

## Modeling the processes of own working capital reproduction in agricultural organizations

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**Abstract.** The article deals with the problem of financing the working capital of agricultural organizations, which is urgent for the Russian economy, and which obtained new content as market relations developed and mainly determines the performance efficiency of an organization. The article also classifies the battery of sources of replenishment of the agricultural organizations' working capital in the form of the group of internal sources determined by own financial policy of an enterprise, the group of external borrowed sources determined by the macroeconomic environment state, and the group of external governmental sources determined by the level of government support of the agricultural industry. Possible scenarios of reproductive policy of the agricultural organizations, causing changes in the structure of assets and sources of their financing, were determined in the article. The article also suggests variants of improvement of the mechanism of governmental support, attraction of borrowed resources in the agricultural sector of the region's economy.

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### Introduction

Formation and development of market relations in the domestic economy has resulted in occurrence of crisis phenomena in the agricultural industry of the country. This broke the proportions in sectoral structures, displayed tendencies of nonequivalent exchange between the agriculture and the industry, and increased the share of imported foodstuffs [1]. Change of the organizational and legal principles of the agricultural organizations operation, strengthening of new forms of rural economic management failed not only to provide for the desirable growth of product output, but also to result in stabilization of the reproductive process. In the course of development of integral, harmonious, and consistent methodology of prevention of the crisis phenomena in the agricultural sector of the economy, it is necessary to consider the regional aspect [2].

As is known, the most dynamical part of resources of economic entities is the working capital. Constantly changing its form, passing from the communication sphere to the sphere of production and back, it is most exposed to environment influence. The rupture of inter-farm ties, the crisis of non-payments by organizations, the inflationary processes in the economy have adversely affected the working capital financing. The fiscal nature of the taxation system, removal of the state from regulating functions in the agricultural sector added to occurrence of deficit of internal resources of agricultural organizations and inaccessibility of borrowed resources.

The other problem of the agricultural sector operation is staffing. At that, there is a deficit of

skilled specialists. Therefore, the key task of agricultural policy of the region is to train and attract graduates-professionals [3].

It becomes obvious that in the conditions of deepening economic reforms, new approaches to searching for resource reserves for replenishment of own working capital by the economic entities of the agricultural industry are required. These circumstances as well as the poor scrutiny of certain theoretical and practical aspects of the problem have caused the urgency and the orientation of the research.

### Methodology

Modern approaches to working capital formation in the agricultural sector of economy, to lending to agricultural producers were suggested in the works by Lisitsian N.S., Efimovoj O.V., Danilina V.N., Danilina E.I., Aitkazina M.A., Bishoff J.M. and other authors.

While rather highly appreciating the contribution of the said scientists to the solution of the researched problem and not denying the legitimacy of the obtained results, it is to be noted that differentiation of the production activity of economic entities brings certain elements of specificity in the working capital financing.

In this view, the research objective is the theoretical substantiation and development of measures on improvement of the economic mechanism of forming the working capital of agricultural organizations in the region in the circumstances of strengthening market principles of economic management.

Implementation of the set goal has predetermined statement and solution of the following range of tasks:

- systematizing the set of financial sources of forming the working capital of agricultural organizations;
- estimating the dynamics of the structure of working capital of agricultural organizations in the region;
- specifying possible scenarios of reproductive policy of agricultural organizations causing changes in the structure of assets and sources of their financing;
- offering variants of improvement of the mechanism of governmental support of borrowing in the agricultural sector of the region's economy.

The research is based on the systematic approach to the studied economic phenomena. At various stages of the work, the following methods were applied: abstract logic, economic and statistical, monographic, and calculational and constructive methods.

### **Body of the work**

The working capital of agricultural organizations has a number of features determined by the agricultural specificity – the working time in this industry is much less than the production time. During certain periods, the work process stops, and the production process continues under the influence of natural factors. This singularity of the agriculture considerably affects the organization of the working capital and the circulation of the advance value.

One part of the working capital is constantly engaged in the production sphere, and the other part is engaged in the distribution sphere; therefore, the structure and the volume of the working capital of an agricultural organization are determined not only by manufacturing requirements, but also by requirements of distribution [4]. In our opinion, the financial sources of working capital formation represent a distribution category, unlike the circulating assets, which represent the category of the material process of reproduction. They are different economic categories, as they reflect various though interconnected economic relations, which develop in the result of autonomous reproductive processes.

The battery of financial sources of working capital formation represents diverse and rather complex system of interrelations of specific processes of distribution and redistribution. Its diversity is determined not only by distinctions of forms of involving in economic turnover, but also by distinctions of behavior of each source in this turnover, peculiar features of its influence on and

reaction to other sources, and the nature of distributive and other relations reflected in it. Despite the entire diversity of distinctions, division of financial sources of working capital formation into own, borrowed, and additionally attracted can be found reasonable.

In our opinion, determination of the demand in own working capital based on scientifically substantiated standards is now one of urgent tasks of development of the economy of agricultural organizations. Effective management should be based on application of standardized management methods. One should not be guided by comparison of the obtained results with actual costs in an accounting period only or be based on estimation of arisen deviations from the respective data obtained in the previous period. One should compare actual costs with economically proved ones, i.e. calculated based on technical, technical and economic, and economic rules and standards.

Formation of essential regulatory framework for management of production, material, and financial flows is obligatory; without it, it is impossible to improve the efficiency of economic activities currently. Main principles of working capital regulation are corrected depending on changing conditions of economic management, development of corporatization, self-financing, and self-sufficiency, i.e. according to the dynamics of market mechanisms improvement.

The Stavropol Region is one of the leaders in the Russian Federation by output of agricultural products and plays a major role in provisioning the food security of the country. During the last twenty years, the region has been maintaining its status of a large supplier of qualitative grain in the Russian and international markets. The share of the Stavropol grain constitutes 5 to 11% in the Russia's total grain output. Following the results of 2010, the Stavropol Region was in the 2<sup>nd</sup> place by the total grain cropping and in the 6<sup>th</sup> place by the total sunflower seeds cropping. Specialization of the region in winter wheat cultivation has allowed strengthening the financial state of the entire agricultural industry. For the last 20 years, the situation in the region's animal industry has considerably worsened. The livestock of agricultural animals and birds has notably reduced, the volumes of cattle-breeding goods production have decreased and the structure of the production has changed. In 2010, as compared with 1991, the number of cattle, pigs, sheep, and goats reduced by almost 66%, the number of cows reduced twice, and of birds – by 54.8% [5].

Analysis of the structure and composition of the working capital of agricultural organizations over the 2009-2011 period evidences that the share of operating production funds in the structure of the working capital equals to 45.9%, including 20.2% of

stores and supplies. The share of distribution funds constitutes 54.1%, including 38.4% of finished goods. As a whole, a steady tendency to reducing the share of operating production funds and increasing the share of distribution funds is observed over the researched period. For example, this relation was 47.6:52.4 in 2009, and it reached 45.5:54.5 in 2011.

The grouping of the analyzed battery of economic entities by the share of the working capital in assets (Table 1) evidences the existence of close interrelation between the increase in this indicator and

the improvement of solvency and financial stability. The value of separate indicators characterizing financial state is extremely low; also, the relative density of working capital in property is rather low. Hence, increasing the share of mobile assets is one of the ways of improvement of financial stability of agricultural organizations. The working capital volume in its assets can be used as a fast and reliable indicator of financial stability of economic entities at an express-analysis of their financial state.

**Table 1. Groups of agricultural organizations of the Stavropol Region by the share of the working capital in assets**

Indicators	Groups of economic entities by the share of the working capital in assets		
	<0.3	between 0.3 and 0.6	≥0.6
<b>Relative share of own capital, %</b>	62.14	72.11	77.43
Current assets to equity ratio	0.06	0.21	0.46
Share of net mobile capital in the working capital, %	0.91	1.34	8.04
Cash ratio	0.0003	0.002	0.06
Quick ratio	0.06	0.34	0.52
Current ratio	1.35	1.91	3.11
Equity ratio	0.59	0.72	0.89
Debt-to-equity ratio	0.51	0.34	0.23
Equity ratio	0.22	0.47	0.68

Results of researches show that the increase in the share of the working capital in assets leads to improvement of efficiency of own capital use. However, generally the level of this efficiency is not high enough, which is evidenced by the values of the current assets to equity ratio of most economic entities, which values do not reach standard values.

As the role of the working capital in assets increases, the capability of agricultural organizations to repaying a part of current obligations under credits and settlements grows (values of the current ratio increase) by mobilization of the capital. The necessary values of the current ratio are achieved by all groups of economic entities of the Stavropol Region; however, optimum values are only achieved by the organizations with the share of the working capital in assets exceeding 0.6.

As a whole, the sources of replenishment of the working capital of agricultural organizations can be divided into the internal and external ones (Figure 1).

Among the internal sources, the leading role belongs to revenue from sales, the dynamics of receipt of which in the agricultural organizations cannot have strongly pronounced seasonal nature [6]. The periods of mass sale of crop products are supplemented here with more rhythmical, though not intensive, receipt of revenues from selling animal products.

The external sources of replenishment of the working capital of agricultural organizations can reasonably be divided into the external governmental and external attracted sources. The contribution of the first group of funds to the working capital formation is annually reduced; therefore, special attention should be paid to the group of attracted funds.

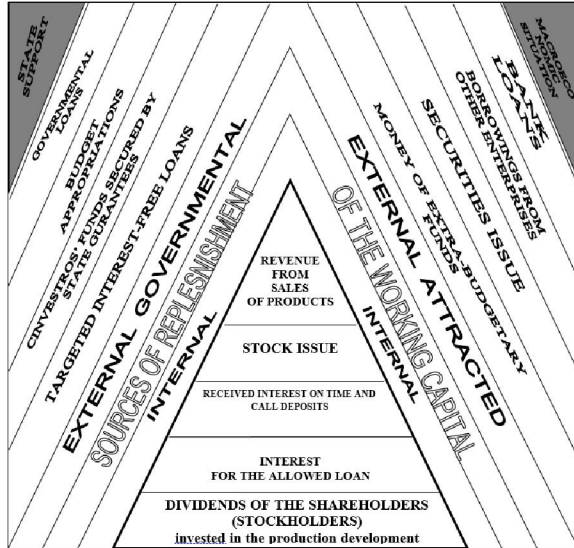
Bank loans given against interest payments, maturity, and secured repayment currently become the basic sources of borrowing: guarantees, real estate pledge, and pledge of other assets of an economic entity [7].

Enhancement of the mechanism of securing guarantees of repayment of bank loans and the system of obligations of the participating parties are of practical interest. In the circumstances of unstable financial position of agricultural organizations, development of necessary mechanisms and infrastructure of estimation and certification of property, real estate, and ground resources can serve as the system of guarantees.

Development of the market of land resources in our country offers the new challenges to mortgage lending to agricultural manufacturers. However, absence of scientifically substantiated government policy in this sphere can lead to increasing the borrowed resources, and promote inflation growth

without providing general strengthening of the agricultural sector's economy.

In the course of exercising the governmental loan policy with respect to agricultural organizations, it is reasonable to be guided by a number of provisions stipulating division of economic entities into three groups by indicators of financial state.



**Figure 1. Sources of replenishment of the working capital of agricultural enterprises**

The first group includes agricultural organizations with stable solvency, which have  $K_{cl}>2$ ;  $K_{er}>0.1$ ;  $K_{r(l)}>1$ ;  $K_{al}>0.2$ ;  $K_{qr}>0.8$ ;  $K_{de}>1$ ;  $P>0.15$ .

Where  $K_l$ - current liquidity ratio;  
 $K_{er}$ - security coefficient own means;  
 $K_{r(l)}$  - ratio of restitution and loss of solvency;  
 $K_{al}$ - coefficient of absolute liquidity;  
 $K_{qr}$ - quick ratio;  
 $K_{de}$ - coefficient of a ratio own and borrowed funds;

$P$  - profitability ratio.

The second group includes agricultural organizations with unstable solvency, which have  $K_{cl}>2$ ;  $K_{er}>0.1$ ;  $K_l<1$ ;  $K_r>1$ ;  $K_{al}<0.2$ ;  $K_{qr}= 0.5- 0.8$ ;  $K_{de}<1$ ;  $P<0.15$ .

The third group includes insolvent agricultural organizations, which have  $K_{cl}<2$ ;  $K_{er}<0.1$ ;  $K_{r(l)}<1$ ;  $K_{al}<0.15$ ;  $K_{qr}<0.5$ ;  $K_{de}<0.7$ ;  $P<0$ .

Estimation of the results of these indicators calculation should be based, mainly, on comparison of their values over time [8]. Prospects of transition of the organizations from the third group to the second and first ones are basically determined by the increase in the market value of equity, which, in turn, depends on the selected reproductive policy as well as the intensity of the governmental loan support.

The modeling of the reproduction processes in agricultural organizations performed both by a simple method and expansion of production by keeping stable growth rates as well as by escalating the growth rates by means of borrowings allowed to determine the analytical expressions of the own equity growth ratios, profit distribution standard, and the volume of own working capital as of the year start.

At expansion of the production by escalating the growth rates by means of borrowing, the equity growth ratio  $r_{ck}^{ii}$  is expressed as follows:

$$r_e^{ii} = r_e(v + 1) - v, (1)$$

where  $v$  is the indicator of the financial lever arm;

$r_v$  is the similar equity growth ratio of an organization without involving borrowed funds.

The rate of profit assigned for accumulation  $N^p$ :

$$N^p = \frac{r_v^{ii}}{f + vf - rv}, (2)$$

where  $f$  is the equity profitability during the planned year;

$r$  is the average settlement interest rate on borrowed funds.

The size of own working capital as of year start  $WC^s$ :

$$WC^s = \frac{2(v+1)d^{wc}P_p^s}{2(v+1)(I_p d^{wc} + 2GI_p - d^{wc}) - v(I_p + 2GI_p + 1)} (3)$$

where  $d^{OK}$  is the share of own working capital in the cumulative equity;

$P_p^s$  is the profit assigned to the accumulation fund;

$I_p$  An is the expected inflation index in the planned year;

$G$  is the rate of the reduced turnover amount growth.

The results of calculation of the indicators' values by variants of the reproductive policy of agricultural organizations are presented in Table 2.



**Table 2. Settlement values of indicators by variants of the reproductive policy of agricultural organizations**

seq.No.	The reproductive policy	Average values of indicators
1	Simple reproduction in the circumstances of inflation	$d^{wc} = 0.35$ ; $\mu_k = 0.19$ $Tu^o = 2.8$ ; $r_e = 3.9\%$ $N^P = 21.3\%$
2	Production expansion at maintaining the existing structure of assets and liabilities in the circumstances of stable development rates	$G = 0.01$ ; $f = 0.17$ $r_e = 5.0\%$ ; $N^P = 29.4\%$
3	Production expansion at preserving the existing structure of assets and liabilities in the circumstances of escalating development rates	$r_e = 6.0\%$ ; $N^P = 35.4\%$
4	Production expansion at stable rates with attraction of borrowed funds	$v = 0.3$ ; $p = 0.18$ $r_e^i = 6.2\%$ ; $N^P = 37.1\%$
5	Expansion of production by escalating the rates with attraction of borrowed funds	$r_e^{ii} = 7.5\%$ ; $N^P = 44.9\%$

\*  $\mu_k$  is the indicator of economic profitability of the turnover;  $Tu^o$  is the indicator of the own working capital turnover.

The data provided in Table 2 evidence that at the annual rate of inflation, for example, 12%, an average agricultural organization in the Stavropol Region needs to allocate 21.3% of the net profit for replenishment of the working capital just for provisioning the reproduction process. Maintaining the annual turnover growth rates at 1% requires as much as 29.4% of profit to be allocated in investments. Thus, the 1% increase in the turnover growth rates requires an increment of 8.1% of the investment share of profit.

With the existing own equity structure, the ensuring of annual growth rates of the reduced turnover amount at 1% requires increasing the annual average capital value by 5% at the expense of the profit. Escalating the production growth rates at agricultural organizations requires increasing the equity growth rate to 6% and the share of profit allocated for investments to 35.4%.

The most practical implementation of the reproductive policy at agricultural organizations is based on borrowing [9]. However, the growth of the share of short-term loan resources in formation of the working capital is restrained by the instability of the financial state of the majority of economic entities [10, 11]. In this view, improvement of the

infrastructure and the system of crediting the industry is of scientific and practical interest.

Currently, measures need to be taken for improving the efficiency of the government program of guarantees for loan investments in the industry, which should target developing a system of replenishment of the working capital of agricultural organizations adequate to modern realities. Agribusiness organizations of the region, loan institutions, the guaranteeing organization authorized by public authorities should act as the subjects of the mechanism of this program implementation. This organization should be functionally subordinated to the Ministry of Agriculture of the region, exercise the authority of the Government in granting loan guarantees and performing the functions of a loan bureau, as well.

Thus, it is possible to develop a mechanism of governmental support of lending to the agricultural sector of the region's economy, which would ensure purposeful and economically reasonable nature of orientation of flows of these resources and decrease in the situation of risk.

#### Summary

The peculiar features of the arrangement of the working capital and the circulation of the advance

value in the agriculture are determined by the share of involvement of the labor process in the course of production, the scopes of advancement at the initial stage of circulation, and the capability of its partial renewal at the expense of own production. The seasonal specificity of the reproductive process in the agriculture aggravates the dependence of organization of circulating assets of economic entities on the borrowed capital.

Currently, the increase in the working capital of agricultural organizations is caused by expansion of operation scales accompanied by maintaining the achieved technical and technological level as well as diversification of the product range or the production activity. Development of the production infrastructure, labor efficiency improvement, and resource and power saving can be achieved only by replacement of worn-out equipment with the new one even without changing the technical and technological level of the production. It will not require increasing financial and operational needs.

The obtained results of modeling the processes of reproduction of the own working capital of agricultural organizations allow to specify the dependence of the ratios of equity growth, profit distribution rate, and own working capital of an organization.

Developing and exercising rational financial policy and effective borrowing schemes will promote strengthening of the financial potential and better performance of agricultural organizations. The deterrent of the process of further increase in the share of short-term loan resources in the sources of the working capital formation is instability of the financial state of the majority of agricultural organizations in the region. Currently, it is necessary to support the group of regional banks, whose business is based on lending operations targeting financial support of their own founders, and to improve the governmental program of guarantees for loan investments in the industry.

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