Management of the Process of Formation of Financial and Credit Infrastructure to Support Agricultural Enterprises

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Abstract

The paper deals with the composition and functions of the financial and credit infrastructure of agricultural enterprises, the necessity of development of its institutes is substantiated. The development of financial and credit infrastructure is a vital part of any developed agricultural sector. Due to the length of the production cycle, the seasonality of production and the associated nature of the formation of costs and stocks, agricultural enterprises lack sources for continuous financing. The use of borrowed capital allows you to significantly expand the volume of economic activities of the enterprise, ensure a more efficient use of its own funds, and accelerate the renewal of fixed assets. In order to attract resources and, consequently, to invest in the agricultural sector, it is extremely important to strengthen both agriculture and the financial sector. This requires a coherent strategy with consistent regulation and policies that meet the needs of the sectors and correspond to the real capabilities of all actors in both sectors. The paper proposes a methodology for calculating the integral indicator of the efficiency of participation of all economic entities and financial and credit infrastructure of agricultural enterprises.

Keywords: agriculture, sustainable agriculture, development, financial and credit infrastructure

1. Introduction

Agriculture continues to be a fundamental tool for sustainable development and poverty reduction (World Bank, 2017). According to expert estimates, by 2050, food demand is projected to increase by 70%, and for its satisfaction it is necessary to invest at least $ 80 billion in agricultural enterprises (International Fund for Agricultural Development [IFAD], 2017; World Food Program & IFAD, 2011). Agriculture is developing towards a modern, highly competitive system, driven by consumer demand for higher value, more processed products, and stable quality and safety standards. Thus, increasing productivity, competitiveness and participation of small farmers in these global value chains were marked as priorities for agriculture for development (World Bank, 2017).

Considering that agricultural enterprises play a special role in ensuring the country's food security, in order to preserve the best traditions of the rural environment, rational use of agro-resource potential, and preserve national natural resources (soil fertility, gene pool). highly productive agricultural plants and animals), the formation of a sufficient in volume, affordable, temporary and effective financial and credit infrastructure, both in terms of quality characteristics and in terms of a variety of sources, forms and mechanisms of provision is a priority task (Food and Agriculture Organization [FAO] & World Bank, 2013). Financial and credit infrastructure is considered as a set of

institutions (credit and banking institutions, stock exchanges, financial, investment and insurance companies) operating within the monetary, stock, investment markets and perform functions to ensure the normal functioning of their functioning (Dorzhdeev, Shkarupa, 2015). The financial and credit infrastructure of the agro-industrial complex is a system of accumulation and distribution of financial resources, the formation and movement of capital between economic entities and the spheres of the agro-industrial complex to ensure the continuity of agro-industrial production. A systematic approach to the study of financial and credit infrastructure of agriculture involves consideration of it as a set of interconnected and interconnected subsystems and elements that are part of their structure, aimed at fulfilling certain functions (Soliwoda, 2017).

Access to finance is extremely important for the growth of the agricultural sector, as in developing countries, agriculture is a source of income for 86% of the rural population (International Finance Corporation [IFC], 2013). However, financial constraints in agriculture remain significant influencing factors that significantly limit the ability of small farmers to compete (World Bank, 2017). Financial institutions are reluctant to take risks in the agrarian sector such as drought, floods, pests and diseases, or transaction costs to cover large geographical distances. Consequently, despite the fact that governments are now struggling to attract investments for agriculture, lack of understanding of financial risks and opportunities in agriculture deprives the sector of the necessary funds to stimulate production, processing and marketing.

The purpose of the paper is to determine the components and theoretical substantiation of the peculiarities of the formation and development of financial and credit infrastructure of agricultural enterprises and to make suggestions on the use of the methodology for calculating the integral indicator of the efficiency of participation of all economic entities in the financial and credit infrastructure of agricultural enterprises in the example of six Ukrainian regions.

2. Method

The methodological basis of the study is a dialectical method of cognition, as well as a systematic approach to the study of the application of financial and credit instruments for the support of the agricultural sector. The following research methods were used in the article: abstract-logical (in substantiating the proposals related to the choice of industry support instruments; induction and deduction, as well as methods of comparison and theoretical generalization (for the disclosure of the essence of the concepts related to the activities of the agricultural sector), the methods of synthesis and analysis (for research of the current state of the industry in Ukraine). The information base of the study is legislative and regulatory documents related to the management and development of rural areas economic statistics, statistics provided by the State Statistics Service of Ukraine, the Ministry of Economic Development and Trade of Ukraine, the State Employment Service of Ukraine, the Ministry of Agrarian Policy and Food of Ukraine, reporting materials, data of the financial and administrative branches of agriculture, materials of expert assessments, materials of scientific and practical conferences, monographic, periodical literature, research of foreign, as well as domestic scientists, as well as the results of their own research. In our micro-study, we analyze the statistics of agricultural development in six regions of Ukraine in 2018 (Kyiv, Vinnytsia, Poltava, Kharkiv, Dnipropetrovsk, Cherkasy regions).

3. Results and Discussion

The agrarian sector is one of the key sectors of the Ukrainian economy: it generates 24% of output and 18% of GDP; agricultural products represent 38.2% of commodity exports (in 2015 - USD 14.6 billion), with 47.2% for Asia, 27.9% for the EU (Andriushchenko, Buriachenko et al., 2020; Mach, Hošková, 2016). Ukraine is among seven world leaders in grain crops and sunflower oil production (Watson et al., 2017; Liezina et al., 2020). Therefore, support for this level of development throughout the industry is justified.
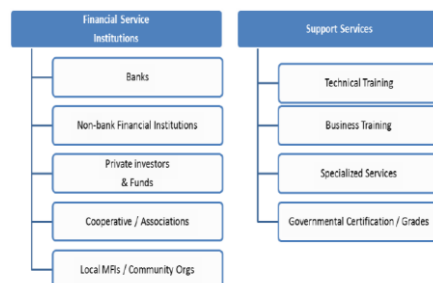

Figure 1. Financial and credit infrastructure of agriculture (International Fund for Agricultural Development, 2017)

The financial and credit infrastructure of the agro-industrial complex is presented in Figure 1. Thus, the financial and credit infrastructure of the agro-industrial complex consists of various relatively independent elements: the financial and credit subsystem, the insurance system and investment funds. The task of financial and credit infrastructure to ensure the accumulation of temporarily free funds and their redistribution in accordance with the needs of agricultural enterprises taking into account the specific features of agricultural production. The special financial and credit infrastructure in the agrarian sector is formed in the specific conditions of risky production, low investment attractiveness, seasonal investment, slowed and unfinished capital turnover, long-term investment projects implementation and a strong dependence on borrowed sources (Soliwoda, 2017; Bazaluk et al, 2020). The specificity of reproduction in agriculture is that agriculture itself is not able to carry out not only extended but also normal reproduction. Multifunctional financial system is engaged in mobilization of deposits from depositors who have low investment opportunities, search of organizations with high returns and the subsequent placement of free cash in them. As a result, there is not only more return on invested capital, but also the growth of the production of the final product (Andriushchenko, Lavruk et al., 2019).

Specificity of the formation of elements of the financial and credit infrastructure of agriculture determines the existence of its basic subsystems: financial and credit. The peculiarity of the financial subsystem of the financial and credit infrastructure of agriculture is the relationship between its subjects in relation to the formation and use of funds of funds, which ensure the creation of conditions for financial support for the development of agriculture (Zamul et al., 2020). The subjects of the credit and financial subsystem are commercial and investment banks, leasing organizations, insurance, factoring companies, and others (Dorzhdeev, Shkarupa, 2015). The credit subsystem provides the accumulation of temporarily free funds and their redistribution in accordance with the needs of agricultural producers, due to specific features of agricultural production (Andriushchenko, Datsii et al., 2019).

Thus, a well-functioning agricultural sector needs a well-developed financial and credit infrastructure. However, an assessment of the effectiveness of the formation and development of financial and credit infrastructure of agricultural enterprises is a very important and difficult task. Therefore, the proposed method of determining the integral index of efficiency of formation and development of financial and credit infrastructure farms are an important tool intensification of agriculture of the country. Consider six objects - agricultural regions of Ukraine (n), for each of which we calculate six indicators of the efficiency of the formation and development of the financial and credit infrastructure of agricultural enterprises in a particular region (m).

Table 1. Indicators of the effectiveness of the formation and development of financial and credit infrastructure of agricultural enterprises in the regions of Ukraine

Region of Ukraine	Indicators of efficiency of agricultural enterprises of the region					
	m_1	m_2	m_3	m_4	m_5	m_6
Kyiv region	51	41	58	94	23	52
Poltava region	23	7	81	67	53	43
Dnipropetrovsk region	13	86	100	23	67	84
Vinnytsia region	65	20	86	96	79	61
Cherkasy region	38	69	38	91	44	46
Kharkiv region	39	49	71	1	6	22

Table 1 shows the values of all analyzed indicators for a specific object - an agricultural region, and each column - the values of a specific performance indicator for all objects (regions).Thus, the main indicators of the efficiency of the formation and development of the financial and credit infrastructure of agricultural enterprises in the region are (Kovtun, Andriushchenko, et al., 2020):

1) Efficiency of gross agricultural production in the region (m_1). This indicator is calculated as the ratio of the gross agricultural output of the region to the costs of living and materialized labor.

2) Rate of natural movement of the rural population of the region (m_2). This indicator is used to characterize the social efficiency - the rate of natural population movement (amount based on the sign of fertility and mortality rates).

3) Ratio of gross agricultural output in comparable prices per 100 hectares of farmland (m_3). This indicator is used to

characterize technological efficiency and is calculated as the ratio of the value of the gross agricultural output of the region in comparable prices per 100 hectares of agricultural land.

4) Effectiveness of financial support for the development of farms in the region by cheapening credit resources (m_4); this indicator is calculated as the ratio of the gross profit of agricultural enterprises in the region to the cost of attracted cheap credit resources.

5) Efficiency of providing credit resources to farms (m_5); this indicator is calculated as the ratio of the gross profit of agricultural enterprises in the region to the cost of attracted credit resources for the development of the agricultural sector of the region.

6) Share of compensation for the cost of agricultural machinery and equipment (m_6). This indicator is calculated as the ratio of the compensated cost of machinery and equipment for agricultural enterprises in the region to the total cost of machinery and equipment for agricultural enterprises in the region.

In addition, m_1 indicators are stimulants, i.e. have a positive (stimulating) effect on the level of development of the studied objects. In other words, an increase in the numerical value of this indicator characterizes an increase in the level of production efficiency; m_2 are de-stimulators. These are the indicators whose numerical increase characterizes the decrease in the level of efficiency of the formation and development of the financial and credit infrastructure of agricultural enterprises ($m = m_1 + m_2$).

Effectiveness indicators, as a rule, are not uniform, have a different order of numerical values and different units of measurement. Therefore, you should perform standardization of indicators by the formula:

$$Z_{nm} = (X_{nm} - \overline{x_n}) \Big/ S_m \tag{1}$$

$\overline{x_n}$ $\overline{\mathbf{x_j}}$ – the average value of the *m-th* effectiveness indicator;

S_m – is its standard deviation;

Z_{nm} – the standardized value of the *m-th* effectiveness indicator for the *n-th* object.

The division of indicators into stimulants and de-stimulants serves as the basis for building a "standard" for the efficiency of the formation and development of the financial and credit infrastructure of agricultural enterprises, which is a vector $\mathbf{E} = (e_1, e_2, \ldots, e_k)$:

$$e_m = \max{}_n Z_{nm}, m \in Sue_m = \min{}_n Z_{nm}, if = m \in D \tag{2}$$

S – a plurality stimulants; D – a plurality disincentives. In other words, the *m-th* component of the standard vector *E* represents the best normalized value of the *m-th* effectiveness indicator in the analyzed group of objects. Obviously, not a single private indicator of efficiency, not a single object of the analyzed aggregate, can have a higher level of efficiency in the formation and development of the financial and credit infrastructure of agricultural enterprises than the corresponding indicator of the standard.

Table 2. Defining vector of "anti-standard"

Region of Ukraine	Defining vector of "anti-standard" (Z_{nm})					
	m_1	m_2	m_3	m_4	m_5	m_6
Kyiv region	0.0	-0.2	0.1	0.8	-0.6	0.0
Poltava region	-0.4	-0.6	0.6	0.3	0.1	0.0
Dnipropetrovsk region	-0.6	0.3	0.5	-0.5	0.1	0.3
Vinnytsia region	0.0	-0.8	0.3	0.5	0.2	-0.1
Cherkasy region	-0.3	0.3	-0.3	0.8	-0.2	-0.2
Kharkiv region	0.1	0.3	0.7	-0.5	-0.4	-0.2

Table 2 shows the calculation of the vector – "anti-standard" $\mathbf{A} = (a_1, a_2, \ldots a_k)$. Thus, the *m-th* component of the vector *A* represents the worst normalized value of the *m-th* effectiveness indicator in the analyzed group of objects.

In this case, each object according to any particular indicator cannot have a lower level of efficiency than the corresponding indicator of anti-standard.

Table 3 shows the distance between standard and anti standard. Thus, for any *n-th* object, the standardized value of the *m-th* indicator satisfies the condition: $a_m \leq Z_{nm} \leq e_{nm}$ for $m \in s$; $a_m \leq Z_{nm} \leq a_{nm}$ for $m \in D$.

So, $d_n \leq d$, and d_n will be equal to *d* only if the *n-th* object has the highest level for each of the analyzed indicators of the efficiency of the formation and development of the financial and credit infrastructure of agricultural enterprises (i.e. The maximum for each of the indicators-stimulants and the minimum for each of the indicators-de-stimulators).

Table 3. Defining distance between the standard and anti-standard

E vector (max)	A vector (min)	$d_n = \sqrt{\sum_{m=1}^{6}(z_m - a_m)^2}$	$d = \sqrt{\sum_{m=1}^{6}(e_m - a_m)^2}$
0.8	-0.6	1.829875	
0.6	-0.6	1.451237	
0.5	-0.5	0.919106	2.900035
0.5	-0.8	1.60854	
0.8	-0.3	1.237808	
0.7	-0.5	1.363636	

Given the above, it is proposed to use the value W_n as an integral indicator of the effectiveness of the formation and development of the financial and credit infrastructure of agricultural enterprises.

$$W_n = (d_n / d) \times 100\%; n = 1,2,...k \tag{3}$$

Table 4. Defining an integral indicator of the effectiveness of the formation and development of the financial and credit infrastructure of agricultural enterprises

Region of Ukraine	m_1	m_2	m_3	m_4	m_5	m_6	d_n	W_n
Kyiv region	0.3	0.1	0.4	1.8	0.0	0.3	1.7	**60%**
Poltava region	0.1	0.0	1.5	1.0	0.6	0.3	1.8	**63%**
Dnipropetrovsk region	0.0	0.6	0.9	0.0	0.3	0.6	1.6	**54%**
Vinnytsia region	0.6	0.0	1.2	1.6	1.0	0.5	2.2	**76%**
Cherkasy region	0.0	0.4	0.0	1.2	0.0	0.0	1.3	**45%**
Kharkiv region	0.4	0.6	1.4	0.0	0.0	0.1	1.6	**55%**

Table 4 shows the defining of the integral indicator of the effectiveness of the formation and development of the financial and credit infrastructure of agricultural enterprises. Thus, the value of W_n reflects (in percent) the level of efficiency of the i-th object relative to the standard ($0 \leq W_n \leq 100$).

According to the results of the research, the highest level of effectiveness of the formation and development of financial and credit infrastructure of agricultural enterprises is Vinnitsa region of Ukraine (76%). The best positions in the rating are only partly the merit of local farmers, as the main factors providing the grain of the grains are natural - the area of the region itself, suitable for agricultural land in its territory and weather conditions. Thus, the leader is the Vinnytsia region, where the area of agricultural land and arable land is 1 838.2 thousand hectares. High indicators of development of agricultural enterprises in the studied regions are a consequence of a number of measures. So, in 2018, Ukraine's agro-industrial complex received UAH 5.45 bln. in support of farmers from the state budget. Programs of support for agro-industrial complex for 2019 are foreseen in the following directions: budget subsidy;

partial compensation of the cost of agricultural machinery at 20%; compensation of the interest rate on loans; loans to farmers; livestock support (Andriushchenko, Kovtun et al., 2020).

4. Conclusion

The development of financial and credit infrastructure is a vital part of any developed agricultural sector. The current state of the financial and credit infrastructure of the agro-industrial complex can be characterized as the stage of its formation. To attract resources and therefore investment in the agricultural sector, it is vital to strengthen agriculture and the financial sector. Creating a win-win financing system of agriculture requires a coordinated strategy and policy consistent with the needs of the real sector and meets all business opportunities.

Thus, the method proposed in the article for calculating the integral indicator of the efficiency of the formation and development of financial and credit infrastructure of agricultural enterprises allowed to identify the regional leaders - Vinnytsia, Poltava, and Kyiv regions of Ukraine. High indicators of the efficiency of agricultural enterprises in the studied regions are determined by a number of implemented measures: - increasing availability of credit resources, development of land mortgages, strengthening of competitive principles in the areas of lending and insurance; - support of the level of subsidization of interest rates on loans received by agricultural producers in commercial banks; - partial compensation of the rise in cost of material and technical resources; - state support for the development of horizontal and vertical integration. That is why the method proposed in the article for calculating the integral indicator of the efficiency of the formation and development of financial and credit infrastructure of agricultural enterprises is an important step in the process of reproduction in agriculture, improving the mechanism of participation of finance and credit in the reproduction process, determining ways to increase the efficiency of their use, optimizing the relations of agricultural commodity producers with institutes of financial and credit system.

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