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AGRO-FOOD VALUE ADDED CHAINS: METHODOLOGY, TECHNIQUE AND ARCHITECTURE

ABSTRACT

Purpose of the research. In connection with the post-COVID and post-war actualization of establishing regional agro-food clusters and in view of a process of forming a new agro-economic and socio-food normality of operation and development of the agrarian sector of the economy (broadly understood – from the agro-enterprise to the processing-food industry) as a response to the "New Agrarian Policy" (presented by the National Council for the Recovery of Ukraine from the War), the necessity arises to analyze traditional problems of one or another territory and identify a place and significance of its respective value-added chains in improving their competitiveness (or recovery) and agro-branches integrated into the process of architecting the value-added potential, inter alia, at the local level.

Principal results. A methodological approach is proposed for the analysis of the creation of value-added chains using an analytic hierarchy process, subject to the factors of identification of the producers' position in the agro-food value-added chain. Factors of identification of the producers' position in the market and in the agro-food valued added chain are a degree of differentiation; a level and degree of economic relationships between chain stakeholders; economies of scale of the valued added chain; ability to respond to COVID challenges and technological shifts in the agrarian sector (Agro 4.0). In solving a set problem, the factors were selected by levels: national, economic area and regional.

Required input data were obtained by using one of the methods of the analysis of value-added chains – rapid food market assessment. According to the computation results, a hierarchy of factors for identification of the agro producer's position in the food market and in the agro-food value-added chain was built.

Main conclusions. It is determined that, through the lens of new normality of the operation of the agro-construction sub-complex (with the differentiation into branch-cluster groups), the agro-food value-added chain should be understood as a process of combining organizations and technological processes of various types of activity into one cycle required for food production (from obtaining raw material with the inclusion of all production stages to selling finished products), which must be resulted in obtaining a synergy effect.

A proposed approach enables expediently collect input information under conditions of martial law, make required computations and analyze obtained data both for the point of anti-crisis correction and for taking large-scale regulatory measures for the provision of their security and traceability according to technical regulations and rules existing in the domestic market of the EU member countries. The flexibility of the proposed method should also be noted, as both, the number of the factors and levels, on which they operate may be differentiated and changed, subject to the post-war symptoms of the agrarian and construction economies development (reconstruction), their interdependence from the perspective of the agro-food chain functioning stability.

Keywords: value-added chains, agro-food chains, clusters, analytic hierarchy process

JEL Classification: Q18, C53

INTRODUCTION

Satisfaction of vital needs of the population with domestic food (to minimize the “washout” of the households’ monetary supply aimed at ensuring a sufficient level of food) is impossible without overcoming the synergy of negative tendencies in the agrarian sector of the national economy. In many respects, this synergy is associated with the lack of the system’s vision of the agrarian policy and strategy for the development of the agrarian sector of the economy (even in peacetime), its organizational-economic and institutional integration with other economic agents including agro-food and agro-construction clustering as well as with the lack of the competitive distribution of budgetary resources, adequate assessment of results of their efficient use, subject to the modern principles of the gradual transition to the application of a mechanism of targeted support of agricultural producers and regulatory territorial stimulation of the creation of local value added through the involvement of institutions of rural territorial communities. All that is most closely associated with a global trend towards comprehensive integration and institutionalization of value-added chains in order to coordinate the agro-construction policy for implementation of agro-tasks within the UN 2030 Sustainable Development Goals and country strategic plans of the UN Food and Agriculture Organization (FAO). The listed orthodox set of crisis-related factors in the architecture of agro-food chains had significantly strengthened due to the large-scale armed aggression of the Russian Federation against the Ukrainian people, moving into the crisis phase, and in some cases into an apogee stage, which would highly probably generate a protracted recession of the agrarian sector of the economy generally and of the formation of the agro-construction clusters, in particular, that would exceed the agrarian crisis of the 1990s and early 2000s both in terms of depth and scale (from the perspective of clusters, it would destroy the connections inside and with the external environment, dropping the technology of the agro-food chain to the level of the 1990s), and from the perspective of the sustainability of the agro-food chain, according to estimates [4; 29], the rural economy would lose no less than \$ 4,29 billion, at the same time, the “hidden hunger” would spread to more than 47 million people in the world.

LITERATURE REVIEW

Formation and development of clusters, a description of value-added chains, which essence was identified way back by M. Porter [19–20], were promoted by a number of foreign and domestic academic scientists, in particular, of the agrarian and construction profile [11; 13; 24; 31]. In furtherance of this research as one of the options of subsequent institutionalization of agro-industrial clusters in the regular iteration of the agrarian policy (including the at pre-war times colored with a land reform and a local self-government reform, a new budget structure architecture etc., at war and post-war periods – Plan of the Ukraine Recovery from the War [9; 28]), their involvement in stabilization (in particular, post-COVID) of agro-production value added chains, subject to synergy of agrarian and construction economies, participation of local bodies of power (rural territorial communities) in creating local value added in the agrarian sector of their economy, we see the necessity to shift a focus onto researching agro-construction clusters that under the conditions of a new economic reality, caused by the armed aggression of the Russian Federation against the Ukrainian people, represent a territorial combination of organizations (from territories of various security level, risk of agricultural production and ready for cooperation in agro-construction clusters) tied by production and production-sales activities in order to improve the competitiveness of agricultural products and ramp up investment activities, create the respective infrastructure within rural construction projects.

At the same time, initiated at the post-Covid stage of the new agro-food chain architecture G. Ryzhakova [21] investigation of the interrelationships and interactions between rural construction and the agro-food chain scaling (by depth, affiliation, progressiveness, etc.), O. Sokolovska [25], M. Dziamulych [7] and methodological instruments for zoning the rural economy taking into account social and economic determinants as growth-shaping factors of the agro-construction clusters formation for the agro-food chain sustainability, O. Vahonova [30] with the agro-construction clusters formation projections into the agro-food chain competitiveness in the global food system of added value generating, partially dissolved the existing theoretical “vacuum”, but they should be adapted not only to the Ukraine need to meet the requirements for a country-candidate for the EU joining, but also to the ability of agricultural sector to undertake the post-war recovery plan, approximation of this chain key subjects into all, without exception, national programs of Ukraine recovery from the war.

In its turn, in program documents [6] of the European Commission and Council of the EU, clusters, including those of the agro-construction profile are defined as an efficient means of strengthening regional innovations and reducing the gap between the business, research and resources as well as included in the EU regional policy programs for the first decades of the 2000s. EU experts believe that they are not the only required condition for stimulating innovative activities in the agrarian sector (including Agro 4.0), but are intended to create framework conditions for a faster application and spread of its results [8]. In a new long-term budget cycle of the EU for 2021–2027, within the framework of the Single Market Program, clusters are mentioned as a strategic instrument of support the competitiveness of small and medium enterprises

as they form a more favourable environment for carrying out entrepreneurial activities, stimulate non-agricultural employment in the rural area [5].

AIMS AND OBJECTIVES

In this connection, the establishment of safe regions of the country's regional agro-food clusters becomes a topical issue, it has to happen thanks to state support (assistance) as well as has to provide involving investors based on the public-private partnership mechanisms [16; 26]. A cluster approach enables not only to analyze, from a different angle, traditional problems of one or another region and/or rural territorial community but also gives an opportunity to realize the place and significance of their respective value-added chains in improving the competitiveness of territories and branches (in our case, these are the agro-food chains) and their post-war recovery.

In our view, an agro-food value-added chain determined by agro-construction sub-complex institutions under conditions of martial law should be understood as a process of combining organizations and technological processes of various types of activities into a single cycle required for creating products (from obtaining raw materials with the inclusion of all production stages to selling finished products), that must be resulted in obtaining a synergy effect. So, a process of approximation and combination of enterprises, branches, and regions in the process of formation of agro-construction clusters must take place not only and not so much by means of combining already existing economic entities but by means of setting up new formations that, in turn, should lead to the arising of agro-food value added chains associated with them.

According to the data of the Ukrainian Agribusiness Club: for seven months of 02021, exports of Ukrainian agro-industrial products to the EU increased by 10 % as compared to the same period of the previous year, up to US\$3.7B; as of 1 August, Ukraine fully exhausted quotas for unlimited export of agricultural products to the EU by seven product groups: honey, groats and flour, treated starch, treated tomatoes, grape and apple juice, poultry meat (volume for three quarters) and eggs (volume for three quarters). As compared to the same period of the previous year, the quota has not been exhausted by two product groups: sugar and maize. The quota on sugar was not exhausted because of the occurrence of the deficit in the Ukrainian market, and on maize – because of the considerable demand from the PRC and redirecting volumes through this sales channel. Potentially, before the end of the year, quotas still can close on treated grain products (now, 99 % are exhausted), starch (78 %) and maize (74 %) [27].

However, the food war of the Russian Federation against the entire democratic world (especially countries that are net exporters of Ukrainian food), in addition to full-scale armed aggression against the Ukrainian people, not only negates the progress achieved in the post-Covid stabilization of agro-food chains but also generates the inertia of a protracted crisis inside them (the priority is a production of a sufficient amount of food on the verge of balancing the social, ecological and economic parameters of growing the agricultural raw materials, their primitive primary processing), exacerbating the mental resistance and institutional threat to relocation and/or the creation of new agro-construction cluster formations. Thus, the blockade of the seaports led to a significant reduction in exports from 6–7 million tons per month to 1,5 million tons, causing a landslide of domestic prices for the agricultural products sale below the prime cost level, which threatens the bankruptcy of the primary institutional item of the agro-food chain – the producer of agricultural goods. According to estimates [14], the actual capacity deficit for grain storage in Ukraine will be up to 15 million tons (the secondary, processing item of the agro-food chain), it means if we do not prepare a sufficiently competitive environment in the food market (particularly through the mechanisms of public-private cooperation, namely the participation of agro-construction clusters in the implementation of national projects of post-war rural economy recovery), we will get destabilization of the agricultural sector branches functioning, and in accordance with the socio-economic parity of the balance in the middle of the agro-food chain.

In view of tough competition among domestic producers of agro-food products, under conditions of martial law, it is difficult to speak of serious production growth even subject to the availability of unambiguous competitive advantages [1; 10; 15], so, previously little investigated by domestic agro-economists instruments of the Analysis of the Valued Added Chain Structure (AVACS) become of great importance. The purpose of the AVACS is to understand the relationships between chain stakeholders and their economic and social benefits. Motivation, decision making, driving forces and approaches may vary, subject to the goal settings of each stakeholder of the chain determining and providing a variety of methodological approaches to the AVACS [2, p. 16–17]. Such approaches enable overcoming the narrow-branch orientation of the economy and move to the complex use of the potential for development of rural areas in order to provide their self-development and self-realization finally oriented on improving the competitiveness of the rural location (region) [12]. So, the analysis of agro-food value-added chain structure under conditions of martial law and post-war recovery, using a clustering method seems to be the most effective today and able to trace the architecture, its iteration and being in line

with new economic normality generated by the COVID-19 coronavirus infection and armed aggression of the Russian Federation. Even today, efforts of the bodies of state power and local self-government are aimed not at individual agro-enterprises but at developing a system of relationships between agro-business entities and state institutions regulating agro-food value-added chains.

In its turn, the application of the concept of the value-added chain enables to trace a technological process from the inception of a food-product idea to the delivery of a specific type of food to an ultimate consumer. In other words, such analysis is impossible without identifying the issues associated with the quality of products, their competitiveness, safety and traceability along the whole value-added chain. It means that the key to such analysis is not only the efficiency of the agro-production but also the level and degree of relationships of stakeholders of the agro-industrial value-added chain. That is a process of the transformation of relationships of economic entities (chain stakeholders) into institutions, i.e., into a form of organization of relationships with set rules, norms and self-regulation.

METHODS

Of induction and deduction, comparison and systematization – to research essential characteristics of agro-food value-added chains; their determination in the wartime and postwar reality conditions of the rural economy and the food market functioning; synthesis and analysis – to separate the factors of identification of the agro producer's position in the market and in the agro-food value-added chain, taking into account the military "face" and the triggers of the new agrarian policy; of modelling – to build a hierarchy of these factors; an abstract-logical method – to make theoretical generalizations and form conclusions from the conducted research.

RESULTS

For the needs of our research, we have chosen one of the AVACS methods – fast food market assessment, between In-Depth Value Chain Study (VCA) and Sub-Sector Analysis (SSA); Action Research, (AR); Monitoring of Local Business Support Centers (LBC). In order to remove the issue of the authenticity of obtained information and because of the impossibility to gather the experts, who were involved, in the joint assessment, a mixed expert assessment method was applied, i.e., the experts individually assessed the situation. The assessment results were brought to their notice. The experts whose assessments were essentially different from the mainstream were asked to reason their point of view. In view of obtained explanations, a summarizing conclusion based on a single coordinated position was developed.

The AVACS enables the identification of the positions of agro-producers in the food market and in the agro-food value-added chain. For the processing of obtained assessments, we apply an Analytic Hierarchy Process (AHP) proposed by T. Saaty [22].

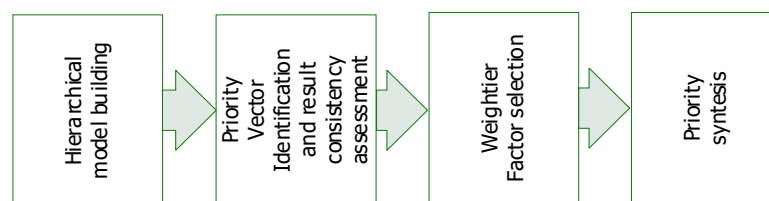


Figure 1. Sequence of Express Assessment of Food Market and Architecture of Factors of Agro-Producer's Positioning on It and in the Agro-Food Value Added Chain. (Source: Formed on the basis of [22])

In view of our previous studies of regulation, institutional system, architecture, empiric statics and dynamics of agro-food value-added chains [17–18], we proposed directions of the modernization of the methodological approach of the AVACS application using AHP's instruments and subject to the factors of identification of the institutional system and position of agro-producers in the agro-food value-added chain. Accordingly, a modified AHP essence consists in building a hierarchical model, identifying eigenvectors and eigen numbers of square inversed matrices, and verifying results consistency. That is, analyzing the factors of identification of agro producers' position in the food market and in the agro-food value-added chain for various process stakeholders at various levels, such a combination of instruments will enable to identify their strengths and weaknesses, providing regulatory institutions with relevant information for taking anti-COVID anti-crisis measures, caused by the armed aggression of the Russian Federation. Factors of identification of agro producers' position in the market and in the agro-food value-added chain are a level and degree of differentiation; a level and degree of

economic relationships between the chain stakeholders; economies of scale of value added; ability to respond to COVID-, armed- and technological (Agro 4.0) challenges [3].

Solving the set problem, a selection was made among the five above listed factors by the following levels (criteria): national; an economic area (traditionally, the Central, Capital, Black Sea, Cisdnieper, Podol, Northeast, Northwest, Carpathian, Donetsk economic areas of Ukraine); regional.

Hierarchical model building. At the top of the dominant hierarchical model is the goal – “Selection of the factor of identification of producers’ position in the market and in the agro-food value-added chain” – the first level. The second level of the obtained hierarchy model is formed by three levels of factors (criteria): “National”, “Economic area”, and “Regional” specifying the goal. At the last level, there are five factors (alternatives): “Degree of differentiation”, “Level of economic relationships between all stakeholders”, “Economies of scale”, “Degree of economic relationships”, and “Ability to respond to COVID- and technological challenges”, which are assessed by the second level criteria, in other words, the most weighted of them for each level is identified.

Priority vector identification and result consistency assessment. Priorities are identified, being of relative value or advantage of elements at each level of the hierarchical model. The larger the priority value is, the more significant the respective element is.

Experts involved in the assessment need to make $\frac{n \times (n - 1)}{2}$ comparisons, where n — number of occurrences at one level. In our case, it is needed to make three comparisons.

First, a matrix was created for pairwise comparison of levels of identification of agro producers’ position in the market:

$$A = \begin{pmatrix} 1 & 1/3 & 5 \\ 3 & 1 & 7 \\ 1/5 & 1/7 & 1 \end{pmatrix}$$

Assessment was made on a nine-point scale of the relative importance of objects [23].

After the formation of the pairwise comparison matrix, we identified, by three criteria, the eigenvector of the matrix and verified the consistency of the matrix by its eigenvalue. It is necessary to emphasize that the eigenvector characterizes the ordering of priorities while the eigenvalue is a measure of the consistency of assessments.

Normalization of the basic eigenvector of the matrix gives a priority vector. We perform four approximations of normalized eigenvectors of the square inversed symmetric matrix:

- we sum the elements of each line of the matrix and normalize them by dividing each sum by the sum of all elements. The sum of the normalized elements must be equal to 1. The first element of the resulting vector will be a priority of the first criterion, the second element – of the second criterion and so on;
- we sum the elements of each column and gain inverse values of these sums. They should be normed so that their sum is equal to one, that is, we divide each inverse value by the sum of all inverse values;
- we average over the normalized column – we divide the elements of each column of the matrix by the sum of the elements of these columns, add the elements of each obtained line and divide this sum by the number of the elements of the line;
- we multiply n elements of each line and having obtained n -th root normalize the obtained numbers.

All these steps give the same eigenvector of the matrix. The fourth step is the most precise and was applied to find the components of the eigenvector of local priorities of the matrix by formulas:

$$\bar{u}_i = \sqrt[n]{\prod_{j=1}^n a_{ij}}; \quad i = 1, \dots, n \tag{1}$$

where a_{ij} - element j i of line j of a column of criteria pairwise comparison matrix, n - number of criteria.

In our case, the solution of the problem by the formula will look as follows:

$$\bar{u}_1 = \sqrt[3]{1 \times \frac{1}{3} \times 5} = 1,185$$

$$\bar{u}_2 = \sqrt[3]{3 \times 1 \times 7} = 2,785$$

$$\bar{u}_3 = \sqrt[3]{\frac{1}{5} \times \frac{1}{7} \times 1} = 0,305$$

We obtain the priority vector by normalizing the eigenvector of the matrix:

$$w_i = \frac{\bar{u}_i}{\sum_{i=1}^n \bar{u}_i}; \quad i = \overline{1, n} \quad (2)$$

Having applied the expression (2) we obtain w_i :

$$w_1 = \frac{\sqrt[5]{1 \times \frac{1}{3} \times 5}}{\sqrt[5]{1 \times \frac{1}{3} \times 5} + \sqrt[5]{3 \times 1 \times 7} + \sqrt[5]{\frac{1}{5} \times \frac{1}{7} \times 1}} = \frac{1,185}{4,275} = 0,277$$

$$w_2 = \frac{2,785}{4,275} = 0,651$$

$$w_3 = \frac{0,305}{4,275} = 0,071$$

We see that the sum of the normalized components of the vector comes to 0.999.

We will multiply the right pairwise comparison matrix by the obtained assessment of the vector and obtain a new vector of relative importance. We will divide each component of this vector by the relevant component of the assessment of the vector of the solution in order to find the eigenvalue of the matrix.

$$A \times w_i = \begin{pmatrix} 1 & 1/3 & 5 \\ 3 & 1 & 7 \\ 1/5 & 1/7 & 1 \end{pmatrix} \times \begin{pmatrix} 0,277 \\ 0,651 \\ 0,071 \end{pmatrix} = \begin{pmatrix} 0,854 \\ 1,989 \\ 0,220 \end{pmatrix}$$

As the maximum approximated eigenvalue of the matrix λ_{max} , we took the arithmetic mean value of components of this vector that is used to assess the consistency. The closer λ_{max} to n (number of criteria) the more consistent the result:

$$\frac{0,854}{0,277} = 3,083; \quad \frac{1,989}{0,651} = 3,060; \quad \frac{0,220}{0,071} = 3,100$$

The maximum eigenvalue of the matrix $\lambda_{max} = \frac{0,220}{3} = 3,081$. It is known that the consistency of the square inversed symmetric matrix is equivalent to the requirement of the equality of its maximum eigenvalue λ_{max} with n , so we will determine the consistency index, IU :

$$IU = \frac{\lambda_{max} - n}{n - 1} \quad (3)$$

In our case, $IU = 0.040$.

We compared the consistency index with a randomly chosen mean value of the consistency index, WI matrix of the same size. Values WI were determined in his time by T. Saaty (for our case, 0.58).

The relation of IU to WI for the matrix of the same order is called relative consistency, WU . For $n = 5$; $WI = 0.58$, then WU :

$$WU = \frac{IU}{WI} \tag{4}$$

In our case, $WU = 0.069$.

A selected method allows a certain level of inconsistency. Relative inconsistency may not be more than 10%. If WU exceeds these limits, then the experts need to return to the initial problem requirements again and check the validity of their judgements.

Selection of a weightier factor (factors are assessed by second level criteria, in other words, a weightier one of them is identified for each level). At this level, we identified priority vectors of the factors (alternatives) in respect of levels (criteria) as well as a global priority vector, based on which the weightiest factor was determined, which identifies the producer's position in the market and in the agro-food value-added chain. The best is the alternative with the maximum priority value.

For example, comparing the factors "Degree of differentiation" and "Level of economic relationships between all stakeholders in respect of the institutional level "Economic area", we identified, which of these factors is the weightiest at this level.

As we have five factors of identification of the position of agro-producers in the food market and in the agro-chain, which may be implemented at three levels, it is necessary to conduct

$$m \times \frac{n \times (n-1)}{2} \tag{5}$$

where m — number of levels, i.e., it is necessary to compare 30 pairs of factors.

We create the pairwise comparison matrix for the factors of identification of agro producers' position in the food market and in the agro-food chain at the national level:

$$B = \begin{pmatrix} 1 & 1 & 1/5 & 1/7 & 1/9 \\ 1 & 1 & 1 & 1 & 1/3 \\ 5 & 1 & 1 & 1 & 1 \\ 7 & 1 & 1 & 1 & 1 \\ 9 & 3 & 1 & 1 & 1 \end{pmatrix}$$

As calculations of results of pairwise comparisons for matrices B, C and D (matrices C and D are given below) are similar to calculations for matrix A, we do not give them here and show the final result only.

So, the relative consistency of the results of pairwise comparisons for matrix B is 0.069.

Pairwise comparison matrix for factors of identification of agro-producers' position in the food market and in the agro-food chain at the level of an economic area:

$$C = \begin{pmatrix} 1 & 1 & 1/3 & 1/5 & 1/7 \\ 1 & 1 & 1 & 1/3 & 1/5 \\ 3 & 1 & 1 & 1 & 1 \\ 5 & 3 & 1 & 1 & 1 \\ 7 & 5 & 1 & 1 & 1 \end{pmatrix}$$

Relative consistency is 0.062.

Pairwise comparison matrix for factors of identification of agro-producers' position in the food market and in the agro-food chain at the regional level:

$$D = \begin{pmatrix} 1 & 1/3 & 1/5 & 1/7 & 1/7 \\ 3 & 1 & 1/3 & 1/5 & 1/4 \\ 5 & 3 & 1 & 1/2 & 4 \\ 7 & 5 & 2 & 1 & 3 \\ 7 & 4 & 1/4 & 1/3 & 1 \end{pmatrix}$$

Relative consistency is 0.093.

It has already been noted above that the results of pairwise comparisons may be deemed satisfactory, if WU is ≤ 0.01 . Thus, for matrices B, C and D, we have a sufficient level of process convergence and proper consistency of expert judgments concerning weighting values of the factors of identification of producers' position in the market and in the agro-food chain.

Priority synthesis. In our problem of selecting a factor of identification of agro-producers' position in the food market and in the agro-food chain at the first hierarchical level (selection levels), the elements of the priority vector are multiplied by a coefficient being a weight of the main goal. At the second hierarchical level, the relative weight of each factor, by a comparative level, is multiplied by the priority of this level, then obtained products are added.

We obtain global priorities of the factors as a result of calculations by the formula:

$$U_j = \sum_{i=1}^n w_i u_{ij}; j = 1, \dots, m \quad (5)$$

where w_i - priority of the i -th level, at which an agro-producer operates in the market and in the agro-food value-added chain ($j = 1, \dots, n$); u_{ij} - relative weight of each of the factors of identification of agro producers' position in the food market and in the agro-food chain ($j = 1, \dots, m$) at each operational level ($i = 1, \dots, n$).

Having substituted the respective values obtained by the formulas (1) and (2) as a result of performing pairwise comparisons for matrices A, B, C and D in equation (5), we obtain the values of weights for all factors enabling us to build a hierarchy of the factors of identification of the agro-producers' position in the food market and in the agro-food value-added chain. The weightiest ones are the ability to respond to COVID challenges and technological challenges (0.324), economies of scale of value added (0.286), a degree (0.221) and a level (0.106) of economic relationships between the chain stakeholders; a degree of differentiation (0.062).

CONCLUSIONS

Calculations showed that the most important factor in the identification of agro-producers' position in the market and in the agro-food value-added chain is the ability to respond to COVID-, armed- challenges and technological challenges – the realization of market trends and the ability to implement technological breakthroughs associated with the transition of agro-producers to the Agro 4.0 model. Today, in the agrarian sector of the economy, the development of biotechnologies and genetic engineering seriously impacts the creation of value-added where this impact manifests on both sides of the chain and is able to cardinaly change a technological process itself (for example, neutralizing the necessity to provide food preservation, clean it from contamination, change processing technology etc.). The same factor already modifies the behaviour of European consumers and creates additional market niches such as consumption of organic products only, etc. However, under the conditions of martial law, the penetration of these global trends in the national agro-food chain is significantly limited by the presence of domestic financially reliable demand, concentrating the policy of agro-construction clusters on the preservation the past harvest agricultural products with a partial adaptation of capacities for feed production and bringing it to acceptable technological parameters of products, plant origin of the new harvest, creation own logistics flows for its delivery to the three unblocked Ukrainian ports – seaport of Odesa, "Chornomorskyi" (the city of Chornomorsk) and "South" (the city of Yuzhne).

Economies of scale of value added arise when an agro-producer dominating in a certain link of the chain focuses on the quality of products produced in large amounts; this phenomenon is characteristic of the processing stages of the chain. These processes impact the processing, preservation and transportation technology. That is, in addition to realizing the trends and ability to respond to challenges including armed-coloured ones, it is necessary to timely detect "pain points" of the chain and propose solutions adequate to the situation.

Thus, agro-construction clusters in the medium-term perspective will begin to increase the production of bioethanol and biofuel; but in the short-term perspective, they will intensify the crop production field thanks to the hydrotechnical land reclamation usage. That is, enterprises in the construction sector and agricultural machinery could potentially be incorporated into the creation of a new prototype of the agro-food chain as a response to the "New Agrarian Policy" [14], presented by the National Council for the Recovery of Ukraine from the War.

The next ability, that the stakeholders of the agro-food value-added chain, under conditions of martial law and post-war recovery, must have is the necessity to undergo a kind of a "qualification selection" and prove their advantages to the food market stakeholders, selling goods to ultimate consumers (brand owners) and not always intending to expand their

outsourcer supplier base and preferring to be limited to only those supply chains, which they got used to, or which already satisfy their needs for the product quantity and quality. In this case, a degree of the economic relationship between the chain stakeholders moves to the forefront. First of all, it applies to the agro-construction clusters that took part in the program of the food processing item relocation in the agro-food chain, having lost their usual consumer from the temporarily occupied territories. Along with this, the internal migration of the population caused by military operations created the “vacuum” in the development of food processing enterprises as representatives of agro-construction clusters and at the same time participants of the agro-food chain in the form of the investment programs reduction (capital investments and investments in food innovations) due to the non-acceptance of internally displaced persons established (typical) brands in relatively undangerous regions of the country and taste qualities of the corresponding food groups.

A size, number of stakeholders and competitors may considerably impact other value-added chain components. In other words, this refers to a level of economic relationships between the stakeholders (including competitors) at the specific stage of the production chain, because a dominating supplier may propose cooperation relationships to small stakeholders at its chain stage, in particular, concerning product technical requirements. Such processes finally lead to the arising of cooperatives or clusters, but at this stage in relatively undangerous regions – participants of the Government relocation program.

The least weighty of the factors considered, but such that, nevertheless, may not be disregarded, is a degree of differentiation. Because of strong competition between the agro-producers (what is evidenced by the numbers given at the beginning of the article), in order to identify their position in the food market and in the value-added chain, it is necessary to identify a degree of differences and advantages in comparison with the competitors. So, even an opportunity to offer an alternative channel, through which food will be supplied to the ultimate consumer, diversifies suppliers and enables other market stakeholders to consider it as an alternative link in the value-added chain. It is necessary to note that a potential agro-food chain stakeholder needs to clearly understand what unique it is able to offer to other chain stakeholders.

Considered data enabled to demonstrate the advantages of the selected analysis method that consists in its relative simplicity in terms of both the collection of the required information under conditions of martial law and its processing taking into account the existing informational and statistical asymmetry.

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АГРОПРОДОВОЛЬЧІ ЛАНЦЮГИ ДОДАНОЇ ВАРТОСТІ: МЕТОДОЛОГІЯ, ТЕХНІКА ТА АРХІТЕКТУРА

Мета дослідження. У зв'язку з постковідною актуалізацією створення регіональних агропродовольчих кластерів та з урахуванням процесу формування нової агроекономічної й соціально-продовольчої нормальності функціонування й розвитку аграрного сектора економіки (в широкому розумінні – від сільгоспідприємства до переробно-харчової промисловості) виникає необхідність проаналізувати традиційні проблеми тієї чи іншої території та визначити місце й значення відповідних їй ланцюгів створення доданої вартості в підвищенні їхньої конкурентоспроможності та агрогалузей, інтегрованих у процес архітектуровання потенціалу доданої вартості в тому числі на місцевому рівні.

Основні результати. Запропоновано методологічний підхід застосування аналізу ланцюгів створення доданої вартості за допомогою методу аналізу ієрархії з урахуванням факторів визначення позиції виробників у агропродовольчому ланцюгу доданої вартості. Факторами визначення позиції виробників на ринку та в агропродовольчому ланцюгу створення доданої вартості є: ступінь диференціації; рівень і ступінь економічних відносин між учасниками ланцюга; економія на масштабі створення доданої вартості; здатність реагувати на COVID-виклики та технологічні зрушення в аграрному секторі (Агро 4.0). При розв'язанні поставленого завдання здійснювався вибір факторів за рівнями: національний, економічний і регіональний. Необхідні вихідні дані були отримані шляхом застосування одного з методів аналізу ланцюгів створення доданої вартості — швидкої оцінки продовольчого ринку. За результатами обчислень побудовано ієрархію факторів визначення позиції агровиробника на продовольчому ринку та в агропродовольчому ланцюгу створення доданої вартості.

Основні висновки. Визначено, що агропродовольчий ланцюг створення доданої вартості через призму нової нормальності функціонування агро-будівельного підкомплексу (із диференціацією на галузево-кластерні підгрупи) слід розуміти як процес об'єднання організацій і технологічних процесів різних сфер діяльності в єдиному циклі, необхідному для створення продовольства (від отримання сировини із включенням всіх стадій виробництва до реалізації готової продукції), результатом якого має бути отримання синергетичного ефекту. Запропонований підхід дозволяє оперативно зібрати вихідну інформацію, здійснити необхідні обчислення та проаналізувати отримані дані й для точкової антикризової корекції, і для вжиття масштабних регуляторних заходів із забезпечення їхньої безпеки й простежуваності відповідно до технічних регламентів і правил, які існують на внутрішньому ринку країн-членів ЄС. Необхідно також відзначити гнучкість запропонованого підходу, адже кількість і факторів, і рівнів, на яких вони діють, може диференціюватися й змінюватися з урахуванням постковідної симптоматики аграрної й будівельної економік.

Ключові слова: ланцюги доданої вартості, агропродовольчі ланцюги, кластери, процес аналітичної ієрархії

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