

## MODELING THE USE OF WORKING CAPITAL IN ORDER TO ENSURE STABILIZATION OF THE REPRODUCTION PROCESS IN AGRICULTURE

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### **Abstract**

*The article deals with the effective use of working capital in reproductive process of agriculture and in ensuring its sustainable development, which ensures the growth of the final product production, the improvement of its quality, cost reduction and, as a consequence, increases profits. Entire and timely provision of agricultural commodity producers with material resources and their effective use are necessary conditions for maintaining the production process and increasing its efficiency. However, in reality, the reproduction of the main types of material resources is violated and carried out on a "narrowed" basis. In order to stabilize the reproductive process in agriculture, the authors suggest a model for the efficient use of working capital in agricultural production, based on the use of a multi-stage algorithm that implements an integrated approach to determining the level of efficiency of working capital use in specific conditions.*

**Key words:** working capital, reproduction process, agriculture

### **INTRODUCTION**

The solution of strategically important tasks to increase the efficiency of agricultural production and the degree of satisfaction of food needs through the products of domestic producers under the conditions of sanctions and the course on import substitution assumes a sufficient supply of material resources to the agricultural sector [1].

Many authors consider the problems of rational use of material resources in agriculture under conditions of relative economic stability, however, the new economic conditions for management are characterized by increased dynamism and require a special approach to gain the increasing efficiency of material resources reproduction [5].

There is a need to systematize the key factors in the efficiency of agricultural production, regarding the role of working capital organization in its provision, developing a methodology for a comprehensive assessment on the efficiency of working capital use and priority areas for improving the mechanism of formation and use of material reserves of agricultural companies [3].

### **MATERIALS AND METHODS**

The effective use of working capital in the organization is of great importance, since it has a significant impact on the overall efficiency of the use all financial resources attracted by the organization. Working capital, its composition and structure, turnover rate and efficiency of use largely determine the financial condition of the enterprise and the stability of its position in the market, the main indicators of which are: solvency (the ability to repay external debt obligations in time); liquidity (ability to cover current debts at any time); the possibility of further mobilization of financial resources. The effective use of working capital plays a large role in ensuring the normalization of the enterprise, increasing the level of production profitability and depends on many factors [4]. To study the cumulative effect of internal factors on the efficiency of working capital use, the regression analysis techniques were taken into consideration in the framework of our research [9]. When conducting a regression analysis, factors were used that reflected various aspects of the use of working capital: the structure of working capital (the amount of material resources, receivables per 100 rubles

of working capital); security with working capital and their sources (working capital per 100 rubles of fixed assets, working capital per 100 ha of agricultural land, own working capital, borrowed funds per 1 ruble of working capital, the ratio of payables and receivables); the effectiveness of the use of individual elements within the working capital (the duration of one turnover of material resources and receivables); factors reflecting the activities of the organization as a whole (revenue from sales of products, total cost of sales and the amount of profit (loss) per 100 rubles of the working capital [2].

As an effective indicator (dependent variable), the turnover ratio of the working capital was chosen. The analysis was carried out using the SPSS software package using the step-by-step method based on data from 153 agricultural organizations of the Penza region (Russia).

Indicators of working capital turnover reflect the impact on the use of working capital of all aspects to the organization. The speed movement of working capital is one of the most important economic indicators, which is not inferior in terms of importance to the indicators of cost and profitability. These are the only total indicators of the effectiveness of the use of enterprise resources in time [6].

## RESULTS AND DISCUSSIONS

The current research and improvement of the mechanism for managing the working capital of organizations is one of the main factors in increasing the economic efficiency of agricultural production at the present stage of the Russian economy development. The rational use of the working capital is one of the priority areas of activity of any agricultural organization [7]. The algorithm for implementing the mechanism of the developed model for the effective use of working capital includes several stages.

The criterion of economic efficiency of using the production potential of the agricultural sector, including working capital, is to obtain the maximum possible excess of income over expenses in volumes that ensure expanded reproduction of agricultural products [8]. The efficiency of the use of working capital, its quantitative parameters should be determined by

a set of interrelated evaluative performance indicators [10]. This methodological approach, which allows you to objectively assess the effectiveness of the use of working capital at all stages of the circulation of advanced capital, was the basis for a model to ensure stabilization of the reproduction process through the efficient use of the working capital.

The first stage:

determination using the methods of regression analysis of the main internal factors that affect the speed of turnover of the working capital and reflect various aspects of their use. The analysis was carried out on the basis of a synthesis of the obtained data from 153 agricultural organizations of the I (first) economic zone of the Penza region (Russia). Identify and express the quantitative relationship between the system of factors affecting the turnover of funds in agriculture, allows the obtained model of multiple regression, represented by the equation:

$$Y = 0.127 + 0.011x_1 + 0.001x_2 - 0.001x_3 - 0.005x_4,$$

Where: Y - current assets turnover ratio;  $x_1$  - revenue from the sale of agricultural products to 100 rubles of current assets, rubles;  $x_2$  - profit (loss) per 100 rubles of current assets, rubles;  $x_3$  - the value of material resources per 100 rubles of current assets, rubles;  $x_4$  - the amount of receivables per 100 rubles of the working capital, rubles.

In the obtained regression equation, the tightness of the relationship between the indicators is characterized by high values of the multiple correlation coefficients ( $R = 0.981$ ) and determination ( $R^2 = 0.962$ ). Note that during the analysis of the total number of factors considered, the most significant ones were selected, and the relationship between the effective indicator and the last two of these factors is the opposite. It was concluded that one of the priority areas for increasing the economic efficiency of using the working capital in agriculture in modern conditions could be considered the optimization of their structure by clarifying the size of material resources and receivables in the total amount of working capital.

The second stage:

The research is based on the method of statistical groupings, and the factors themselves are determined as grouping characteristics, the influence of which on the turnover rate of funds is most significant.

Of particular importance in solving the problem of the rational and efficient use of the working capital is the first stage of the circuit, at which the formation of inventories of

material resources takes up a significant share in the value of current assets and acts as a necessary condition for the consistent resumption of the reproduction process. We could recommend to increase the amount of funds advanced for the formation of inventories of material resources to 256.3 - 582.8 rubles per 1 thousand rubles working capital (Table 1).

Table 1. Grouping of agricultural organizations of the Penza region (Russia) at the cost of material resources per 1 thousand rubles of the working capital

Indicators	Groups of organizations at the cost of material resources per 1 thousand rubles working capital, RUB				Total average
	Less than 250	251–500	501–750	More than 750	
-The number of organizations in the group	68	69	12	4	153
-Accounted for material resources for 1 thousand rubles of the working capital, rubles	102.2	256.3	582.8	782.0	228.7
-Average annual inventory value per 1 group economy, thousand rubles, including average annual cost of the material resources, thousand rubles	6,594.1	5,836.0	5,280.1	2,169.0	5,484.4
-It accounts for 1 rube of the material resources, rubles:	1,371.4	3,006.0	3,354.3	1,845.8	2,276.5
*revenue	7.24	3.10	1.67	0.82	3.91
*profit (+), loss (-)	0.02	0.37	0.34	-0.34	0.26
*borrowed funds – total	12.43	2.78	2.05	4.59	5.11
*of which payables	5.76	1.29	0.67	4.26	2.38
*Turnover ratio of the working capital	0.86	1.20	1.05	0.57	1.02

\*Compiled by the authors according to the financial statements from agricultural organizations of the Penza region

We could see that one of the main levers of influence on the efficiency of the working capital use is a competent policy in the field of receivables management. The researchers came to the conclusion that the most optimal way for agricultural organizations in the Penza region (Russia) is the amount of receivables at which it would divert from 106.0 to 216.3 rubles per 1 thousand rubles of the working capital. It is this ratio that provides the most efficient use of the working capital.

The third stage:

In the course of our study, the optimal limits of the speed and duration of one turnover of the funds were determined, which ensure the greatest efficiency of agricultural production in the Penza region (Table 2). Thus, given the specialization of production of the bulk of agricultural organizations in the Penza region (Russia) as the most predominantly grain-

growing with developed dairy and processed products, the optimal rate of turnover of the funds is characterized by a turnover ratio of 1.83 (normative value). The duration of one turnover should be no more than 196 days (IV group of farms). Note that for this group, the sizes of both material resources and receivables correspond to the optimal proportions established earlier in the study. The period of circulation of material resources should be no more than 56, and accounts receivable - no more than 42 days.

The fourth stage:

the calculation of the reserve for accelerating the turnover of the working capital in groups of farms with different levels of efficiency of their use (Table 3) by clarifying and bringing to the optimal value of the size of material resources and receivables, with other unchanged factors.

To calculate the reserve, we used the obtained model of multiple regression and the optimal values of the considered factors established for each group. The objects of testing the

developed model were agricultural organizations of the Penza district within the Penza region (Russia).

Table 2. Grouping of agricultural organizations the Penza region (Russia) on the efficiency of the working capital

Indicators	Groups of organizations by turnover rate working capital, times (according to the turnover ratio)					Total average
	There was no turnover	Less than 0.7	0.71–1.4	1.41–2.1	More than 2.1	
-The number of organizations in the group	11	44	57	30	11	153
-Working capital turnover rate, times	–	0.40	1.09	1.83	2.91	1.02
-The duration of one turnover of working capital, days	–	901	330	196	124	353
-Accounted for material resources per 100 rubles of the working capital, RUB	17.0	14.9	25.5	28.6	7.1	22.9
-Accounts receivable per 100 rubles. working capital, RUB	36.4	27.9	24.5	20.2	59.8	23.5
-Duration of one turnover days: *material resources	–	143	85	56	13	74
*accounts receivable	–	309	87	42	60	96
-It accounts for 100 rubles of the working capital, RUB: *revenue	–	32.5	101.3	165.6	259.4	100.7
*profit (+), loss (-)	-24.3	-2.9	10.5	23.4	-59.5	4.6
-Accounted for own working capital for 1 ruble of the material resources, RUB	-52.86	-0.75	-0.59	0.55	-2.56	-0.70
-The level of profitability (+), loss ratio (-) of all activities,%	–	-9.0	11.4	14.8	-14.1	4.9
-Return on current assets	-0.20	-0.04	0.11	0.14	-0.48	0.04

\*Compiled by the authors according to the financial statements from agricultural organizations of the Penza region

Thus, from the second group, characterized by a low level of efficiency in the use of working capital, the Joint-Stock Company was taken for the research, the turnover ratio of which at the end of 2018 was 0.68. As the analysis showed, bringing the size of material resources to the level of 25.6 rubles and accounts receivable - to 10.8 rubles for 100 rubles of the working capital would accelerate turnover by 0.12 points. The turnover period would be reduced by 79 days, which, in turn, would further release funds from the turnover in the amount of 1,564.2 thousand rubles.

In the third group of farms, where the level of efficiency of the working capital is quite high, the calculation of the reserve was made on the example of the Closed Joint-Stock Company. In 2018, the actual value of the turnover ratio in this farm was 0.98. According to the results of the analysis, it was found that optimization of the level of the factors under consideration will allow to accelerate the turnover by 0.04 points and accordingly reduce the period of turnover by 14 days, which should result in the release of

1,381.8 thousand rubles from the turnover. Of the “best” fourth group, the Open Joint-Stock Company was selected for research. So, the level of factors considered, established as optimal for this group of farms (material resources - 28.6 rubles, accounts receivable - 20.2 rubles per 100 rubles of the working capital) would have a turnover ratio of 1.50, which is 0.06 points higher than its actual value in 2018. The duration of one revolution will be reduced by 10 days, which would correspond to the release from circulation of 1,066.0 thousand rubles.

To sum up it should be mentioned that in the Penza region (Russia), the reserve for accelerating turnover by clarifying the values of key factors that determine the level of efficiency of the working capital use.

It is 0.08 points, which corresponds to a reduction in the turnover period for 18 days. The amount of funds released from circulation in this case will amount to 247,410.0 thousand rubles, which is 2.2 times the amount of all budget funds received by agricultural organizations of the region in 2018. It should be

kept in mind that the use of average data in assessing the composition of key factors may necessitate the adjustment of the proposed model in the context of specific agricultural enterprises.

## CONCLUSIONS

The authors of the current research came to the conclusion that one of the priorities for ensuring the stability of the process of reproduction of material resources in agriculture is to increase the efficiency of the use of working capital, characterized primarily by the acceleration of their turnover.

The developed model for the efficient use of working capital in agriculture, tested at agricultural organizations in the Penza region, suggests that the optimization of their structure, achieved through scientifically based control of the values of key factors determining the level of efficiency of their use in specific conditions, be considered as the main factor in accelerating the turnover of working capital.

It was considered that the effective use of working capital in reproductive process of agriculture and in ensuring its sustainable development, which ensures the growth of the final product production, the improvement of its quality, cost reduction and, as a consequence, increases profits. Entire and timely provision of agricultural commodity producers with material resources and their effective use are necessary conditions for maintaining the production process and increasing its efficiency. However, in reality, the reproduction of the main types of material resources is violated and carried out on a "narrowed" basis. In order to stabilize the reproductive process in agriculture, the authors suggest a model for the efficient use of working capital in agricultural production, based on the use of a multi-stage algorithm that implements an integrated approach to determining the level of efficiency of working capital use in specific conditions.

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