

# “The efficiency of use of the human capital in the agriculture”

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## ARTICLE INFO

Viktor Bazylevych, Galyna Kupalova, Zhanna Bulhairova, Larysa Satyr and Natalia Goncharenko (2016). The efficiency of use of the human capital in the agriculture. *Problems and Perspectives in Management*, 14(4), 97-102. doi:[10.21511/ppm.14\(4\).2016.12](https://doi.org/10.21511/ppm.14(4).2016.12)

## DOI

[http://dx.doi.org/10.21511/ppm.14\(4\).2016.12](http://dx.doi.org/10.21511/ppm.14(4).2016.12)

## RELEASED ON

Wednesday, 14 December 2016

## JOURNAL

"Problems and Perspectives in Management"

## FOUNDER

LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

0



NUMBER OF FIGURES

0



NUMBER OF TABLES

0

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## The efficiency of use of the human capital in the agriculture

### Abstract

The article presents the results of theoretical review and summarizing of materials regarding the interpretation of the nature and role of human capital. It is the main strategic resource capable of solving complex problems for the country's transition to "green economy". Human capital is considered as a totality of certain personal, social, professional and business skills, as well as an important investment resource, the use of which contributes to the efficiency of production. Considerable attention is devoted to the methodological aspects of the human capital's study. Despite the importance of the problem of productive use of human capital, the relationship of quality, motivation of personnel and efficiency of its use has not been sufficiently studied, which led to the need of a more detailed study of this issue with the use of sampling, monographic studies and statistical methods for the research of stochastic relations. The study included the following stages: analysis and assessment of the level of development of the human capital of Kazakhstan compared to the developed countries, identification of factors that influence the use of this capital and calculation of strength of their relationship; formation of proposals regarding the accumulation, effective use and further development of human capital in the agricultural sector of the economy.

**Keywords:** agriculture, human capital, efficiency, Kazakhstan.

**JEL Classification:** E24, J24, M53, O15, Q13.

### Problem statement

Human capital is the main strategic resource capable of solving complex problems for the country's transition to "green economy". It is considered as a totality of certain personal, social, professional and business skills, as well as an important investment resource, the use of which contributes to the efficiency of production. Despite the importance of the problem of productive use of human capital, the relationship of quality, motivation of personnel and efficiency of its use has not been sufficiently studied, which led to the need of a more detailed study of this issue with the use of sampling, monographic studies and statistical methods for the research of stochastic relations.

### 1. Research goal

The goal of this research is to determine the main ways to increase the efficiency in the use of human capital in the agriculture of Kazakhstan. To achieve this goal, the following tasks were to be solved: to show the level of human capital development in Kazakhstan in comparison with other countries, to analyze and assess the state of human capital in

agriculture, to identify the main factors that affect the efficiency of use of human capital, to determine the strength of this influence, to develop proposals for more efficient use of human capital in the agrarian sector.

### 2. Research methodology

The hypothesis of the study was the assumption that a decisive role in achieving the efficient use of human capital in the agricultural sector belonged to qualification, financial incentives and productivity of workers. The foundations of the study's methodology were the principles of dialectical approach to the study of economic phenomena and processes. In view of this goal, the authors applied various methods and techniques on the theoretical level, for example, a systematic approach, and on the empirical level – observation, analysis, comparison and modeling. The analysis used traditional statistical, economic and mathematical methods: balance method, average values, time series, table, index, regression and correlation analysis, etc. The use of the complex system approach and the limited information caused the need for sampling, monographic and logical methods, in particular, the sociological method.

### 3. The main results of the study

Efficient use and management of human capital in agriculture are some of the basic conditions for the successful functioning of the sector and for ensuring food security of the country in general. This is due to the fact that human capital is not only a set of specific human and professional business skills, but also the main investment resource (Grishnova, 2014). Human capital is formed as a result of investments in human resources, which includes

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education, training at the workplace, health costs, migration and the search for information on prices and revenues (Becker, 2003), that is, it consists of the valuable qualities acquired by the person that can be strengthened by appropriate investments (Schultz, 1958) and which is also a source of innovation – an important component of socio-economic and political transformations.

Over time, researchers have expanded the interpretation of human capital due to the social and psychological characteristics, which include personal qualities, moral values, objectives, worldviews, and others. Thus, according to I. Soboleva, A. Bovenberg (Bovenberg, 2008) and N. Rimashevskaya, human capital is a set of personal qualities, worldview and values, which may have an indirect effect on the result of productive activity.

While endorsing the above interpretations in general, at the same time, we should point out their diversity, the lack of common vision, which complicate the quantitative measurement of human capital. Therefore, we prefer the definition of human capital as a combination of personal qualities and human skills of an individual that in case of their implementation can bring benefits: human capital – the skills, capacities and abilities possessed by an individual which permit him to earn income (The Penguin Dictionary of Economics, 2004).

This definition of the essence of human capital makes it possible to develop methodological approaches to its accounting, control, analysis, valuation, the level of use and management. We have also made it the foundation of our factor analysis for the efficiency of use of the human capital in agriculture, where the amount of income per one average annual worker of the agricultural enterprise serves the role of performance indicator.

In agriculture, human capital has become an important aspect of improving the results of management and organization of production factors such as land and capital (Nowak, 2014). Considering the role of human capital in the development of Kazakhstan's economy, researchers believe it to be the main wealth of the nation (Mukhamedzhanova, 2002). The role of human capital increases in connection with the entry of Kazakhstan into the World Trade Organization in 2015, implementation of the country's transition to the Concept of "green economy" with higher standards of living and careful use of natural resources, which is accompanied by the modernization of production, labor and land relations. By 2050, due to the changes within the "green economy" in the country, it is planned to further increase GDP by 3%, to create more than 500

thousand new jobs, to form new industries and services, to provide universally high living standards for the population (The concept of the transition of the Republic of Kazakhstan to the "green economy", 2013). The task was set to actively develop international trade, especially of agricultural producers, in order for Kazakhstan to become one of the 30 most competitive countries of the world.

Kazakhstan is among the group of countries with low levels of human capital development. In 2014, according to the UN data and to the index of human capital development, the country occupied the 56th place in the ranking among 143 countries of the world. However, compared with other countries of the former Soviet Union (except for the Baltic States, Belarus and Russia), the indicators of Kazakhstan are much better (Table 1).

Table. 1. Index of human capital development in 2014 by country

Country	HDI	HDI rank	Country	HDI	HDI rank
Very high human development			High human development		
Norway	0.944	1	Belarus	0.798	50
Australia	0.935	2	Russian Federation	0.798	51
Switzerland	0.930	3	Kazakhstan	0.788	56
Denmark	0.923	4	Georgia	0.754	76
Netherlands	0.922	5	Azerbaijan	0.751	78
Germany	0.916	6	Ukraine	0.747	82
Ireland	0.916	7	Armenia	0.733	86
United States	0.915	8	Medium human development		
Canada	0.913	9	Moldova (Republic of)	0.693	107
New Zealand	0.913	10	Turkmenistan	0.688	109
Estonia	0.861	30	Uzbekistan	0.675	114
Lithuania	0.839	37	Kyrgyzstan	0.655	120
Latvia	0.819	46	Tajikistan	0.624	129

Source: compiled by the authors (UN Data, 2014).

A significant part of the human capital in Kazakhstan is concentrated in agriculture, the basis for the formation of which is the rural population. In the recent years in Kazakhstan, with a slight increase in the rural population, there is a tendency of reduction of its share towards an increase in the share of the urban population. Thus, in 2014, compared with the year 2010, the number of rural residents increased from 7383.6 to 7727.3 thousand people, or by 343.72 thousand people (4.65%). At the same time, its share in the total population decreased from 45.6% to 45.0% (0.6 percentage points), while the share of the urban population, respectively, increased from 54.4% to 55.0%. This is primarily caused by low wages, elimination of agricultural enterprises, job cuts, unemployment and migration of rural residents of the working age to the cities. This negative phenomenon leads to the narrowing of the natural base of human capital in the agrarian sector.

Agriculture has large untapped reserves. It is also a priority sector for the development of the country's economy. It plays a key role in solving the problems of employment, income, preservation of human capital, rural society, food and national security. In spite of the fact that in 2014, only 4.4% of the GDP was produced in the agricultural sector, it employed 1605.1 thousand people, or 18.9% of the total number of people employed in the economy, including hired workers – 460.5 thousand people (7.6% of the total number in the economy) and self-employed – 1379.1 thousand people (59.9%). The bulk of the working population is concentrated in the sector of small households. It produces 46% of agricultural products, including over 70% of livestock farming.

In the recent years, there is a decrease in the number of people employed in the agricultural sector. In the period 2010-2014, dropping out from agriculture were 689.8 thousand people or 30.1%, that is, an annual reduction reached 172.5 thousand people or 7.5%. Overall, the share of people employed in agriculture in the total working population declined from 28.3% in 2010 to 18.9% in 2014 (Table 2).

Table 2. Dynamics of the number and share of the population employed in agriculture, forestry, hunting and fishing in 2010-2014

Country	2010	2011	2012	2013	2014
Great Britain					
Thousand people	366.0	356.0	316.0	322.0	375.0
%	1.3	1.2	1.1	1.1	1.2
USA					
Thousand people	2206.0	2254.0	2186.0	2130.0	2237.0
%	1.6	1.6	1.5	1.5	1.5
Germany					
Thousand people	656.3	665.1	673.0	634.9	640.6
%	1.6	1.6	1.6	1.5	1.6
Bulgaria					
Thousand people	65.5	68.3	68.9	70.2	70.9
%	2.1	2.3	2.4	2.4	2.4
Russia					
Thousand people	6622.0	6565.0	6467.0	6364.0	6247.0
%	9.8	9.7	9.5	9.4	9.2
Belarus					
Thousand people	488.8	484.1	460	441.6	430.7
%	10.4	10.3	10.0	9.6	9.6
Poland					
Thousand people	1984.0	1981.2	1965.6	1872.0	2384.9
%	12.8	12.7	12.6	12.0	16.3
Ukraine					
Thousand people	3115.6	3410.3	3308.5	3389.0	3091.4
%	15.4	16.8	17.2	17.5	17.1
France					
Thousand people	745.3	748.2	745.3	796.7	748.2
%	2.9	2.9	2.9	3.1	2.9

Kazakhstan					
Thousand people	2294.9	2196.1	2172.7	2073.6	1605.1
%	28.3	26.5	25.5	24.2	18.9
Moldova					
Thousand people	302.5	328.8	290.4	345.6	361.0
%	27.5	27.4	26.4	28.8	30.4
Armenia					
Thousand people	466.8	466.8	447.6	435.6	394.8
%	38.9	38.9	37.3	36.3	34.8

Source: Compiled by the authors (The official website of the State Statistics Service of Ukraine, Demographic Yearbook of Kazakhstan, Statistical Yearbook of Kazakhstan, Statistical Yearbook of Russia, The official website of the Federal Statistical Office of Germany, The official website for the UK Office for National Statistics, 2015).

The qualitative aspect of human capital characterizes the age of employees. The results of the study of the population engaged in agriculture, forestry, hunting and fishing in Kazakhstan, are evidence of the favorable age structure and composition. Thus, in 2014, among 1605.1 thousand workers, there were 1370.0 thousand people, or 85.3%, aged 15-54. However, one must take into account the tendency towards reduction in the number and share of this group in 2010-2014 – by 630 thousand people (1.8 percentage points), that is, the annual reduction averaged 157.5 thousand people or 7.9%. If this tendency continues, in the future, we might have a disproportion of employees according to their age and an increase in the pension burden on them.

The reduction in the number of population employed in agriculture is a natural process, which is caused by transition to the innovative path of development. Under these conditions, the role of educational and qualification component of human resources in the agrarian sector is the formation of such employees who have the necessary knowledge and skills in the technical, agronomic and economic fields. In the agrarian sector, there is an acute need in skilled and competitive personnel. In 2014, the sector was dominated by workers with basic, secondary, general and primary education. Their number amounted to 96.9 thousand people or 60.17%. At the same time, the number of people with higher and incomplete higher education was only 194.1 thousand or 12.1%. For comparison, in the industry and in the retail and wholesale trade sectors, the share of employees with higher and incomplete higher education was 2-fold higher than in agriculture.

In recent years, the agrarian sector has had a negative trend of reduction in the number of employees with higher and incomplete higher education, for example, in the period 2010-2014 –

by 35.9 thousand people with some increase in their share (2.1 percentage points) due to more intensive reduction of the total number of people working on the surveyed farms. The most problematic issue is educational and professional level of executives and specialists of agricultural enterprises, in which only half of them have a complete higher education. Given this, the farms are actively engaged in the training and skills development of personnel. There is a positive trend of expansion in the volume of such training by involving both employers and employees. Thus, if in 2010 only 87948 agricultural employees in Kazakhstan were trained and retrained, then, in 2014 – 120640 employees, which means 32692 employees or 37.2% more. Most of the employees are trained and retrained at the workplace (over 77%) at the expense of employers, other enterprises and institutions. For example, in 2014, 106320 employees (88.1%) were trained entirely at the expense of employers, 10228 employees (8.5%) trained with partial payment and 4092 employees (3.4%) trained at the own expense (Statistical indicators measure decent work in the Republic of Kazakhstan, 2010-2014).

On the whole, we believe that the current level of human capital development in agriculture is insufficient for a successful market economy, its

integration into the world economy and for the implementation of the Program for the Development of Agro-industrial Complex of the Republic of Kazakhstan for 2013-2020 “Agribusiness-2020”, which plans to increase the volume of production by 1.5 times and the level of labor productivity in agriculture by 3 times (the Program for the Development of Agro-industrial Complex of the Republic of Kazakhstan for 2013-2020 “Agribusiness-2020”, 2014).

In spite of the importance and the urgent need to address the problem of productive use of the human capital, the methodical basis of the research of interrelation between the quality of personnel and the efficiency of its use is insufficiently developed. This explains the need for more detailed investigation. According to our assumptions and observations, the effectiveness of the use of human capital is influenced by a number of factors, the most important of which are the professional level, wages and labor productivity of employees. In order to confirm this hypothesis, we have conducted clusterization and correlation and regression analysis based on the data of sampling observations of agricultural enterprises in the Akmola region of the Republic of Kazakhstan in the period 2010-2015 (Table 3).

Table 3. Dependence of skills and the efficiency of workers' use in the agricultural enterprises of the Akmola region of Kazakhstan, 2010-2015

Indicator	Groups of companies according to the share of highly skilled workers, %			Average (Total)	Relationship of indicators of group III to group I, %
	I	II	III		
	To 4.5	4.5-5.9	More than 5.9		
The share of highly skilled workers, %	3.5	5.3	6.7	5.2	191.4
Number of enterprises, units	11	8	8	27	130.7
The average annual labor productivity, thousand tenge (thousand dollars)	134.5 (0.81)	192.4 (1.10)	226.1 (1.25)	190.3 (1.05)	168.1 (154.3)
The average annual wage per worker, thousand tenge (thousand dollars)	245.9 (1.50)	380.7 (2.48)	561.6 (3.02)	419.5 (2.33)	228.4 (201.3)
The average wage of one man-hour, tenge (dollars)	151.54 (0.90)	195.0 (1.28)	322.1 (1.74)	233.7 (1.30)	212.6 (193.3)
The average annual income per worker, thousand tenge (thousand dollars)	291.3 (1.55)	1705.5 (12.16)	5007.4 (27.10)	2620.4 (13.60)	17 times higher

Source: compiled by the authors according to the data of sampling observations of agricultural enterprises in the Burabay, Tselinograd and Shortandin districts of the Akmola region.

As we see, there is a clear relationship between the proportion of highly skilled workers, efficiency of their use, productivity and wages. Thus, in the third group of enterprises with the biggest proportion of highly trained specialists (6.7%) in comparison with the first group, in which the number of such specialists is almost 2 times less (an average of 3.5%), the average annual labor productivity was 1.68 times, the wage of one worker – 2.28 times, the payment of one man-hour – 2.13 times higher and the income per worker was 17 times higher.

In order to study the impact of individual factors on the efficiency of workers, we use the regression analysis made on the basis of materials of sampling observations of agricultural enterprises in the Burabay, Tselinograd and Shortandin districts of the Akmola region. As a result of identification of the factors, our multi-factor regression model includes the following indicators: performance indicator  $Y$  – average revenue of an enterprise from the realization of products and services per 1 employee, thousand tenge; factorial signs:  $X_1$  – average annual

wage per worker, thousand tenge;  $X_2$  – average annual labor productivity per worker, thousand tenge;  $X_3$  – the share of highly skilled workers in the total number of employees of the agricultural enterprise, %.

According to the results of the regression analysis, we obtain the following multiple regression equation:

$$Y_{X_1, X_2, X_3} = -4699.22 + 3.89x_1 + 5.28x_2 + 903.7x_3.$$

Therefore, it is evident that there is a direct relation between the indicator of average annual income calculated per one employee, which characterizes the efficiency of labor use (performance indicator), wages, labor productivity and the availability of highly qualified personnel (factors). With an increase in the average worker's wage by one thousand tenge, his average annual income increases by 3.89 thousand tenge (or 22.9 US dollars) at a fixed value of other factors included in the model. Similarly, with an increase in the average annual labor productivity by one thousand tenge, the income increases by 5.28 thousand tenge (or 31.1 US dollars). An increase in the share of highly skilled workers by 1% is accompanied by the highest income growth – on average by 903.7 thousand tenge (or 5.3 thousand dollars). The significance of impact of these factors on the performance indicator is confirmed by the *t*-test.

The results of regression analysis make it possible to identify the existing potential reserves for increasing the efficiency of the human capital use at economically weak agricultural enterprises. For example, in the first group of companies (with the share of over 40% of the total number) with an average annual income per employee of 291.3 thousand tenge (or 1.7 US dollars), an increase in the proportion of highly qualified personnel to the average level for all enterprises (with 3.5% to 5.2%) will make it possible to raise the income to 1666.7 thousand tenge (or 9.8 thousand dollars). An increase in the average annual wage up to the medium level (up to 419.5 thousand tenge against 245.9 thousand tenge) will raise the revenue per one worker in the amount of 805.7 thousand tenge (or 4.7 thousand dollars). Similarly, the achievement of a medium employee productivity level for the surveyed agricultural enterprises (190.3 versus 134.5 thousand tenge) can increase revenue up to 425.1 thousand tenge (or 2.5 thousand dollars). Therefore, the results of the regression analysis should be used to substantiate the projected, predicted and expected indicators for the efficiency of the human capital use in agriculture.

To evaluate the tightness (density) of relationship between the performance indicator and the totality of factors, we have calculated the multiple

correlation coefficient ( $R = 0.918$ ) and the multiple coefficient of determination ( $R^2 = 0.843$ ). Consequently, there is a very strong and substantial relationship between the studied characteristics, since the actual value of the multiple correlation coefficient (0.918) exceeds its critical value (0.3-0.4) for the level of significance of 0.05 (the level of probability 0.95) and, respectively, (0.4-0.5) for the level of significance of 0.01 (the level of probability 0.99). Variation of the size of the average annual income of the enterprise per employee by 84.3% is related to the factors included in the model. Other possible factors account for 15.7% of the performance indicator's variations.

It was established that there is a direct strong relationship between the size of the average annual income of the enterprise per employee and the share of highly qualified personnel, which, in comparison with other factors, has the biggest impact on the efficiency of the human capital use ( $r_3 = 0.860$ ). The second most important factor according to its importance and impact is the average annual wage of an employee ( $r_1 = 0.807$  – strong direct relationship). Labor productivity also has a significant influence ( $r_2 = 0.628$  – considerable closeness of the relationship). Consideration of the obtained results in the formation of personnel policy and motivational mechanisms for employees will be conducive for more efficient use of human capital at agricultural enterprises. Particular attention should be paid to the development and implementation of measures aimed at improving productivity and stimulating labor of agricultural workers, creating for them favorable working, social, housing and communal conditions. The correctness of this approach is confirmed by the results of the sociological survey of more than 70 4th year students of S.Seifullin Kazakh Agro Technical University conducted by the authors in 2015. The survey has shown that after graduation 60% of the graduates do not plan to work in rural areas in their specialty fields. The main reasons for this decision are: low salaries (19.1% of responses), difficult working conditions (13.5%), poor social infrastructure (13%), lack of career opportunities (12.6%) and conditions for professional growth (9.4%), nonprestigious labor in agriculture (9.3%), low levels of leisure activities and cultural events (8.6%), low levels of health and education (6.5%).

## Conclusion

Taking into account the implementation of the plans for modernization, restructuring and integration of the economy of Kazakhstan into the world economy and the experience of developed countries, we expect a further reduction in the number and proportion of people working in agriculture.

The government, rural communities and agrarian producers must be prepared for this and develop measures to create jobs and ensure compensations for redundant workers.

To increase the quality and efficiency of the human capital use at agricultural enterprises, it is necessary to implement a series of organizational and socio-economic measures aimed at enhancing the prestige of agricultural labor: to increase investment in education, professional training and agricultural research for the realization of human abilities, to enhance people's participation in the production

process and the distribution of benefits; to reform the system of vocational and further training, to develop motivation for self-education; to increase wages by means of a monthly surcharge to the basic wage rates for young and highly qualified agricultural specialists who have scarce jobs; to develop a contract form of targeted training of qualified personnel at the request of agricultural enterprises; to form a state program of training, retraining and advanced training of personnel on the basis of agricultural universities; to provide market access to scientific, educational, advisory and information programs; to regulate labor migration.

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