Formation of an effective system for managing the reproduction of personnel potential in agriculture in the region

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Abstract. This article is devoted to the formation of an effective system for managing the reproduction of personnel potential in the region's agriculture. The novelty of the development consists in distinguishing the stages: first, an analysis of the functioning of the industry; the second is the construction of mathematical models according to the most important indicators that allow a comprehensive assessment of the processes occurring in the industry; the third - an assessment of the level of personnel potential, indicators of its reproduction, forecasting the rate of reproduction in agriculture; fourth - the development of general provisions of the target program “Formation and implementation of a system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic”; fifth - the development of a mechanism for implementing the program; sixth, forecasts of changes in indicators that influence the rate of reproduction in the industry are justified; seventh - the rationale for calculating the national economic, economic and budgetary effectiveness of program activities. The effectiveness of the developed system is justified by the dynamics of the rate of reproduction of personnel potential (the input level is estimated and an increase in the output potential level is noted), which affects the efficiency of reproduction processes in agriculture, which is the evidence base for the appropriateness of the development of personnel resources.

1. Introduction

In modern conditions of uncertainty, one of the main conditions “to achieve stabilization and further rise and sustainability of rural development is the use of scientifically based methods of strategic planning” [1]. “At the same time, the conditions for the development of rural settlements largely depend on how objectively the government at the regional level assesses the situation and in a timely manner, in accordance with the expected results obtained on the basis of methods of economic and mathematical modeling and adaptive forecasting, will be able to make tactical changes to strategic development plans. Thus, in the short term, the main tools for the successful implementation of strategic plans of sustainable development adopted at the level of individual regions are formalized methods of modeling and forecasting”[2].

2. Methodology

In this regard, for a more reasoned proof of the conclusions to the analysis, taking into account the shortcomings of the existing methods [3–5], mathematical models are constructed according to the most important indicators that allow a comprehensive assessment of the processes occurring in the industry.
Previously, such an objective study using mathematical tools was not conducted in the republic, which confirms its novelty. Appeal to mathematical modeling is not accidental, since it is currently the only tool for obtaining reliable predicted results.

In total, six mathematical models were constructed that characterize the dynamics of change: production of goods in agriculture of the Chuvash Republic; output per 1 employee; the number of managers of agricultural organizations; the number of tractors and combines; the number of workers in plant growing and animal husbandry. Arranged models are accompanied by parameters based on analysis of variance; dispersion characterizes the magnitude of the spread and is the best indicator of the qualitative characteristics for processes with random components. Since these models are non-linear, applying the mathematical apparatus to a non-linear model, the explained variables undergo changes. Thus, the use of analysis of variance to obtain the standard error of the predicted value allows you to obtain the optimal confidence interval of the predicted value and more objective forecast results [6].

Four of the six built mathematical models proved objectivity and accuracy of calculations in practice. Two of them showed an excess of indicators instead of projected reductions, and both of them are associated with workers in the industry, on the basis of which it can be argued that it is the regulation of the reproduction of personnel potential in agriculture of the Chuvash Republic and the elimination of imbalances in this area that will allow the industry to take a new round of development.

3. Calculation
According to the methodology developed by the author (based on the data of the Ministry of Agriculture of the Chuvash Republic: “Analysis of the number, composition by education and movement of workers holding the positions of heads and specialists of agricultural organizations of the in 2000–2017” – form 1S and “Analysis of the number, composition and movement of rural workers economy in 2011–2017”– form 1SMP), an assessment of the personnel potential in the region’s agriculture was carried out.

According to the results of calculations, it is clear that the reproduction of personnel potential indicator in the agriculture of the Chuvash Republic is relatively lower than in the country as a whole. So, in 2015, it amounted to 0.41381 points (asymmetrically narrowed reproduction), which is almost 2 times less than in the whole country and in the federal district, while in the Russian Federation – 0.85051 (minimally narrowed), and according to the Volga Federal District – 0.76392 (narrowed polarized). According to the author’s methodology described in [7], the reproduction rate in the agriculture of the Chuvash Republic was estimated (table 1).

| Table 1. Indices for calculating and predicting the rate of reproduction of personnel potential in agriculture of the Chuvash Republic in 2011-2022 (in % to the previous year). |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Year            | Index           | Integral value  |
|                 | balanced        | agricultural    | profitability   | growth rate     | physical        | indicator       | value          | pace           | reproduction   | potential       | in rural        | household       |
|                 | financial       | production      | changes         | (decrease)      | volume          | reproduction     |                |                | growth rate     | in agricultural | in agricultural |
|                 | result (profit  | agricultural    |                 |                 | investment      | of personnel     |                |                | (decrease)      | (increase)      | (increase)      |
|                 | minus lesion)   | products (in    |                 |                 | in fixed assets | potential in    |                |                |                 |                 |                |
|                 | agricultural    | farms of all    |                 |                 | agricultural    |     |                |                |                |                 |                |                |
|                 | organizations   | categories)     |                 |                 |                |                |                |                |                 |                 |                |                |
| 2011            | 367,2           | 146,3           | 24,8            | 356,0           | 150,9           | 112,6           | 141,561        |                |                 |                 |                |                |
| 2012            | 130,4           | 101,6           | 5,8             | 129,2           | 140,6           | 77,6            | 101,252        |                |                 |                 |                |                |
| 2013            | 84,6            | 94,6            | 1633,3          | 87,8            | 79,3            | 101,2           | 144,781        |                |                 |                 |                |                |
| 2014            | 75,4            | 120,1           | -112,2          | 78,2            | 89,2            | 121,4           | 143,161        |                |                 |                 |                |                |
| 2015            | 117,9           | 114,7           | 216,4           | 113,9           | 122,3           | 149,8           | 135,195        |                |                 |                 |                |                |
| 2016            | 98,5            | 85,8            | 116,8           | 115,6           | 77,5            | 50,0            | 128,098        |                |                 |                 |                |                |
| 2017            | 136,3           | 109,8           | 48,9            | 114,4           | 130,0           | 138,3           | 107,061        |                |                 |                 |                |                |
Pessimistic forecast  
2018  105.8  104.8  110.3  105.9  104.3  113.9  107,445  
2019  105.5  104.6  108.0  105.6  104.2  85.3  101,886  
2020  105.2  104.4  108.6  105.3  104.0  92.5  103,203  
2021  104.9  104.2  106.8  105.0  103.8  106.6  105,211  
2022  104.7  104.0  107.4  104.8  103.7  99.0  103,903  

Probabilistic forecast  
2018  109.0  109.7  111.8  107.6  105.6  142.5  113,735  
2019  109.0  109.7  110.5  107.0  105.6  101.3  107,138  
2020  109.0  109.7  109.5  106.6  105.6  102.7  107,154  
2021  97.3  94.1  104.3  102.1  100.8  102.3  100,090  
2022  104.7  104.1  106.3  104.7  103.7  105.7  104,863  

Optimistic forecast  
2018  117.7  129.4  126.5  110.1  107.8  215.0  130,399  
2019  108.0  118.0  120.9  109.2  109.2  107.8  102.6  110,906  
2020  108.0  118.0  117.3  108.4  107.8  95.3  108,866  
2021  90.0  77.5  86.1  97.4  96.5  104.6  91,593  
2022  109.1  104.3  106.7  105.3  103.8  110.2  106,540  

Note – Calculated by the author according to the results of his own research.

In the Chuvash Republic in 2015, these rates were at the level of 135.195 % per year, while in the country – 109.098, and in the Volga Federal District – 109.628. That is, despite the fact that the rate of reproduction of personnel potential in the region’s agriculture in 2015 was almost half that in the Russian Federation and the Volga Federal District, the integral value of the rate of reproduction in the republic’s agriculture was even higher by 26.1 p.p. than the country and the county. This indicates that the latter not only depend on the set of indicators considered in table 1, but are also directly interrelated with them, which also confirms that in order to increase the efficiency of agricultural production in the Chuvash Republic, it is necessary to closely tackle the regulation of the reproduction of personnel potential.

To this end, on the basis of the above analytical work, we have developed a target program “Formation and implementation of a system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic” (table 2).

Table 2. General characteristics of the target program “Formation and implementation of a system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic”.

| Mission | Ensuring the conditions for the continuous reproduction of personnel potential in agriculture and the achievement on this basis of improving the quality of life of the population and food security of the country |
| Purpose | Transformation of personnel potential into an effective industry resource for the formation of competitive agriculture |
| A task | Find ways to compensate for the shortage of workers in the industry |
| Function | Optimization of the influence of state bodies, agricultural organizations and their workers on solving urgent problems of reproduction of personnel potential in the industry |
| Target specifications | Application of a systematic approach to managing the reproduction of personnel potential, taking into account changes in factors of the exogenous environment, expanding the list of tasks of managing reproduction and accelerating their solution with adaptation to factors of the endogenous environment of the agricultural organization |
Restrictive conditions  Financing of the industry, the demographic situation in the industry, the state of the rural labor market, the size and stage of the life cycle of the agricultural organization

The processes  Assessing the level of reproduction of personnel potential, determining personal limitations of an employee and agricultural production conditions imposed, stimulating the development of competencies through training programs and self-development, evaluating the results of management

Destination  Agriculture, agricultural organizations and their employees

Instruments  Financial support from federal and regional budgets; forecasting the balance of labor resources and their reproduction for agriculture; planning educational activities and the effective use of personnel potential; organization of material and moral stimulation of labor, depending on the level of qualification and labor participation of workers (taking into account experience)

Criteria  Correspondence of the rate of reproduction of personnel potential in agriculture to industry requirements

Results  Industry level  Increase of personnel potential by 0.23 points, agricultural production by more than 10,000 million rubles

Results at the level of the organization  Increasing staff potential by 0.21 points, labor productivity by 1.2 percentage points

Results on employee level  Ensuring the realization of the personnel potential of employees by developing their abilities and increasing the personnel potential by 0.015 points

Note – Compiled by the author on the basis of his own research.

“In order for the region and industries to develop in the new economic conditions, outdated approaches must be replaced by new technologies for managing regional development, adapted for use in society, based on knowledge and the latest achievements of the humanities. The main goal of research on the reproduction of personnel potential in the region’s agriculture is to, based on the fundamental provisions of the agrarian policy, substantiate a consistent system of measures that facilitate the reproductive processes of staffing the region’s industry with employees of the required qualification level”.

“The main aspects of the system of proposed scientific justifications are presented in the form of a targeted program “Formation and implementation of a system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic”. The fundamental difference between the implementation mechanism of this program and the Deming cycle (Plan, Do, Study, Act) consists in splitting each stage (for example, the first one – “Determining the priority directions of personnel potential reproduction” (Plan)) into additional stages: analysis and assessment, forecasting, regulation. Thus, the program mechanism is implemented in the Chuvash Republic, both vertically and horizontally, allowing you to specify the actions of the leadership at each stage of the system for managing the reproduction of personnel potential in the region's agriculture.

Based on the dynamics of indicators for 1997–2017, affecting the rate of reproduction in agriculture in the Chuvash Republic, and using the Excel program, graphs of three options for the development of the situation for 2018–2022 were constructed (optimistic, probabilistic and pessimistic). An abbreviated version of the forecast values is presented in table 3.

Table 3. Forecast of changes in indicators affecting the rate of reproduction in agriculture of the Chuvash Republic until 2022.

| Option forecast | The equation | Year 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2017, % |
|----------------|-------------|-----------|------|------|------|------|------|--------|
| Balanced financial result (profit minus loss) of agricultural organizations, million rubles | Y = 55,703x + 270,34 | 1110,0 | 1198,8 | 1294,7 | 1165,0 | 1271,4 | 134,8 |         |
| Optimistic     | Y = 54,183x + 257,86 | 942,9 | 1027,8 | 1120,3 | 1221,1 | 1187,6 | 1243,3 | 131,9 |         |
| Probabilistic  |             |          |      |      |      |      |      |        |
According to the results of our sociological survey, only 10% of respondents want to work in agriculture. And if by graduates this figure is close to the actual reproduction of personnel potential - fluctuate: from an increase of 116.1% in 2018 to a decrease of 14.7% in 2019.

In 2018, the forecasted values of the indicator of reproduction of personnel potential will amount to 0.33227 points (table 3), and the reproduction rate in agriculture of the Chuvash Republic - 107.445%. According to the results of our sociological survey, only 10% of respondents want to work in agriculture. And if by graduates this figure is close to the actual - 21 people. of 256 (or 8.2%) came to work in the industry in 2017, then by technical school - only 1.4% of graduates return to the village.

In this case, the economic efficiency of the functioning of the agriculture of the Chuvash Republic as a result of the implementation of the Program in 2018-2020 will amount to 131590.1 mln. rub. or 14.199068 mln. rub. / per 1 employee (which will be about 0.394419 mln. rub. per 1 month). Economic efficiency - 3156.2 mln. rub. or 0.340647 mln. rub. per 1 employee (0.394962 mln. rub. per month). Budget efficiency - 189.4 mln. rub. or 0.020442 mln. rub. per 1 employee (0.000569 mln. rub.).

| Scenario         | Equation                                                                 | Values                              |
|------------------|--------------------------------------------------------------------------|-------------------------------------|
| **Agricultural production (in farms of all categories), million rubles** | **Y = 52,494x + 243,48**          | **997,5 1052,1 1106,6 1116,2 1215,7 128,9** |
| **Optimistic**   | **Y = 76,599x^2 + 283,11x + 2995.4**                                     | **51820 61147 72154 55889 58270 145,6** |
| **Probabilistic**| **Y = 31,237x^2 + 1183.6x + 29,973**                                    | **43915 48175 52848 49747 51780 129,3** |
| **Pessimistic**  | **Y = 15,829x^2 + 1491,4x - 989,84**                                     | **41947 43863 45778 47694 49610 123,9** |
| **Profitability, loss-making of all agricultural activity,%**      | **Y = 0.002x^2 + 0.5768x - 6,6531**                                     | **8,6 10,4 12,2 10,5 11,2 +4,4 pp** |
| **Labor productivity in agriculture, thousand rubles / person**    | **Y = 0.3797x^2 + 22,393x - 17,271**                                    | **619,3 646,8 675,5 680,5 726,4 229,1** |
| **Investments in fixed assets of agriculture, million rubles**    | **Y = 0.2205x^2 + 25,05x - 24,69**                                       | **575,6 606,5 637,5 668,4 699,4 202,1** |
| **The indicator of the reproduction of personnel potential in agriculture, points** | **Y = 0.5091x^2 + 123,59x + 52,554**                                    | **3213,0 3463,6 3733,8 3604,9 3740,4 125,5** |
| **Optimistic**    | **Y = 0.0016x^2 + 0.0436x + 0.0429**                                     | **0,6734 0,6911 0,6587 0,6906 0,7687 268,6** |
| **Probabilistic** | **Y = 0.1937ln(x) + 0.0153**                                            | **0,4975 0,5038 0,5180 0,5303 0,5623 196,5** |
| **Pessimistic**   | **Y = -0.0061x^2 + 0.089x - 0.0033**                                     | **0,3322 0,2833 0,2620 0,2805 0,2778 97,1** |

Note – Calculated by the author according to the results of his own research.

If no action is taken either by the state or by the leadership of agricultural organizations, the situation in the agriculture of the Chuvash Republic for 2018-2022 will develop according to a pessimistic scenario. The average forecast values, changes in indicators affecting the reproduction rate will be as follows: the balanced financial result will increase annually during this period by 105.2%; production (in farms of all categories) - increase by 104.4%; profitability of all agricultural activities - increase by 108.2%; labor productivity - by 106.0%; investments in fixed assets - increase by 104.0%; reproduction of personnel potential - fluctuate: from an increase of 116.1% in 2018 to a decrease of 14.7% in 2019.
When developing a probabilistic forecast within the framework of the target program “Formation and implementation of a system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic”, we were guided by the opinion of Academician of the Russian Academy of Sciences Dolgushkin N.K.: “As never before, the task of creating adequate personnel potential, training and consolidation in the production of professional personnel with the latest knowledge, skills and competencies, able to actively participate and effectively manage innovative processes in the industry”[8]. In this connection, he suggests focusing on the system of training, retraining and advanced training of personnel.

Having monitored the market for services provided by agricultural educational institutions in the regions adjacent to the Chuvash Republic, it was found that the most suitable educational institutions (in terms of price-quality-remoteness) for continuing education courses and professional retraining of agricultural workers in the region are: “Tatar Institute of Retraining of Agribusiness Personnel”, “Training Center ”Niva” of the Ministry of Agriculture of Chuvashia, “Russian State Correspondence Agricultural University”, “Ural Institute for Continuing Education and Retraining”, “Nizhegorod Management and Economics of the Agro-Industrial Complex”, “St. Petersburg State Agrarian University”, "International Academy of Expertise and Assessment”.

Based on the calculations, taking into account the opinions of experts, the existing shortage of industry workers, annually from 2018 to 2020 additionally 52 people will be sent to continuing education courses, 25 people will be retrained. (34 managers, specialists and 43 workers each), on-the-job training – 2703 people. The number of students was calculated on the basis of production need, but with the minimum budgeted costs. In total for 2018-2020 2,990,789 rub. will be spent on activities of the program “Formation and implementation of a system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic”, which is about 1 mln. rub. on average over the year, more precisely 996,929.7 rub.

In addition, it is advisable to organize on-the-job training of working personnel according to the scheme developed by the author. Actual data for 2017 indicate that 175 workers improved their skills without interruption from production, 5 people with a separation from production, 171 people underwent retraining at the factory. (form 1-SMP of the Ministry of Agriculture of the Chuvash Republic for 2017); it is assumed that in 2018 these indicators will remain the same. By adding to them the students planned by the Program events for 2018. (30 people (sent to continuing education courses), 13 people (for professional retraining programs), their total number will be (175 + 5 + 171 + 30 + 13) = 394 people.

In 2017, in fact, in the agriculture of the Chuvash Republic, 8503 workers worked, subtracting from there the number of students - 394 people. It turns out 8109 people. (8503-394 = 8109). Since the program is designed for three years from 2018 to 2020, accordingly, on-the-job training will be carried out proportionally by year: 8109/3 = 2703 people.

Thus, with a probabilistic forecast based on an assessment of the effectiveness of the implementation of measures in five agricultural organizations of the Chuvash Republic and taking into account the opinions of experts, it was found that all the indicators analyzed that affect the reproduction rate in the region's agriculture will increase on average per year. The balanced financial result of agricultural organizations is increasing - by 105.8 %; industry production - by 105.5 %; profitability of all activities - by 108.5 %; labor productivity - by 107.1 %; investments in fixed assets - by 104.3 %; reproduction of personnel potential - by 117.3 % (table 3). In 2018, the predicted values of the indicator of reproduction of personnel potential will amount to 0.49755 points, and the reproduction rate in agriculture of the Chuvash Republic - 113.735 %.

The national economic efficiency of the functioning of the region's agriculture as a result of the implementation of the Program in 2018–2020 will amount to 144938.8 mln. rub. (which is 13348.7 mln. rub. more than under the pessimistic forecast) or 15.02141 mln. rub. / per employee (per 1 month - 0.417261 mln. rub.). Economic efficiency – 3369.2 mln. rub. (which is 213 mln. rub. more than under the pessimistic forecast) or 0.349092 mln. rub. / per employee (0.009697 mln. rub. per month). Budget efficiency – 202.2 mln. rub. (which is 12.8 mln. rub. more than under the pessimistic forecast) or 0.020946 mln. rub. / per employee (0.001415 mln. rub. per month).
To justify the effectiveness of the activities of the Program “Formation and implementation of a system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic”, table 4 analyzes the dynamics of changes in the probability forecast indicators to the pessimistic forecast for 2018-2020. Characterizing this table, it can be argued that in 2018, as a result of the implementation of the Program with a probabilistic forecast, the integral value of personnel potential in agriculture will increase by 0.16528 points compared to the pessimistic forecast. This will lead to a change in national economic efficiency by 1967.6 mln. rub. (which per one student, including at the workplace, will amount to 0.70777 mln. rub. / person), economic – by 30.3 (0.010899 mln. rub. / person), budget – by 1.8 mln. rub. respectively (0.00647 mln. rub. / person). In total for 2018–2020 12.8 mln. rub. will go into the budget of the Chuvash Republic, which indicates the effectiveness of investments in the Program. They pay off even with a probabilistic forecast of 4.28 times (12.8 mln. rub. / 2.290789 mln. rub. = 4.28).

Table 4. Justification of the effectiveness of the programme's activities: changes in indicators probabilistic to pessimistic forecast for 2018–2020.

| Year   | Change indicator reproduction personnel potential in agricultural, points | Amount students in the workplace and in training institutions, people | National economic efficiency | Economic efficiency | Budgetary efficiency |
|--------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------|----------------------|----------------------|
|        | Change from the implementatio n of the Program, mln.                   | Changes resulting from the implementatio n of the Program, mln. / person                          | Changes resulting from the implementatio n of the Program, mln. / person  |
|        |                                                                 | For 1                                                                                           | For 1                                                                     |
| 2018   | 0.16528                                                               | 2780                                               | 1967.6                                                                 | 30.3                 | 1.8                   | 0.000647             |
| 2019   | 0.22052                                                               | 2780                                               | 4311.8                                                                  | 68.2                 | 4.1                   | 0.001475             |
| 2020   | 0.25594                                                               | 2780                                               | 7069.3                                                                  | 114.5                | 6.9                   | 0.002482             |
| Total during the action |                                                                      | 13348.7                                          | 4,801691                                                               | 213.0                | 12.8                  | 0.004604             |

Note – Calculated by the author on the basis of his own research.

With an optimistic forecast, in addition to the activities provided for in the probabilistic forecast for the reproduction of personnel potential (advanced training courses, professional retraining, training at the workplace), it is supposed to organize the educational process in agricultural educational institutions of higher and secondary professional education so that the number of hours students allocated for practical training, corresponded to six to eight months. For example, students of the secondary specialized educational institution should include in the curriculum not six but six months for practical training and make it distributed by year (each month and a half to work out), and students of an agricultural university should not have three, but eight months (each year two months) ) Such a revision of the curriculum will completely solve the problem of the shortage of workers in the industry (with the help of temporary workers) and partly the problem of compensation of public funds for training budget students.

Describing changes in indicators affecting the reproduction rate in agriculture of the Chuvash Republic in 2018-2022 for this type of forecast, it should be noted that the average annual values of the studied parameters will also increase. Thus, the balanced financial result is increasing - by 106.6 % per year; production of products in the industry - by 109.4 %; profitability of all activities - by 111.5 %; labor productivity - by 108.2 %; investments in fixed assets - by 104.7 %; reproduction of personnel potential - by 129.9 %, except 2020, when there is a decrease of 4.7 % (table 3). As a result of the implemented measures, the predicted values of the indicator of personnel potential reproduction in 2018 will amount to 0.67344 points, and the reproduction rate in agriculture of the Chuvash Republic will be 130.399 % (table 3).
The national economic efficiency of the functioning of the region's agriculture as a result of the implementation of the Program in 2018-2020 will amount to 185,122.4 mln. rub. (which is 40183.6 mln. rub. more than with the probabilistic forecast) or 18.954956 mln. rub. / per employee (0.526527 mln. rub. per month). Economic efficiency - 3603.5 mln. rub. (which is 234.3 mln. rub. more than in the probabilistic forecast) or 0.367481 mln. rub. / per employee (0.010208 mln. rub. per month). Budget efficiency - 216.2 mln. rub. (which is 14 mln. rub. more than with the probabilistic forecast) or 0.022048 mln. rub. / per employee (0.000612 mln. rub. per month).

To justify the effectiveness of the measures of the Program “Formation and implementation of a system for managing the reproduction of human resources in agriculture of the Chuvash Republic”, an analysis is made of the dynamics of changes in the indicators of the probabilistic forecast for the pessimistic forecast for 2018-2020 (table 5). Characterizing it, it can be argued that in 2018, as a result of the implementation of the Program with an optimistic forecast, the integral value of human potential in agriculture will increase by 0.17589 points compared with the probabilistic forecast. This will lead to a change in national economic efficiency by 7904.8 mln. rub. (which will be 2.349.822 mln. rub. per trainee), economic - 82.2 (0.024435 mln. rub. / person), budget - 4.9 mln. rub. respectively (0.001457 mln. rub. / person).

In total for 2018-2020 with an optimistic forecast, the budget of the Chuvash Republic will receive 14.0 mln. rub. (table 5), which indicates the effectiveness of investments in the Program. Dividing this indicator by 7 months of practice, it turns out that students will bring 16.0 mln. rub. to the budget during their 4-year education (14.0 / 7 + 14.0 = 16.0 mln. rub.). Whereas the cost of their training is 84.010936 mln. rub. Consequently, the recommendations of the Program will make it possible to compensate only 19% of budget expenditures for the preparation of agricultural students (16.0 mln. rub. * 100 % / 84.010936 mln. rub. = 19.0 %).

Table 5. Justification of the effectiveness of the programme's activities: changes in indicators optimistic to probabilistic forecast for 2018-2020.

| Year   | Change indicator reproduction personnel potential in agricultural, points | Number of trainees | National economic efficiency | Economic efficiency | Budgetary efficiency |
|--------|--------------------------------------------------------------------------|--------------------|-----------------------------|---------------------|----------------------|
|        | Changes resulting from the implementatio of the Program, mln. rub.          | Changes resulting from the implementatio of the Program, mln. rub. | Changes resulting from the implementatio of the Program, mln. rub. | Changes resulting from the implementatio of the Program, mln. rub. |
|        | On 1 trainee, mln. rub./person                                          | On 1 trainee, mln. rub./person  | On 1 trainee, mln. rub./person | On 1 trainee, mln. rub./person |
| 2018   | 0,17589                                                                 | 3364                | 7904,8                      | 2,349822            | 82,2                 | 0,024435             | 4,9                  | 0,001457             |
| 2019   | 0,18730                                                                 | 3060                | 12972,6                     | 4,239412            | 78,5                 | 0,025654             | 4,7                  | 0,001536             |
| 2020   | 0,14071                                                                 | 2784                | 19306,2                     | 6,934698            | 73,6                 | 0,026437             | 4,4                  | 0,00158              |
| Total during the action |                                                                 |                     |                              |                     |                     |                      |                     |
| Programs from 2018 to 2020 | 40183,6                                                                 | 13,52393            | 234,3                       | 0,545345            | 14,0                 | 0,004573             |

Note - Calculated by the author on the basis of his own research.

4. Results and discussion

Table 6 below presents the general dynamics of changes in the effectiveness of the projected results of the Program for 2018-2020. When filling out table 6, it should be taken into account that when calculating the efficiency, it is impossible to simply summarize individually the final data of tables 4 and 5, since the line “Total for the duration of the Program from 2018 to 2020” table 4 already includes the activities of the probabilistic forecast program. Accordingly, in table 6 in the line “Change in the indicators of an optimistic forecast to a probabilistic”, it is necessary to indicate the difference in the effectiveness of the values in optimistic and probabilistic forecasts.
Thus, investments in the Program pay off: budget effectiveness of measures with a probabilistic forecast of 12.8 mln. rub., with an optimistic forecast of 1.2 mln. rub., which in total is 14.0 mln. rub. Then 14.0 mln. rub. / 2.990789 mln. rub. = 4.68 times, that is, the budget of the Chuvash Republic will receive so many times more revenues from its implementation.

Since the criterion of the effectiveness of the functioning of the system should be considered the measure (probability) of achieving a specific goal, the degree of achievement of this goal will determine the effectiveness of managing the reproduction of personnel potential in agriculture. Therefore, the task of the target program “Formation and implementation of the system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic” - to find ways to compensate for the shortage of workers in the industry, due to the proposed measures of the Program, has been achieved.

Table 6. Dynamics of changes in performance indicators of the predicted results Programs “Formation and implementation of a system for managing the reproduction of personnel potential in agriculture of the Chuvash Republic” for 2018-2020, mln. rub.

| Forecast                | Efficiency       |
|-------------------------|-----------------|
|                         | National economic | Economic | Budgetary |
| Pessimistic             | 131590,1        | 3156,2   | 189,4     |
| Probabilistic           | 144938,8        | 3369,2   | 202,2     |
| Change in the probability forecast indicators to pessimistic | 13348,7 | 213,0 | 12,8 |
| Optimistic              | 185122,4        | 3603,5   | 216,2     |
| Change in optimistic indicators forecast to probabilistic | 26834,9 | 21,3 | 1,2 |
| Total                   | 40183,6         | 234,3    | 14,0      |

Note – Calculated by the author on the basis of his own research.

Even if investments flow into agriculture, then in this case it will be impossible to solve the problems of rural territories only by administrative methods; a new level of village development and its new dimension are associated with the formation of a peasant as a citizen. The village as a single territorial-production and socio-cultural complex can develop only with a combination of two mutually stimulating factors: positive changes in the worldview of rural residents should be supported by economic transformations [9].

The experience of the regions implementing various projects in agriculture, including in the Chuvash Republic, indicates that the development of rural territories should begin with the villagers, with the preparation of their participation in this process, with their awareness of the feasibility of changes. Examples of "awakening" of rural areas participating in a pilot project to support local initiatives aimed at improving the living conditions of the rural population are presented in the publication [10].

5. Conclusion
Summarizing the foregoing, the author believes that the systemic management of the reproduction of personnel potential in agriculture will allow the Ministry of Agriculture of the Russian Federation, industry management bodies at the level of federal districts, regions and "organizations to make more informed decisions to remove agricultural production from a difficult situation. Moreover, Russia's membership in the World Trade Organization and its simultaneous participation in regional integration associations, the transformation of the Customs Union into the Eurasian Economic Union, the beginning of the implementation of the eight-year state program, created a fundamentally new socio-economic situation in the agricultural sector, which no longer meets the requirements of the modern agricultural politics and does not fit into its framework "[11].

As Medvedev D.A. said: “The time for simple decisions has passed, the economic challenges that confront us today cannot be underestimated. Ahead, we have a difficult path. In difficult, practically in
crisis conditions, we need to continue to move towards a post-industrial economy, towards a smart state, the main value of which is a person” [12].

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