The Current State of Supply Chain Management and Development of Rural Labor Resources in Kazakhstan

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***Abstract*-- Labor resources remain the main factor of production and the national wealth of the state, while improving the efficiency of the supply chain management and the use of labor resources is currently the main task of the economy. This is particularly true of labor in agricultural production, because it is this sector that ensures the food stability of the state. Thus, the purpose of this article is to consider the innovative methods of supply chain management and labor regulation, which are applied in agricultural organizations in general and in women's work in particular.**

To achieve this goal, a set of complementary research methods, statistical and comparative analysis, a systematic approach to the study of economic phenomena and processes were used.

This article describes the main approaches to the innovative methods of supply chain management and to labor incentives, aimed at increasing the motivation and interest of employees. A regression model of the human resource potential of the agricultural region was also constructed, which makes it possible to predict changes in the rural labor force in the region.

***Keywords*-** *labor resources, agricultural production, increased motivation, economic growth, increased interest, supply chain management.*

1. Introduction

Due to their distinctive abilities from other economic spheres, agriculture requires more attention to the processes of supply chain management, formation and use of labor resources [4, 10, 19, 22, 25]. A proper supply chain management is a good way to increase the efficiency of agricultural production [11]. Supply chain studies suggest that product integration with customers and suppliers can increase a firm's effectiveness in its product development efforts, and thus lead to increased sales [16]. Moreover, note the problem of weak interest, motivation of agricultural workers and low wages [7, 9, 12]. At this stage, the solution to this problem is the need to increase economic incentives [8, 15, 21].

Currently, the financial crisis exacerbates the already difficult financial and economic situation of agricultural enterprises, which leads to a significant reduction in jobs. Decrease in the efficiency of agro-industrial production, increase in the share of unprofitable farms, institutional transformations that do not accompanied by the expansion of the scope of employment in rural areas, negatively affect the use of labor resources, moreover, the

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deformation of the sectoral structure of labor resources in agriculture sharply limits the variety of areas of employment, which provokes further outflow of qualified personnel [25].

The above circumstances exacerbated the problem of managing the supply chain and labor resources in agriculture, and thereby made it necessary to find new ways to solve it in the conditions of the market [14, 25].

Companies are constantly aiming to improve the design of their supply chains, amid accelerated growth and fierce competition of contemporary global markets [5]. Conventional supply chain practices are being constantly re-evaluated as companies find ways of increasing the efficiency and accuracy of their operations. One of the traditional practices that is changing in a supply chain is the flow of products, which in no longer only in the forward direction [2]. In order to make use of returned products companies are adopting reverse logistics in addition to forward logistics, forming what is known as a closed-loop supply chain. One of the reasons for this is the growing interest in product recovery and material recycling, which has expanded the scope of traditional supply chains to include final-users, collection centers, de-manufacturers or remanufacturers [24].

Studies have shown that the functioning of agricultural enterprises and households is based on the use of factors of production, such as land, capital, labor, and the receipt of appropriate revenues from their use.

The distribution of labor resources by types of employment, and the practical needs of population accounting, necessitate the allocation of various types and forms of employment that characterize the degree of efficiency of the use of labor resources in agriculture [25].

Rural labor resources, due to the specificity of rural areas, are characterized by the lowest level of salaries, the fall in labor requirements during the financial and economic crisis is negative, the territorial remoteness of rural settlements sharply limits mobility and causes limited opportunities to provide job seekers with the necessary information, makes it difficult their professional retraining.

Ensuring high employment of citizens remains a priority goal of the state economic policy and determines the strategy of supply chain management [14]. Market reforms of the 90s of the 20th century, the formation of employment under the influence of real demand in the labor market were accompanied by fundamental changes in both labor relations and employment among all residents and in all regions of sovereign Kazakhstan [25].

The aim of the research is to develop scientifically sound proposals on innovative labor management in agricultural organizations in general and women's labor in particular and on this basis to improve the efficiency of agriculture.

2. Methods

To achieve this goal, a comprehensive analysis and monitoring of data on the number and composition of the economically active population, employed and unemployed, employment, movement and the number of employees is necessary.

In the course of the study, general scientific methods of management theory, expert, statistical and comparative analyzes, a systematic approach to the study of economic phenomena and processes, methods of structural-functional analysis, analysis and synthesis, tabular and graphical data visualization techniques were used.

Below is a model for studying the dependence of the human resources potential of the agricultural sector in the SKO (y) on several factors:

x1 - population size of SKR;

x2 - economically active population of SKR;

x3- economically inactive population of SKR;

x4 - employed population of SKR;

x5 - unemployment rate for SKR;

x6 - the number of directions for SKR.

The regression six-factor model will be constructed in a linear form

$$\hat{y} = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + b_6 x_6 \quad (1)$$

To find the parameters of this equation, we calculate the auxiliary quantities.

Let us formulate a system of normal equations:

$$\begin{cases} 212038 = 7a + 15382{,}9b_1 + 7169{,}6b_2 + 3033{,}7b_3 + 6629{,}1b_4 + 53{,}3b_5 + 12536b_6, \\ 465340833{,}6 = 15382{,}9a + 33854780{,}37b_1 + 15790072{,}69b_2 + 6676575{,}85b_3 + 14603737{,}46b_4 + 116697{,}4b_5 + 27301404{,}8b_6, \\ 216741428{,}1 = 7169{,}6a + 15790072{,}69b_1 + 7367550{,}16b_2 + 3113859{,}25b_3 + 6814959{,}33b_4 + 54288{,}68b_5 + 12673866{,}1b_6, \\ 91778347{,}5 = 3033{,}7a + 6676575{,}85b_1 + 3113859{,}25b_2 + 1317353{,}59b_3 + 2879957{,}6b_4 + 23007{,}26b_5 + 5384569{,}5b_6, \\ 200351743{,}4 = 6629{,}1a + 14603737{,}46b_1 + 6814959{,}33b_2 + 2879957{,}6b_3 + 6304152{,}19b_4 + 50159{,}86b_5 + 11699244{,}8b_6, \\ 1619890{,}2 = 53{,}3a + 116697{,}4b_1 + 54288{,}68b_2 + 23007{,}2b_3 + 50159{,}86b_4 + 409{,}75b_5 + 97543{,}4b_6, \\ 382838383 = 12536a + 27301404{,}8b_1 + 12673866{,}1b_2 + 5384569{,}5b_3 + 11699244{,}8b_4 + 97543{,}4b_5 + 23776622b_6. \end{cases}$$

Solving this system by the Cramer method, we obtain the multiple regression equation, which expresses the dependence of the personnel potential of the agricultural area on SKR (y) on such factors as the population size of SKR (x1), the economically active population of SKR (x2), the economically inactive population of the SKR (x3) the population of South Kazakhstan (x4), the unemployment rate for SKR (x5), the number of graduates of agricultural educational institutions in the SKR (x6), will look like:

$$\hat{y} = -139389{,}67 - 37{,}53x_1 + 596{,}98x_2 + 144{,}94x_3 - 497{,}77x_4 + 6349{,}89x_5 + 0{,}53x_6 \quad (2)$$

Let us calculate the theoretical values of $\hat{y}$.

In order to verify the adequacy of the model and analyze it, it is necessary to calculate the pair, partial and multiple correlation coefficients, the multiple coefficient of determination.

The tightness of the combined influence of factors on the result is estimated by the multiple correlation index:

$$R_{yx_1x_2,\ldots,x_p} = \sqrt{1 - \frac{\sigma^2_{y_{ocm}}}{\sigma^2_y}}. \quad (3)$$

For a linear relationship, the coefficient of multiple correlation can be determined through a matrix of paired correlation coefficients:

$$R_{yx_1x_2,\ldots,x_p} = \sqrt{1 - \frac{\Delta r}{\Delta r_{11}}},$$

Where

$$\Delta r = \begin{vmatrix} 1 & r_{yx_1} & r_{yx_2} & \ldots & r_{yx_p} \\ r_{yx_1} & 1 & r_{x_1x_2} & \ldots & r_{x_1x_p} \\ r_{yx_2} & r_{x_2x_1} & 1 & \ldots & r_{x_2x_p} \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ r_{yx_p} & r_{x_px_1} & r_{x_px_2} & \ldots & 1 \end{vmatrix}$$ - the determinant of the matrix of paired correlation coefficients;

$$\Delta r_{11} = \begin{vmatrix} 1 & r_{x_1x_2} & \dots & r_{x_1x_p} \\ r_{x_2x_1} & 1 & \dots & r_{x_2x_p} \\ \dots & \dots & \dots & \dots \\ r_{x_px_1} & r_{x_px_2} & \dots & 1 \end{vmatrix}$$ - determinant of the matrix of inter-factor correlation.

We calculate the coefficient of multiple correlation $R_{yx1x1x3x4x5x6} = 0,99$ - this means that the combined effect of factors on the outcome is very large.

$r_{yx1,x2x3x4x5x6} = 0,957$; $r_{yx2,x1x3x4x5x6} = 0,99$; $r_{yx3,x1x2x4x5x6} = 0,009$; $r_{yx4,x1x2x3x5x6} = 0,014$; $r_{yx5,x1x2x3x4x6} = 0,025$; $r_{yx6,x1x2x3x4x5} = 0,785$. This means that factors such as: economically inactive population of SKR (x3), employed population of SKR (x4), unemployment rate for SKR (x5) weakly affect the effective indicator, and they can be excluded from the regression equation (1), then the equation 1) takes the form:

$$\hat{y} = -139389,67 - 37,53x_1 + 596,98x_2 + 0,53x_6 \quad (2)$$

The quality of the constructed model as a whole estimates the coefficient (index) of determination. The multiple determination coefficient is calculated as the square of the multiple correlation index:

$R^2_{yx_1x_2,\dots,x_p}$.

Let's calculate the determination index:

$R^2_{yx1x2x3x4x5x6} = 0,98$ i.e. the quality of the model built is generally good

3. Results

The current state of the use of labor resources in the agriculture of the Turkestan region of the Republic of Kazakhstan shows that the stability of the socioeconomic situation in the countryside, supply chain management development and the dynamics of development of many branches of the rural economy largely depend on women who constitute the majority of the population and most of Kazakhstan's labor resources. Women make up 52% of the population of Kazakhstan and 47% of the total number of people employed in the economy, 68% of them are of working age. The average age of employed women is 38.8 years, men - 39.2 years. With a general decline in the proportion of women among the employed, there is an increase in the number of women engaged in entrepreneurial activities.

Partial coefficients (or indices) of the correlation, which measure the effect on y of the factor xi at a constant level of other factors, can be determined from the formula

$$r_{yx_i \cdot x_1x_2\dots x_{i-1}x_{i+1}\dots x_p} = \sqrt{1 - \frac{1 - R^2_{yx_1x_2\dots x_i\dots x_p}}{1 - R^2_{yx_1x_2\dots x_{i-1}x_{i+1}\dots x_p}}}.$$

We calculate the coefficients of the partial correlation.

Table 1. Labor force

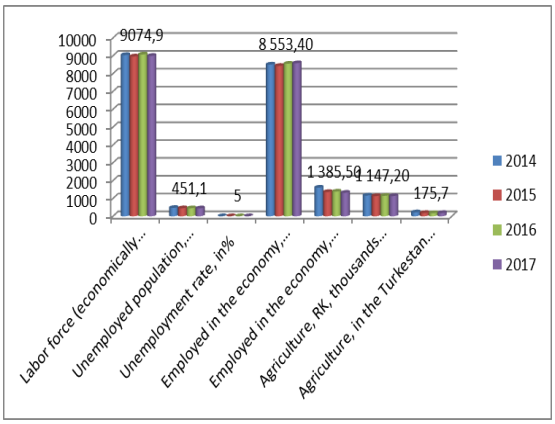
	2014	2015	2016	2017
Labor force (economically active population), thousands of people	9041,3	8962,0	9074,9	8998,8
Unemployed population, thousands of people	470,7	451,9	451,1	445,5
Unemploy	5,2	5,0	5,0	5,0

ment rate, in%				
Employed in the economy, total, thousands of people RK	8510,1	8433,3	8553,4	8585,1
Employed in the economy, total, according to the Turkestan region, thousands of people	1605,1	1362,9	1385,5	1319,0
Agriculture, RK, thousands of people	1163,2	1132,1	1147,2	1134,9
Agriculture, in the Turkestan region thousands of people	222,6	186,9	175,7	186,2

Analysis of the 1-table shows that in 2017 the labor force in the country as a whole amounted to 8,998.8 thousand people, and of them 8855.1 thousand people were employed in the economy, and compared to 2014, that is, the economically active population as a whole it was reduced by 0.47% and amounted to 99.53%.

In the agriculture of the republic, this figure amounted to 1,134,900 people in 2017, and compared to 2014, the decrease was 2.4%, and amounted to 97.6% (1-figure).

Figure 1. The distribution of labor by sector



Employed in the economy of the Turkestan region, if in 2014 there were 1605.1 thousand people, in 2017, they became less by 17.8%, and amounted to 82.2%. And this is explained by the fact that in 2017 the employed in agriculture of the Turkestan region also decreased by 16.4%, and amounted to 83.6%.

The main reasons for this situation are: remoteness of rural areas from the market of raw materials, materials, agricultural machinery and the sale of agricultural products; underdevelopment of production and social infrastructure, in this regard, limited investment opportunities to create additional jobs; lack of vacancies offered by the employment center; lack of suitable work, inadequacy of the proposed vacancies for education and qualification of the unemployed; poor adaptation of unemployed to market conditions and their transition to the informal sector of the economy.

The decline in job opportunities is due not only to these factors, but also to the limited mobility of rural residents, and sometimes to people's reluctance to take up virtually free jobs. Moreover, the lack of a sufficient number of qualified local personnel, the attraction of foreign labor and the predominance of shift work methods in the organization of production, contributed to the growth of unemployment in many rural areas of the republic. Despite the adopted Law of the Republic of Kazakhstan "On employment of the population", effective means of promoting productive employment of the population have not yet been used in the country. This explains that the official unemployment rate in the republic among the UIS countries is estimated at 7.8% of the economically active population, and the informal unemployment rate is from 12% or more, depending on the regions. The reasons for all this are slow rates of overcoming the consequences of crisis phenomena in decisive sectors of the economy, violation of the parity of prices for agricultural and industrial products, problem with supply chain management, financial instability in agricultural enterprises, low financial incentives for both workers and employers, etc. In rural areas of a number of regions of the republic, these processes became more acute, which led to the emergence of families in which there is not one employed in the sphere of socially useful labor. As a result, migration processes among rural residents, especially young people, moving to work in cities, in regions with a more developed economic structure intensified. Recently, the trend of increasing demand for the services of qualified professionals of the highest professional level has been increasingly apparent in agriculture. The analysis of the state of vocational education in the republic testifies to insufficient attention to the problem of education and human development, which negatively affected the ability of the population to adapt to the demands of the market.

The transfer of labor from public sector enterprises to non-state does not stimulate employers to train such personnel at their own expense. The outflow of skilled workers from technically equipped production to less equipped ones in itself meant a reduction in the already available skills of these workers. The existing gap in the level of wages in the sectors of the economy (in this, agriculture from industry lags 4-5 times or more) leads to a decrease in labor activity and material interest and, accordingly, a loss of incentive for the professional growth of workers. For comparison, in the 2-table, we give statistical data on the average monthly nominal wage of one employee for certain types of economic activity (table 2).

Table 2. Average monthly nominal wage of one employee by type of economic activity

	2013	2014	2015	2016
For all types of activities	109141	121021	126021	142898
Industry	138933	159839	174436	195295
Information and communication	156037	173887	180828	204192

mining and quarrying	210 404	251 686	27 5 62 4	312 572
Professional, scientific and technical activities	211 562	250 816	25 5 21 6	323 661
Agriculture, forestry and fisheries	58 304	66 483	72 50 7	81 572

Analysis of the coefficients of the multiple regression equation (2) allows us to conclude on the degree of influence of each of the three factors on the indicator of the personnel potential of the agricultural direction in the SKR. So the parameter b1 = -37.53 indicates that with an increase in the population size of the SKR by 1%, we should expect a decrease in the staff potential of the agricultural sector in the SKR by 38 people (feedback). Increasing the number of economically active population of SKR by 1% may lead to an increase in the personnel potential of the agricultural sector in the SKR by 597 people, and, finally, an increase in the number of graduates of agricultural educational institutions in the SKR by 1% will lead to an increase in the personnel potential of the agricultural sector in the SKR by 0.53%.

4. Discussion

Thus, the constructed regression model of the personnel potential of the agricultural area in the SKR (2) is suitable not only for analysis, but also for forecasting.

This state of affairs with the formation of rural labor resources at the stage of development of economic sectors contradicts the requirements of market relations conditioned by the conditions of the financial crisis in the country, when the effective employment and professionalism of the employee are put on the forefront. Negative phenomena in the formation of agrarian personnel are exacerbated by the fact that the existing system of supply chain management lags far behind the needs of agricultural production [1, 17, 18, 20]

It should be noted that global supply chains link thousands of firms across multiple political and economic boundaries. The diffusion of global supply chains in an array of different industries, including those that deal with apparel, electronics, footwear, food, toys, etc., provided developing countries with the needed investment, employment, technology, and access to international markets [6].

The shortage of skilled labor creates a situation of lack of competition for the workplace, which in turn affects the level of labor productivity, motivation to work leads to losses in production.

The increase in the prestige of agricultural labor, along with measures to increase its profitability, create favorable housing and other social conditions in rural areas, should be provided through various forms of moral encouragement [13, 23]

Thus, market relations in the agricultural sector of the Republic of Kazakhstan require a radical improvement in the reproduction of the labor force and its effective use, which refers to the totality of economic and social relations emerging in the process of realizing the demand and supply for rural labor resources. These problems are closely related to the ongoing shifts in rural employment, changes in the professional and qualification structure of the agricultural staff. In this connection, appropriate changes are needed in the system of reproduction of rural labor resources, since the current agricultural workers are not

sufficiently prepared for activities in a market economy. The personnel security of newly created, organizational, new supply chain management and legal forms, the introduction of professions and specialties of a market type complicate the existing disproportions in the emerging agrarian labor market, characterized by hidden unemployment, underdeveloped areas of employment and job cuts.

5. Conclusion

Analysis of the practice of motivating supply chain managers at Kazakh enterprises shows that widespread incentive systems are mostly borrowed from the planned economy, generate opportunistic behavior and demotivation of managerial work. Information on the size and structure of remuneration of top supply chain managers is declared a trade secret. Analysis of the practice of concluding contracts with supply chain managers shows that at the same time managers are not very interested in achieving the medium- and long-term goals of the enterprise.

Practically unclaimed are the forms of incentives for managers, practiced in developed countries of Western Europe and the United States. In the basis of the decision of questions on stimulation of work of managers at the Russian enterprises development of a policy of stimulation of work of managers lies. It must start with the philosophy of stimulating the work of managers, which includes goals, objectives, incentive principles. The philosophy of incentives for supply chain managers should be based on the mission and strategic goals of the enterprise. In the policy of stimulating labor supply chain managers should include the following main areas:

- ensuring the competitiveness of remuneration of managers' work;
- study of motives of labor managers and their accounting in the development of incentive systems for managers of the enterprise;
- the optimal combination of labor incentive components (basic salary, material and social, short-term and long-term remuneration, etc.), taking into account the motives of managers' work;
- indicators and performance standards of the enterprise, an assessment of the work of managers.

The results of this study can be used to further study the incentives for managers at Kazakh enterprises and also used in practice to analyze the incentives for supply chain managers and their impact on enterprise development.

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