per worker which is calculated as arithmetic middling considering the ratio of remuneration of labor to the average number of workers on a list (R_w); 2) growth rate of labor hours per worker (R_h); 3) growth rate of workers in agricultural entities (R_{wor}); 4) growth rate of social transfers (R_t); 5) growth rate of standard of living (R_{st}); 6) growth rate of per capita production (R_{pr}); 7) growth rate of consumption of essential products (R_c); 8) growth rate of average income of workers in agricultural entities ($R_{av.in.}$).

The sum of these rates defines the criteria growth rate of social efficiency of regional agricultural production ($R_{soc.ef.}$):

$$R_{soc.ef.} = \sqrt[n]{R_w \cdot R_h \cdot R_{wor} \cdot R_t \cdot R_{st} \cdot R_{pr} \cdot R_c \cdot R_{av.in}} \quad (2)$$

In terms of social efficiency it is appropriate to define the institutional one using efficiency indices of performance of managerial body and organizational and management entities that have to be divided into four interconnected groups:

1. The indices of performance of organizational and management entities which assist the substantiation of characteristics connected with the performance of management staff and are used as criteria of working results evaluation in the agricultural households (Khvesnyk & Lysetsky, 2008).
2. The indices representing the process of labor organization of management staff are useful for defining the results of productive and commercial activity in agricultural entities. To define the level of the above mentioned efficiency an integral growth rate of institutional efficiency is presented ($R_{in.ef.}$):

$$R_{in.ef.} = \sqrt[n]{R_{org.str.} \cdot R_{man.} \cdot R_{per.wor.} \cdot R_{tech.}} \quad (3)$$

where $R_{org.str.}$ – growth rate of performance of organizational and management entities;

$R_{man.}$ – growth rate of labor costs of management personnel;

$R_{per.wor.}$ – growth rate of performance of work units;

$R_{tech.}$ – growth rate of technical maintenance of organizational and management entities.

Integral indices of each group of rates are calculated by geometric average.

To define the external economic efficiency of a regional food complex it is appropriate to use the methodology implying the calculating of two groups of indices of food complex as an integral economic system. The first group contains statistic indicators and characteristics of foreign trade integration level and the second one has dynamic indicators of it.

To solve the above mentioned task it is necessary to aggregate single indicators and to form generalized object characteristics. Combination of static and dynamic characteristics in analytics allows to obtain a more profound and detailed system description according to its structure and development trends.

As a means of getting an aggregated evaluation of a specialized food complex field as a part of international integration on a food market a standard is to be used. It is appropriate to define the optimum levels, i.e. regulatory value ratio, provided there is the most significant indicators of an investigated activity of industries. Thus, a combination of standards of industry compared to its actual characteristics is formed.

Production level in various industries affects the state and development of foreign trade integration. If production does not completely meet the market's demand this function is performed by import. If production meets demand there appears a possibility of export increase.

The algorithm of calculating the efficiency of external economic integration of separate food complex industries on the basis of a standard approach can be presented as follows:

1. In order to stick to the criteria of food security in foreign trade relations according to which production volume of industry (P) has to be equal or exceed 80% of a regulatory consumption fund (RF) the first criteria is represented as:

$$P \geq 80\% RF, \text{ if } RF = Pc \times r \quad (4)$$

where Pc is a per capita consumption rate;

r – population size.

2. In order to provide food security it is necessary to fix an import limit (I) which cannot exceed 20% of a regulatory consumption fund:

$$I \leq 20\% RF \quad (5)$$

3. External economic integration on a modern insufficient level of food complex development cannot be oriented at unlimited export increase if to speak about deficit industrial products. It is suggested that export volume (E) cannot exceed 10% of domestic production volume without obvious losses for food supply of the population:

$$E \leq 10\% P \quad (6)$$

4. It is appropriate to follow the priority of domestic food production, in its growth rate (Rd) compared to the index of import growth (Ri). This situation corresponds to the strategy of import replacement.

$$Rd > Ri \quad (7)$$

5. With the same aim the growth rate of production must be higher than the growth rate of export to avoid decrease of a consumption fund.

$$Rd > Re \quad (8)$$

6. Ratio of low and high added value products in external economic integration must be efficient for the country. It is calculated as the index of raw materials in foreign trade.

In export structure high added value products (finished products) must prevail. Standard value of the level of raw material export (RME) regulates that raw material export (Er) should not exceed production export (Ep):

$$RME = (Er/Ep) < 1 \quad (9)$$

7. The level of raw material import (RMI) is characterized by the ratio of raw material import (Ir) to the finished product import (Ip):

$$RMI = Ir/Ip \quad (10)$$

The following inequality can be considered to be standard:

$$RMI > 1 \quad (11)$$

The sum of evaluations according to seven single indices is compared to the sum of standard evaluations which is 70 points. Zero points obtained show weak sides of the investigated field and can be a starting point of the development of a task-oriented program. The index in percent representation is an aggregated evaluation of the efficiency of foreign trade integration (RAj). It can vary from 0 to 70 and is calculated for j-industry using a formula:

$$R_{Aj} = \left[\left(\sum_{i=1}^7 P_i \right) / 70 \right] \cdot 100 \quad (12)$$

where Pi is evaluation in points according to index i of the industry j; 70 is the sum of standard valuations according to seven single indices. Figure 2 shows the problem solution algorithm of evaluation of external economic integration.

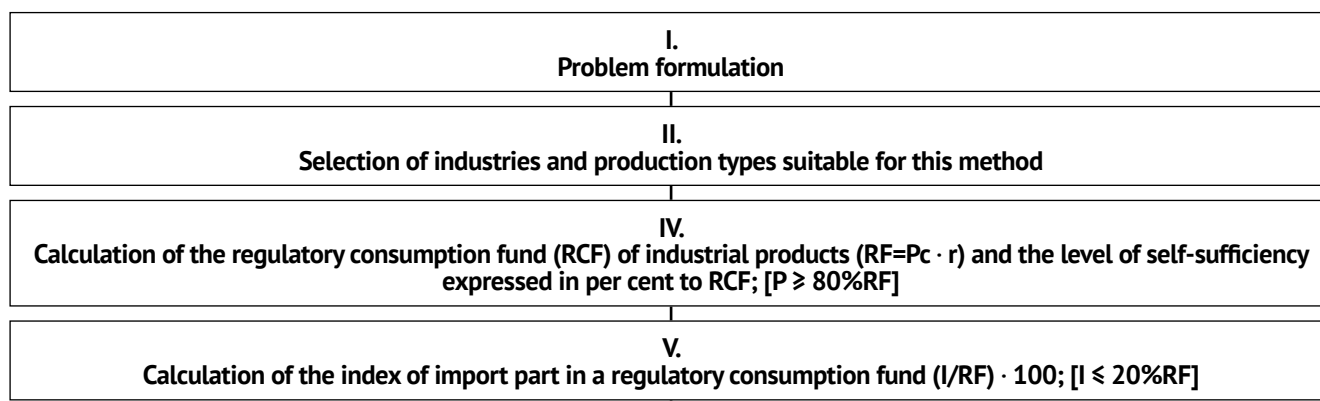
For application and approbation of the method it is offered to choose the priority industries for the region. The obtained results can be useful for concept development and task-oriented strategies for the perspective development of food complex industries.

For a system usage of the above differentiated indices the general evaluation criteria is formulated which is a general efficiency and is calculated using a formula:

$$R_{gen.} = \sqrt[n]{R_{ec.ef.} \cdot R_{soc.ef.} \cdot R_{in.ef.} \cdot R_{Aj}} \quad (13)$$

Figure 2.

Algorithm of Aggregated Evaluation Method of Foreign Trade Integration of Food Complex Industries Based on a Standard Approach



<p>VI. Calculation of the index of export part of food in the production volume $(E/P) \cdot 100$; $[E < 10\%P]$ for deficit products</p>
<p>VII. Calculation of production index (I_p), import index (I_i) and their correlation $(I_p - I_i)$; $[I_p > I_i]$</p>
<p>VIII. Calculation of export index (I_e) and its correlation to the production index $(I_p - I_e)$; $[I_p > I_e]$</p>
<p>IX. Calculation of the index of the level of raw material export $(RME = E_r/E_p)$; $[(E_r/E_p) < 1]$</p>
<p>X. Calculation of the index of the level raw material import $(RMI = I_r/I_p)$; $[(I_r/I_p) > 1]$</p>
<p>XI. Correlation of seven single indices obtained with their correspondent standard indices in a separate industry or production type</p>
<p>XII. Calculation based on correlation of each of seven single indices (P_i)</p>
<p>XIII. Calculation of an aggregated efficiency index of external economic integration of industry or production type in a food complex</p> $R_{Aj} = \left[\left(\sum_{i=1}^7 P_i \right) \cdot 70 \right] \cdot 100$

An important issue considered in the formulation process of system of indices characterizing different types of efficiency is the provision of their structural and hierarchical correspondence to the basic aims and tasks of the investigated processes. Evaluating the efficiency of certain events connected to the improvement of its structure it is possible to use single indices. Their selection is based on their maximum correspondence to the task orientation and completeness of the achieved result.

Conclusions and Prospects for Further Research. Successful development of a food complex needs certain conditions the main of which include a substantial development of productive forces, presence of productive forces, constant productive and economic connections with agricultural sector, processing and service enterprises. Identification of efficiency evaluation indices of performance and development of food complex in a wide integral representation allows to draw a conclusion that it can be efficient in the following cases: Firstly, its results meet the demands of population for foodstuff, or processing industry for raw materials; Secondly, the possibility of diversification of agricultural entities is provided; Thirdly, there are conditions for simple as well as wide reconstruction; Fourthly, production potential of agricultural enterprises is maintained and increased.

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