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Workforce planning distribution of the region's results.

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ABSTRACT

Solution of the optimal allocation labor resources is a major innovation in the development strategy of Russia. The solution of such problems are ability to determine the dynamics of development basic and innovative industries, diversification of the economic structure of Russia and its regions. Optimization structure of the labor market requires the construction of a control system that ensures an optimal distribution labor force, according with requirements of regional economy. That, in turn, requires solution a complex problems in the development of mathematical models optimal allocation human resources and relevant methodologies. Questions of management human resource in the region, identifying main principles of distribution and formation, as well as use techniques mathematical modeling discussed in [3], [4], [5]. Studying state of social and labor sphere of Stavropol Territory the village is have dedicated to the work [1]. Ability to create database the image of employees or persons as an information system module labor resources, modeling, planning, Stavropol Territory, the result of which could be concept of regional development in the innovation sphere are discussed in [2].

Keywords: human resources, modeling, planning, Stavropol Territory

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INTRODUCTION

With the development of market relations in the production system of the region human resources are an essential element in ensuring the production, marketing and other functions activities. Effective functioning of the region is impossible without the focus on the formation and use of labor resources to meet the needs of the production system in the region and solving the problem of optimal allocation of resources. Since the problem can be many, they require effective joint solutions. In this context, it seems appropriate to propose a model of labor resources allocation plan for the result in the region.

The region's economy includes a set of *n* sectors, which have considered the main (industry, agriculture, trade and others.). The development of basic industries entails the development of supporting industries and sub-industries.

Let the number of sub-sectors will be equal to *m*. This industry, serving the development of basic sectors (processing industry, production of commercial equipment, serving the major industries of the city economy, and others.). The relationship between the primary and secondary sectors of the region is have determined by the balance equations.

MATERIALS AND METHODS

Suppose that you need to plan the development of the region for a long period of planning $[t_0, T]$, where t_0 – beginning of planning period, and T – the end of the planning period. At every year planning$t, t \in [t_0, T]$in the economy of the region are distributed workforce $\Delta c(t)$. Workforce $\Delta c(t)$ should been divided between the primary and secondary sectors. Let $X(t) = \{x_1(t), \dots, x_n(t)\}$– quantitative status of the main branches of economy of the region, and through$Y(t) = \{y_1(t), \dots, y_m(t)\}$ – quantitative status of subsidiary branches of the regional economy in the planning year$t$.

Let $U_i(t)$– labor resources allocated to the *i* the main branch of the regional economy, and $v_j(t)$– labor resources allocated to the *j* supporting industries. We believe that the development of both core and supporting industries is proportional to the amount of labor, i.e.

$$x_i(t) = x_i(t) + \tau_i u_i(t),$$
$$y_j(t) = y_j(t) + l_j v_j(t),$$

where $1/\tau_i$and $1/l_j$ – unit cost, respectively, the main and auxiliary industries.

So we need to find the distribution of the labor force in the main branches of the regional economy $\{u_i(t)\}$ and supporting industries$\{v_j(t)\}$, who asked if the annual total amounts $\Delta c(t)$to provide simultaneous translation for all major sectors of municipal economy of the state $\{x_i(t)\}$ in a pre-set final state $\{x_i(T)\}$.

Let $\Delta A(t)$ human resources included in the basic branches of economy of the region, and then have to perform the following equation

$$\sum_{i=1}^{n} u_i(t) = \Delta A(t) \cdot \alpha,$$

where α– a coefficient.

Let $X(T) = \{x_i(T), \dots, x_n(T)\}$planned quantitative state of the main sectors the economy of region.

One of the plans for the development of basic industries, remitting them to the state $\{x_i(t_0)\}$ in the planned $\{x_n(T)\}$, It can be a support plan allocation of labor resources. Basic plan allows simultaneously convert all branches of state $X(t)$ in $X(T)$ and to some extent; it eliminates disparities that exist between the main industries.

We write down the reference of labor resources allocation plan for the major branches for a given capital $\Delta A(t)$ and an unknown factor α:

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$$u_i(t) = \frac{(x_i(T)-x_i(t))/\tau_i}{\sum_{i=1}^{n}(x_i(T)-x_i(t))/\tau_i}\Delta A(t)\alpha. \quad (1)$$

The increment of the industry in the year t It is equal to $\tau_i \cdot u_i(t) = \Delta x_i(t)$. The increase in the basic sector entails a change and supporting industries. Let β_{ij} increasing the standard of the auxiliary industry j with the change of the main industry i per unit. With an increase in the basic sectors $\Delta x_i(t)$ there are additional costs:

$$\sum_j \frac{i}{l_j}\sum \beta_{ij}\Delta x_i(t) = \sum_j \left(\sum_i \beta_{ij}\, u_i(t)\cdot\tau_i\right)/l_j.$$

Then the total number of labor in the year *t*, directed at the development of the regional economy must be equal to:

$$\sum_i u_i(t) + \sum_j \frac{1}{l_j}\sum \beta ij\Delta x_i(t) = \Delta A(t)\alpha + \sum_j \frac{1}{l_j}\sum \beta_{ij}\Delta x_i(t) = \Delta c(t). \quad (2)$$

Substituting (2) instead of the expression (1) and transforming the expression, we find the coefficient α:

$$\alpha = \frac{\Delta c(t)}{\Delta A(t)\alpha}\cdot\frac{1}{1+\frac{\sum_j \frac{1}{l_j}\sum_i \beta_{ij}(x_i(T)-x_i(t))}{\sum_i (x_i(T)-x_i(t))/\tau_i}}. \quad (3)$$

Substituting (3) in (1), we received a distribution of labor resources $\{u_i(t)\}$ in year *t* for the main sectors of the economy of the region.

Consequently

$$v_j(t) = \frac{\sum_i u_i(t)\cdot\tau_i}{l_j}, \quad j = 1,2,\dots,m. \quad (4)$$

RESULTS AND DISCUSSION

Consider the logic of organizing data in the task of planning the development of the economy of the region by the result. Information relating to the same industry can been represented as a tree structure (Figure 1).

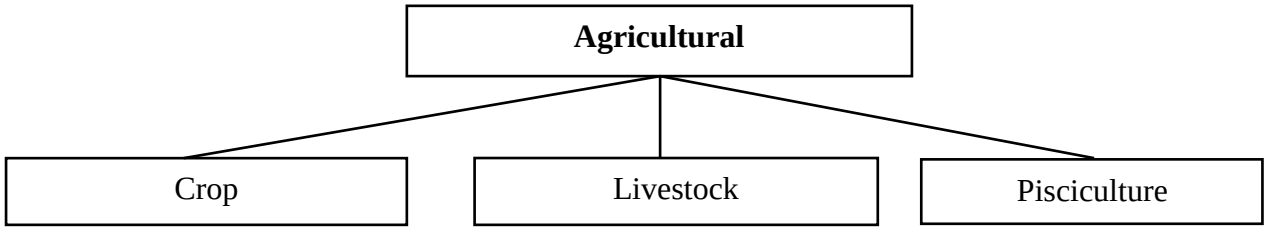

Figure 1: Tree structure of Stavropol Territory Agriculture

We present the results of labor resource allocation computing by industry and sub-sectors of the economy of the Stavropol Territory in accordance with the procedure described previously (excluding ancillary sub-sectors). To illustrate the effectiveness of the proposed calculation of three groups of calculations were carried out, respectively, with initial terms of planning - 2010, 2013, 2015 and year-end planning for all versions – 2020. The result of these calculations are set out below charts the development of the main branches of the Stavropol Territory's economy according to the reference plan of labor resources distribution (Fig. 2). The calculations were have performed for the following sectors and sub-sectors of the economy of Stavropol Territory:

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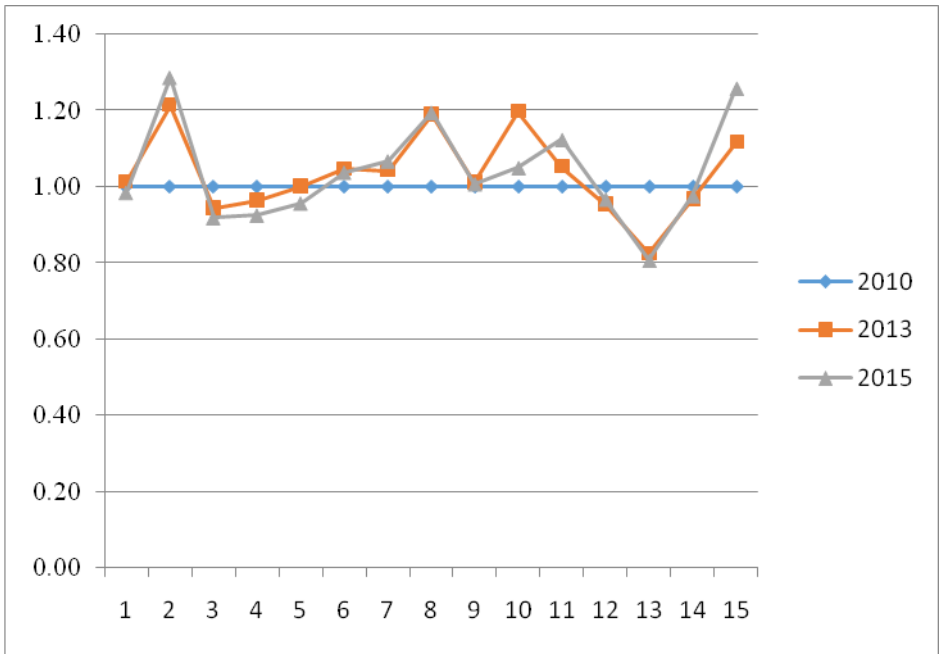

Figure 2: Graphs of development branches of Stavropol Territory

a) branch of agriculture; subsectors: 1) crop, 2) livestock, 3) fish farming;
b) trade and catering industry; subsectors: 4) retail outlets, 5) catering, 6) storage of food, 7) stocks of manufactured goods;
c) the housing industry; subsectors: 8) housing;
d) public utilities sector; subsectors: 9) water supply, 10), sewer, 11) gasification, 12) district heating, 13) of the road;
e) education sector; subsectors: 14) secondary schools, 15) kindergartens.

We describe the construction of industries graphs of the Stavropol Territory. The x-axis represents the number sub-sectors of the Stavropol Territory from 1 to 15.

On the vertical axis represents the value of $\frac{x_i(t)}{x_i(T)}$ – the relative ratios of the current backlog of quantitative status of the planned sub-sector. If the ratio $\frac{x_i(t)}{x_i(T)} = 1$, the industry i reached the planned level. For each year of planning all points of the graph are connected by a broken line, illustrating the development of the region in the planning year t.

CONCLUSION

Formation of a labor is essential, as is an effective use of the means of production, and hence the component of improving integrated development, labor productivity growth and competitiveness of the region. The number of labor force is dependent on the efficiency of their use, which in turn is have closely linked to the previous stages of its reproduction. The constructed model is the maximum possible simplification of the real picture, and its practical use is associated with a minimum of information material. The use of labor resources allocation plan for the industry of Stavropol Territory will provide harmonious growth of all sectors to the normative level.

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