Development of a Model of the Development Level of Computer Literacy of Employees of Agro-industrial Complex of Kazakhstan

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Abstract—**The level of computer literacy of workers in the agro-industrial complex of Kazakhstan is considered. The author emphasizes that in modern conditions, one of the main tasks of the priority development of the agro-industrial complex of the country and regions to address food issues and the need to increase competitiveness is the intensification of agro-industrial production. Automation, complex mechanization and the development of information technologies that allow each unit of resources used to get a greater number and variety of high-quality food products-this is the most effective way to develop the agro-industrial complex.The global trend in the development of a socio-economic indicator that determines the prospects for digitalization of the agro-industrial complex is being studied. The direction of research of this indicator is aimed at developing a competitive agricultural economy and improving the quality of agricultural products. The results obtained represent a mathematically sound scientific judgment that expresses the future state of the studied indicator. Calculated calculations are based on the algorithm for finding estimates of the coefficients of the regression equation. Methods of statistical analysis of the obtained regression equation are applied. The mathematical analysis of calculations of possible trajectories of development of the factor attribute for the mid-term period of the lead is carried out. The overall quality of the multiple regression equation is checked.**

Keywords—modeling, factors, digital technologies, government support, digitalization of the economy, factor variables, coefficient, model equation.

I. INTRODUCTION

Over the past years, international experts have been actively talking about the digitalization of the economy and the socio-social way of life of the population of many countries of the world. We talked about it as a trend that changes the usual business models, and as a philosophical concept that everyone perceives in their own way.

For the period of the current time, humanity is faced with a new reality. Around the world, most industries and private businesses are switching to remote work [1].

In modern conditions, one of the main tasks of priority development of the agro-industrial complex of the country and regions to address food issues and the need to increase competitiveness is the intensification of agro-industrial production. Automation, complex mechanization and development of information technologies that allow each unit of resources used to get a greater number and variety of high-quality food products-this is the most effective way to develop the agro-industrial complex.

The innovative development of the agro-industrial complex is slowing down, among other things, due to the low level of technological equipment, which is largely determined by the technical and technological level of the industry and the lack of qualified personnel. While the world and European experience in agricultural work is already directly related to information technologies, this area is still practically undiscovered in Russia. A few decades ago, the goal was not to achieve high performance at minimal cost, but to provide employment for the country's population. Now it's a market economy. Priorities have changed in the direction of improving the efficiency of the agricultural sector. And we can say that a technological revolution is currently taking place in Russian agriculture.

Information technology is an important resource for influencing the NCD system- 2 cost-effective, sustainable production of food and raw materials for industry, improving the quality and safety of food, reducing the anthropogenic load on the environment, reducing losses in the production of agricultural products, according to expert estimates, the overall level of Informatization of agricultural enterprises in modern conditions is insufficient, which is explained by the following reasons: low efficiency of economic entities in the conditions of insufficient and state influence on the processes of formation of the material and technical base and the organizational and economic situation of system Informatization; lack of a developed infrastructure for Informatization of the domestic agro-industrial complex; low interest of economic entities in the development of information systems and the use of its products due to insufficient incentives for the production of information technology systems.

This is confirmed by the degree of use of information technologies, which largely depends on the size of enterprises. So, as of 2019, in the country's agricultural sector, the use of information technologies is carried out only on 10 % of agricultural enterprises, mainly large ones, whose land area is more than 20 thousand hectares.

The agro-industrial complex of the Republic of Kazakhstan is on the threshold of a new stage, which should ensure the effective development of the country's economy in market conditions and the global system of trade in food and agricultural products.

And further economic transformations in agriculture require a transition to a new quality of growth in the agricultural sector, associated with the formation of a rational structure of agribusiness, an increase in the level of agricultural technologies, a transition to a marketing strategy for agricultural production, import substitution in the domestic market, and increased exports to countries near and far abroad.

Today, it is becoming more and more obvious that there is a high demand for expanding opportunities for using the global information field, including services for providing complete and reliable information about the activities of economic sectors from not only business structures and state institutions, but also the majority of the economically active population of the country.

Informatization of the agro-industrial complex is a strategic task for the development of agricultural production and its innovative development.

Automation tools create the necessary material and technical base that can influence the dissemination of knowledge through electronic recording and General automation of information processes.

The main modern trends in the development of information technologies in agriculture are precision farming, geoinformation and intelligent agricultural monitoring systems, and decision support systems [4].

In the current conditions in the Republic of Kazakhstan, the provision of services in electronic format, including in the agricultural sector of the economy, is becoming more relevant and urgently needed.

Today, the population of the country has a potentially high level of training and qualifications to receive services and conduct business in electronic format. So, as of the end of 2019, the share of PC users aged 6-74 years increased to 82.2% (a year earlier-80.3%), and the share of Internet users increased to 84.2% (a year earlier — 81.3%).

In General, today more than 82% of public services are automated, and by the end of 2020 it is planned to increase this figure to 90%. Kazakhstanis can get public services online through the e-government portal, the mGov mobile app, and the Telegram bot. In offline mode, you can contact one of the front offices of the state Corporation "Government for citizens".

Over the five months of this year, about 16 million public services were provided on the e-government portal of the Republic of Kazakhstan. Of these, the largest number fell on the registration of social payments to participants of the mandatory social insurance system for the period of the state of emergency — 8.1 million services.

It is worth noting that in the global rating of e-government development, which is formed by the UN, Kazakhstan rose to 29th place among 190 countries (a year earlier-39th place). When compiling the current rating (2020), the work carried out by States in 2018-2019 was evaluated. Directly among the CIS countries, Kazakhstan took 1st place. Below them are Russia (36th place), Belarus (40th), Moldova (79th), Ukraine (69th), Uzbekistan (87th) and others.

Denmark, South Korea and Estonia are among the three world leaders in e-government development. Finland and Australia complete the TOP 5 countries [2].

II. PURPOSE OF WORK

We will develop a mathematical scenario the dynamics of the indicator of computer literacy of employees of AIC of Kazakhstan is made on the basis included in the multivariate model of estimated figures of investment income of the industry benchmarks in the fixed capital of the enterprises, and also indicators of the state program "Information Kazakhstan".

III. MAIN RESULTS

Quantitative analysis of forecasting is carried out on the basis of a formalized econometric method, which uses the actual available information material. The model obtained with the help of regression analysis makes it possible to predict the development of economic processes and phenomena, to study trends in economic indicators, i.e. it serves as a tool for scientifically based predictions [3].

Note-Compiled by the author based on the source: data of the statistics Committee of the Ministry of national economy of the Republic of Kazakhstan www.stat.gov.kz

When studying the patterns of development of socio-economic processes, the revealed links between socio-economic factors that develop over time and the related analysis of dynamics are of great importance. For this purpose, multi-factor models of interrelated time series are constructed [4,5]. We will develop a multiple regression equation in which the General solution can have the following form:

$$Y1 = a_0x_0 + a_1x_1 + a_2x_2 + \ldots + a_mx_m \qquad (1)$$

where Y_l is the simulated indicator of the l^{zo} year ;

x_i – factors that affect this indicator, $i = \overline{0, m}$

a_i-model parameters,

6	435280	193,1	458,5
435280	34072143550	13583999,3	32672900,6
193,1	13583999,3	6321,35	14894,52
458,5	32672900,6	14894,52	35295,53

$i = \overline{0, m}$; m – the number of factor features.

As the research described in the works of many domestic and foreign authors [1, 2, 3] shows, the results of forecasts for the model based on the dynamics series are quite satisfactory.

The algorithm for finding estimates of the coefficients of the regression equation requires preliminary verification of a number of prerequisites of the least squares method (MNC):

1. Find mathematical expectation of random deviations ei, which must be 0 for all observations (M(ei) = 0).

2. Investigate the constancy of the variances of the deviations ei , which must be a constant: $D(\varepsilon_i) = D(\varepsilon_j) = S2$ for any i and j.

3. Avoid the presence of autocorrelation.

4. the Calculated value of the random deviation must be independent of the explanatory variables.

5. The resulting model is linear with respect to the parameters.

6. The calculated errors ei must have a normal distribution, i.e. the feasibility of this assumption is important for constructing confidence intervals and testing statistical hypotheses.

To calculate estimates of the parameters of the multiple regression equation, we use the MNC.

Calculate the vector of estimates of regression coefficients, according to the MNC, the vector s gets expressions: $s = (X^T X)^{-1} X^T Y$

Consider TABLE I, which presents a multiple regression matrix. Add a single column to the matrix with variables Xj.

TABLE I. MULTIPLE REGRESSION MATRIX

1	107222	26,4	64,1
1	90788	27,1	74,2
1	47241	35,5	76,2
1	57941	31,4	78,2
1	69256	35,6	80,2
1	62832	37,1	85,6

Performing the transposition of the matrix X^T, the calculation data is presented in TABLE II.

TABLE II. TRANSPOSED MATRIX

1	1	1	1	1	1
107222	90788	47241	57941	69256	62832
26,4	27,1	35,5	31,4	35,6	37,1
64,1	74,2	76,2	78,2	80,2	85,6

Performing the matrix multiplication operation $(X^T X)$, the calculation data is presented in TABLE III

TABLE III. RESULTS OF MATRIX MULTIPLICATION CALCULATIONS

In the calculated matrix $(X^T X)$, the number at the intersection of the 1st column and the 1st row is obtained as the sum of the products of the elements of the row of the matrix X^T and the column of the matrix X.

As a result, we get a regression equation of the following form:

$$Y = 9{,}3423 + 8{,}0E\text{-}6\ X_1 - 0{,}7028\ X_2 + 0{,}4188\ X_3$$

Then, using the matrix of paired correlation coefficients R, we evaluate the relationship between the series of values. We have the number of independent variables in the model equal to 3, the number of observations n = 6, and the number of regressors taking into account the unit vector is equal to the number of unknown coefficients. Taking into account the calculated attribute Y, the dimension of the matrix becomes 5. the Matrix of independent variables X has dimension (6 x 5). Thus, we get the calculated matrices:

A matrix made up of Y and X; - Transposed matrix; - $X^T X$ matrix.

The resulting matrix will have the following correspondence, TABLE IV.

TABLE IV. THE CALCULATION OF GRID VALUES

$\sum n$	$\sum y$	$\sum x_1$	$\sum x_2$	$\sum x_3$
$\sum y$	$\sum y^2$	$\sum x_1 y$	$\sum x_2 y$	$\sum x_3 y$
$\sum x_1$	$\sum y x_1$	$\sum x_1{}^2$	$\sum x_2 x_1$	$\sum x_3 x_1$
$\sum x_2$	$\sum y x_2$	$\sum x_1 x_2$	$\sum x_2{}^2$	$\sum x_3 x_2$
$\sum x_3$	$\sum y x_3$	$\sum x_1 x_3$	$\sum x_2 x_3$	$\sum x_3{}^2$

Find the paired correlation coefficients:

$$rxy = \frac{\overline{x \cdot y} - \overline{x} \cdot \overline{y}}{s(x) \cdot s(y)} \qquad (2)$$

$$r_{yx_1} = \frac{1413977 - 72546{,}667 \cdot 19{,}325}{20388{,}03 \cdot 1{,}741} = 0{,}338$$

$$r_{yx_2} = \frac{618{,}521 - 32{,}183 \cdot 19{,}325}{4{,}218 \cdot 1{,}741} = -0{,}466$$

$$r_{yx_3} = \frac{1477{,}767 - 76{,}417 \cdot 19{,}325}{6{,}564 \cdot 1{,}741} = 0{,}0888$$

$$r_{x_1 x_2} = \frac{2263999{,}883 - 32{,}183 \cdot 72546{,}667}{4{,}218 \cdot 20388{,}03} = -0{,}823$$

$$r_{x_1 x_3} = \frac{5445483,433 - 76,417 \cdot 72546,667}{6,564 \cdot 20388,03} = -0,735$$

$$r_{x_2 x_3} = \frac{2482,42 - 76,417 \cdot 32,183}{6,564 \cdot 4,218} = 0,834$$

TABLE V shows the paired correlation coefficients.

TABLE V. PAIRED CORRELATION COEFFICIENTS

Signs x и y	$\sum x_i$	$\overline{x} = \frac{\sum x_i}{n}$	$\sum y_i$	$\overline{y} = \frac{\sum y_i}{n}$	$\sum x_i \cdot y_i$	$\overline{xy} = \frac{\sum xy}{n}$
Для у и x_1	435280	72546,667	115,95	19,325	8483862	1413977
Для у и x_2	193,1	32,183	115,95	19,325	3711,125	618,521
Для у и x_3	458,5	76,417	115,95	19,325	8866,6	1477,767
Для x_1 и x_2	193,1	32,183	435280	72546,667	13583999,3	2263999,883
Для x_1 и x_3	458,5	76,417	435280	72546,667	32672900,6	5445483,433
Для x_2 и x_3	458,5	76,417	193,1	32,183	14894,52	2482,42

We calculate the variance and standard deviations, TABLE VI.

TABLE VI. CALCULATION OF VARIANCE AND STANDARD DEVIATIONS

Signs x и y	$D(x) = \frac{\sum x_i^2}{n} - \overline{x}^2$	$D(y) = \frac{\sum y_i^2}{n} - \overline{y}^2$	$s(x) = \sqrt{D(x)}$	$s(y) = \sqrt{D(y)}$
Для у и x_1	415671747,22	3,03	20388,03	1,741
Для у и x_2	17,791	3,03	4,218	1,741
Для у и x_3	43,081	3,03	6,564	1,741
Для x_1 и x_2	17,791	415671747,2	4,218	20388,0
Для x_1 и x_3	43,081	415671747,2	6,564	20388,0
Для x_2 и x_3	43,081	17,791	6,564	4,218

We get a matrix of paired correlation coefficients R of the following form. The calculation data is presented in TABLE VII.

TABLE VII. MATRIX OF PAIRED CORRELATION COEFFICIENTS R

-	y	x_1	x_2	x_3
y	1	0,3385	-0,4661	0,0888
x_1	0,3385	1	-0,8232	-0,7345
x_2	-0,4661	-0,8232	1	0,8335
x_3	0,0888	-0,7345	0,8335	1
-	y	x_1	x_2	x_3

Find the partial correlation coefficients. The partial correlation coefficient differs from the simple linear pair correlation coefficient in that it evaluates the pair correlation of the corresponding factor features (y and xi), provided that the influence of all other features (xj) on them is eliminated.

The obtained partial coefficients allow us to conclude that the inclusion of variables in the resulting regression model is justified. If the coefficient estimate is too small or has an insignificant value, it follows that the relationship between the factor attribute and the resulting calculated variable is either completely absent or very weak, and therefore this factor can be excluded from the model.

$r_{yx_1/x_2} = \frac{0,338-(-0,466)(-0,823)}{\sqrt{(1-0,466^2)(1-0,823^2)}} = -0,09$, that is, the tightness of communication is low.

$r_{yx_1/x_3} = \frac{0,338-0,0888\times(-0,735)}{\sqrt{(1-0,0888^2)\times(1-0,735^2)}} = 0,597$, that is, the tightness of communication is moderate.

$r_{yx_2/x_1} = \frac{-0,466-0,338\times(-0,823)}{\sqrt{(1-0,338^2)\times(1-0,823^2)}} = -0,351$, that is, the tightness of the connection is not strong

$r_{yx_2/x_3} = \frac{-0,466-0,0888\times0,834}{\sqrt{(1-0,0888^2)\times(1-0,834^2)}} = -0,982$, that is, the tightness of the connection is strong

$r_{yx_3/x_1} = \frac{0,0888-0,338\times(-0,735)}{\sqrt{(1-0,338^2)\times(1-0,735^2)}} = 0,528$, that is, the tightness of communication is moderate.

$r_{yx_3/x_2} = \frac{0,0888-(-0,466)\times0,834}{\sqrt{(1-0,466^2)\times(1-0,834^2)}} = 0,977$, that is, the tightness of the connection is strong

$$r_{x_1 x_2/y} = \frac{r_{x_1 x_2} - r_{x_1 y} \times r_{x_2 y}}{\sqrt{(1-r_{x_1 y}^2)(1-r_{x_2 y}^2)}} \tag{3}$$

$r_{x_1 x_2/y} = \frac{-0,823-0,338(-0,466)}{\sqrt{(1-0,338^2)(1-0,466^2)}} = -0,799$, that is, the tightness of the connection is strong

$r_{x_1 x_2/x_3} = \frac{-0,823-(-0,735)0,834}{\sqrt{(1-0,735^2)(1-0,834^2)}} = -0,563$, that is, the tightness of communication is moderate.

$$r_{x_1 x_3/y} = \frac{r_{x_1 x_3} - r_{x_1 y} r_{x_3 y}}{\sqrt{(1-r_{x_1 y}^2)(1-r_{x_3 y}^2)}} \tag{4}$$

$r_{x_1 x_3/y} = \frac{-0,735-0,3380,0888}{\sqrt{(1-0,338^2)(1-0,0888^2)}} = -0,816$, that is, the tightness of the connection is strong.

$r_{x_1 x_3/x_2} = \frac{-0,735-(-0,823)0,834}{\sqrt{(1-0,823^2)(1-0,834^2)}} = 0,154$, that is, the correlation is low, and cross-factor relationship is weak.

$$r_{x_2 x_3/y} = \frac{r_{x_2 x_3} - r_{x_2 y} r_{x_3 y}}{\sqrt{(1-r_{x_2 y}^2)(1-r_{x_3 y}^2)}} \tag{5}$$

$r_{x_2 x_3/y} = \frac{0,834-(-0,466)0,0888}{\sqrt{(1-0,466^2)(1-0,0888^2)}} = 0,993$, that is, the tightness of the connection is strong.

$r_{x_2 x_3/x_1} = \frac{0,834-(-0,823)(-0,735)}{\sqrt{(1-0,823^2)(1-0,735^2)}} = 0,594$, that is, the tightness of communication is moderate.

Let's proceed to the statistical analysis of the obtained regression equation, i.e. checking the significance of the equation and its coefficients, and investigating absolute and relative approximation errors [6,7].

For an unbiased estimate of the variance, we perform the following calculations: Unbiased error ε = Y - Y(x) = Y - X*s (absolute approximation error).

Calculate the average approximation error. To do this, multiply the resulting matrix by X_0 and find $V = 85,47$.

$$S_y = S\sqrt{V} = 0,55\sqrt{85,47} = 5,09$$

For the value of the effective attribute $M(Y)$, we obtain the following confidence intervals with a probability of 0.95:

$$(Y - t \cdot S_y; Y + t \cdot S_y)$$

where $t(6-3-1;0,05/2) = 6,205$ we find the student's table.

$$(9,34 - 6,205 \times 5,09 ; 9,34 + 6,205 \times 5,09)$$

$$(-22,24;40,92)$$

The average value of Y for X_{0i} is within the specified limits with a probability of 0.95. For the individual value of the effective feature confidence intervals with a probability of 0.95 are obtained using the following calculation formula:

$$S_y = S\sqrt{1 + V} = 0,55\sqrt{1 + 85,47} = 5,12$$

$$(9,34 - 6,205 \times 5,12 ; 9,34 + 6,205 \times 5,12)$$

$$(-22,43;41,11)$$

The individual value of Y at X_{0i} is also within the specified limits with a probability of 0.95.

We perform a check on the significance of the parameters of the obtained multiple regression equation, i.e. we check the hypothesis put forward regarding the coefficients of the regression equation [8].

The calculated value of the number $V=n-m-1$ determines the so-called number of degrees of freedom. It is generally assumed that during the evaluation of the multiple linear regression equation, to ensure statistical reliability, it is recommended that the total number of observations made should be at least 3 times higher than the number of estimated parameters.

The resulting t-statistics: Ttabl $(n-m-1;\alpha/2) = (2;0,025) = 6,205$

$$t_i = \frac{b_i}{s_{b_i}} \qquad (6)$$

$$t_0 = \frac{9,342}{5,088} = 1,836 < 6,205$$

$$t_1 = \frac{8,0E - 6}{2,0E - 5} \leq 6,205$$

$$t_2 = \frac{-0,703}{0,117} = 6,025 < 6,205$$

$$t_3 = \frac{0,419}{0,0627} = 6,678 > 6,205$$

However, the statistical significance of the regression coefficient b_0, b_1 and b_2 is not confirmed, while the coefficient b_3 is confirmed. We will determine the confidence intervals of the regression coefficients, which with a reliability of 95% will be as follows:

$$(b_i - t_i \times S_{bi}; b_i + t_i \times S_{bi})$$

b_0: $(9,342 - 6,205 \times 5,088 ; 9,342 + 6,205 \cdot 5,088) = (-22,23;40,915)$

b_1: $(8,0E-6 - 6,205 \cdot 2,0E-5 ; 8,0E-6 + 6,205 \cdot 2,0E-5) = (8,0E-6;8,0E-6)$

b_2: $(-0,703 - 6,205 \cdot 0,117 ; -0,703 + 6,205 \cdot 0,117) = (-1,427;0,021)$

b_3: $(0,419 - 6,205 \times 0,0627 ; 0,419 + 6,205 \cdot 0,0627) = (0,0297;0,808)$

The final step is to check the overall quality of the multiple regression equation. To do this, the significance of the multiple regression equation will be evaluated by testing the hypothesis that the coefficient of determination is equal to zero, which is calculated from the data of the General population: $b_1 = b_2 =... = bm = 0$ or R^2.

Fischer's F-test is used to test this hypothesis. In this case, the observed (actual) value of the F-criterion is calculated using the coefficient of determination R^2 calculated from the data of a particular observation.

The critical value of the F-criterion (FCR) is selected from the catalogs of the Fischer-Snedokkor distribution tables. To do this, set the significance level α, which is usually chosen with two numbers of degrees of freedom $k_1=m$ and $k_2=n-m-1$ and α = 0.05.

We perform F-statistics and check the Fisher criterion:

$$R^2 = 1 - \frac{s}{\Sigma(y_i - \overline{y})^2} \qquad (7)$$

$$R^2 = 1 - \frac{0,606}{18,18} = 0,9667$$

To do this, we check the hypothesis of General significance, i.e., the hypothesis that all regression coefficients are simultaneously equal to zero for explanatory variables:

H_0: $R^2 = 0$; $\beta_1 = \beta_2 = ... = \beta_m = 0$.

H_1: $R^2 \neq 0$.

This hypothesis is tested using the f-statistics of the Fischer distribution. If $F < F_{kp} = F_{\alpha\,;\,n-m-1}$, then there is no reason to reject the hypothesis H_0:

$$F = \frac{R^2}{1-R^2} \cdot \frac{n-m-1}{m}$$

$$F = \frac{0,9667}{1-0,9667} \cdot \frac{6-3-1}{3} = 19,339 \qquad (8)$$

The values used for degrees of freedom are tabular values, i.e. $k_1 = 3$ and $k_2 = n - m-1 = 6 - 3 - 1 = 2$, Fkp (3; 2) = 19.2. Based on the fact that the actual value of F >Fkp, it can be stated that the coefficient of determination is statistically significant, and therefore the regression equation is statistically reliable (therefore, the calculated coefficients of b are jointly significant).

Conclusion. As a result of the calculations performed, the multiple regression equation was obtained:

$$Y = 9,3423 + 8,0E-6 \cdot X_1 - 0,7028 \cdot X_2 + 0,4188 \cdot X_3.$$

This equation has an economic interpretation of the model parameters. I.e. it is possible to characterize the dynamics of change in the result value, when an increase in X_1 of 1 unit. leads to an increase in Y on average by 8.0 E-6 unit.; -an increase in X_2 by 1 unit leads to a decrease in Y by an average

of 0.703 units, and an increase in X_3 by 1 unit leads to an increase in Y by an average of 0.419 units.

Based on the maximum coefficient, we conclude that the factor X_3 has the greatest influence on the result Y. The statistical significance of the equation was confirmed by checking the coefficient of determination and the Fisher criterion.According to the results of the study, it is proved that in the studied situation, 96.67% of the total variability of Y values will be explained by changes in X_j factors.

The introduction of an automated system for managing agricultural sectors will improve the efficiency and quality of management decisions, increase citizens ' confidence in the government, significantly reduce direct and indirect costs for maintaining a state body, increase the efficiency of public management of industries as a whole due to reengineering of business processes of public administration, as well as by transferring divisions to the use of paperless office management technologies and electronic document management, mechanisms for collective use of documents and data, creation of databases, and data management and processing systems.

In modern conditions, one of the main tasks of priority development of the agro-industrial complex of the country and regions to address food issues and the need to increase competitiveness is the intensification of agro-industrial production. Automation, complex mechanization and development of information technologies that allow each unit of resources used to get a greater number and variety of high-quality food products-this is the most effective way to develop the agro-industrial complex.

IV. CONCLUSION

Thus, automation of information interaction and documentation support of management activities is essential for improving the efficiency of both individual institutions and the system of state management of industries as a whole. The introduction of an automated system means large-scale changes in the information interaction of departments and all interested companies, the population and entails the need for technological re-equipment of the Ministry of agriculture of the Republic of Kazakhstan, increasing the level of knowledge and horizons of civil servants in the field of information technology. Its implementation will improve the quality of state management of agricultural sectors, which will have a positive impact on the country's image as a state that uses advanced it Technologies in its activities.

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