Production Diversification as a Tool for Agricultural Risk Management: The Case of Northern Kazakhstan

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Abstract:- This paper addresses the impacts of degree of risk aversion on optimal farm plans in Kazakh agriculture. The results obtained during the field research in the region of Northern Kazakhstan are presented. Calculations were carried out using data from 145 peasant farms in the region for 2017-2022 based on a risk model. It has been found that the choice of a portfolio is influenced not only by considerations of profitability and riskiness of crops, but also by grain production traditions deeply rooted among the farmers of the region, and the skills and knowledge associated with them, as well as the existing infrastructure. These circumstances constrain the wider spread of oilseed crops in the region. It seems that the size of the farm does not significantly affect the choice of portfolio, while the degree of risk aversion by the farmer affects the optimal farming plan. The potential benefits of the farming diversification are an empirical issue, and it should be addressed on a case-by-case basis. The question is to choose the utility function and its parameters that most accurately reflect the preferences of a particular farmer, the authors conclude.

Key-Words: - uncertainty; diversification; crop production; income; covariance; model; decision making; risk aversion; utility function; optimization.

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1 Introduction

There is always a trade-off between diversification and specialization. Farm planning models to find the most referable degree of production diversification is usually cast in the portfolio selection framework. And the best approach is to formulate the model in terms of direct expected utility maximization. This type of models puts more weight on bad outcomes and is more consistent with the expected utility hypothesis. In countries such as Kazakhstan, where risk-sharing strategies have not yet become widespread, on-farm management strategies can more readily be used to soften the impact of downside risk. The idea of diversification is to reduce the dispersion of the overall return by selecting a mixture of activities that have net returns with low or negative correlations. Again, however, the aim should be to find the risk-efficient combinations of activities, not the one that merely minimizes variance. In general, farmers will diversify more with an increasing degree of risk aversion. However, more diversification can be increasingly costly if it means forgoing the advantages that specialization confers through better command of superior technologies and closer attention to the special needs of one particular market. And diversification remains a priority on the farm to prevent or mitigate the consequences of undesirable events (risk reduction). Of course, they may also include measures reflecting risk aversion on the part of the decision-maker.

The paper is organized as follows. The next section describes the data and methods. Then the results are presented. The final section provides a discussion of the results and concluding remarks.

In recent years, a number of studies have documented how farmers in different countries are adopting measures that rely on the use of agricultural biodiversity in response to climatic changes and their associated effects, [1], [2], [3], [4], [5]. These measures can be classified in three categories: cultivation of a larger number of species and farm diversification overall; introduction or increased cultivation of better adapted crops and varieties, and livestock animals and breeds; and integration of trees and shrubs into production systems. Different crops are affected differently by climate events, and this in turn gives some minimum assured returns for livelihood security. Alternating cereal crops with legumes has been a common practice for maintaining soil nutrients, managing diseases and adapting crop production to climatic variations that has been widely successful, [6].

The introduction of livestock has also been observed as a diversification strategy in response to climate change, [7], [8]. Over the past three decades, in many arid regions of Kazakhstan farmers have reduced their investment in crops, or even stop planting and focus instead on livestock management. Different animal species and breeds differ greatly in the extent to which they can tolerate climatic extremes. In arid areas of Kazakhstan, there has been a return to the breeding of traditional animals for commercial purposes, such as camel, sheep and horse breeding, more adapted to the changing climatic conditions. Such trends take place almost everywhere. For example, [9], notices the expansion of the distribution range of one-humped camels further south in Africa, replacing cattle, because of their better drought resistance. Crop diversification and crop-livestock integration are often combined with adjustments in agricultural practices and adoption of low-input methods for soil fertility improvement, water conservation and weed management. The substitution of traditional varieties with improved, early maturing ones has also been observed as part of adaptation strategies in places affected by drastic increases or decreases of temperature and rainfall, [10], [11]. The opposite is also observed: farmers stick to the cultivation of traditional varieties because of their capacity to respond and adapt to new climate patterns, [12].

The most important role in ensuring success in farming is played by competent risk-based planning. In a planning model accounting for uncertainty it is usually important to take account of the farmers' risk attitude. In countries with transition economy, such as Kazakhstan, many previous studies assumed complete certainty or overlooked farmers' aversion to risk. Others who have incorporated farmers' risk attitudes have found risk aversion to have an important influence on the choice of the farming plan.

Our empirical objectives are to examine the effect on the optimal farm plan of differences in (1) farm size, (2) farmers' risk aversion.

2 Methods and Data

A realistic planning model should take into account the farmer's subjective assessment of the probability of the occurrence of uncertain consequences from the decisions made and his preferences regarding these consequences, reflecting the farmer's degree of risk aversion. It is assumed that the subjective expected utility hypothesis is the best framework for structuring these two components into a workable model of risky choice, [13].

As a utility function, we used a power function of the form $U = \left(\frac{1}{1-r}\right) z^{1-r}$, where z is size of wealth (the value of assets), r is coefficient of relative risk aversion. This function is useful for solving problems and interpreting their results. In *r=0* this case, the function takes a linear form $U = z$; the linear function corresponds to the case when the entrepreneur's attitude to risk is neutral (risk is not taken into account when optimizing the solution). When *r=1* the power function turns into a logarithmic one. The higher the value *r*, the less likely the entrepreneur is to make risky decisions, so the less willing they are to invest in risky activities. The study, [14], offers the following interpretation of the coefficients of risk aversion: $r_r(w) = 0$ is individual manifests an indifference to risk (in other words, assess risky decision only on subjective expected impact); $r_r(w) = 0.5$ is perhaps taking the risk into account; $r_r(w) = 1$ is paying attention to a reasonable degree; $r_r(w) = 2$ is very cautiously accepts the risk; $r_r(w) = 3$ is high level of risk prevention; $r_r(w) = 4$ is extremely high degree of risk aversion. Nobel Prize winner in economics, [15], suggests considering the relative coefficient of risk aversion equal to one as "normal", which is typical for most individuals. We note that in most cases the risk aversion coefficient is estimated in relation to the total wealth of the enterprise, so the total value of its assets. In practice, to make a decision, the main argument of the utility function, as a rule, is income, that is, the increase in the value of assets. In this regard, there is a need to recalculate the relative coefficient of risk aversion for income. The recalculation is carried out with the use of a formula that relates the coefficients of income and risk aversion by wealth:

$$r = r(z) = \left(\frac{z}{W}\right) r(W) \quad (1)$$

where z is the average annual income; W is the average annual total asset value of the enterprise.

In our problem, risk aversion was estimated by the ratio of marginal income. At *r=0*, the risk is not considered when optimizing the solution. As the coefficient r increases, the entrepreneur avoids making risky decisions of the production structure.

The following model has been used to solve the problem:

$$\max CE = \left[(1-r)E(U)^{\frac{1}{(1-r)}}\right] \quad (2)$$

under restrictions:

1) use of resources

$$\sum_{j=1}^{n} a_{ij}x_j = y_i, \; i = 1,2,\dots,m \quad (3)$$

$$y_i \le b_i \quad (4)$$

2) the share of the area of individual crops is the maximum allowable in the structure of crops

$$x_j \le \alpha_j y_1, \; j = 1,2,\dots,n \quad (5)$$

3) fulfillment of contractual obligations for the supply of individual products or by market capacity

$$\gamma_j x_j \le (\ge) v_j, \; j \in J \quad (6)$$

4) market conditions and margin income based on production

$$z_s = \sum_{j=1}^{n} c_{sj}x_j, \; s \in S \quad (7)$$

5) the minimum required income for fulfillment of financial obligations in any state of production and market conditions, for example, to repay a loan

$$z_s \ge \lambda, \; s \in S \quad (8)$$

6) margin income expected

$$Z = \sum_{s \in S} p_s z_s \quad (9)$$

7) utility expected

$$E(U) = \sum_{s \in S} p_s U(z_s, r) = \sum_{s \in S} p_s \left[\left(\frac{1}{(1-r)}\right) z_s^{1-r}\right] \quad (10)$$

where: CE is the guaranteed equivalent; $E(U)$ is the expected utility; r is a coefficient of relative risk aversion; i is an index of the resource *(i =1* is the index of arable land); j is an index of crop; s is an index of market conditions and production; m is number of species of economic resources; n is a quantity of types of crops; S is a set of states of production and market conditions; J is a set of crops (products); x_j is the area under the *j*-crop; a_{ij} is the cost of resource i per one hectare of crop j; y_i is the total size of resources i used (y_1 is the total area of arable land under crops); b_i is the overall size of resources i available on the farm; α_j is the maximum share of the area under crop j; γ_j is the yield of crop j; v_j is the market capacity or the amount of contractual commitments for the supply of product j; c_{sj} is the margin income per hectare of crop j in state s of production and market conditions; z_s is the total size of the margin income from crops in state s of production and market conditions; λ is the minimum amount of whole-farm margin income required under any production and market conditions; Z is the total expected whole-farm margin income; p_s is the probability of state s of production and market conditions.

Calculations were carried out using data from 145 farms of North-Kazakhstan region for 2017-2022. Farms were divided into 6 groups according to the size of the arable land. Then the average farm size for each group was determined. Further calculations based on the model were carried out on average farms. The main constraints in the model are (1) land constraint, (2) rotational limits (to avoid the build-up of pests and diseases it is assumed that no more than a quarter of the area can be oilseeds).

Farms under consideration grow crops such as wheat, barley, oats, buckwheat, peas, rapeseed for seeds and flax. The size of acreage in farms ranges from 16 to 3082 hectares. The first group consisted of 19 farms (with crop area 16 to 49 hectares), the second group includes 37 farms (with crop area 50 to 125 hectares), the third group comprises 43 farms (with crop area 126 to 344 hectares, the fourth group includes 25 farms with a sown area of 345 to 799 hectares, the fifth group consisted of 14 farms (with crop area 800 to 1734 ha), 7 farms make up the sixth group with crop area of 1735 and more hectares. Table 1 (Appendix) shows marginal income by crops on the farms for the period from 2017 to 2022.

3 Results and Discussion

In all groups of farms, oilseeds are the dominant crops in terms of economic efficiency. Flax is represented in each group, while rapeseed only in the 5th group of farms. It should be borne in mind that the most stable is the income from oilseeds. Peas on the farms of the 1st and 4th groups have the lowest efficiency in terms of income, barley in the 2nd group of farms, oats in groups 3 and 6. At the same time, peas turn out to be the most economically risky crop, while other crops occupy an intermediate position in terms of variability. These circumstances, of course, have a decisive influence on the processes of structural optimization of production.

Table 2 (Appendix) shows the results of optimizing the production structure based on model (2)-(11). The economic conditions of each year are assumed to be equally probable, namely, the probability of each of them is 0.17.

The results of calculations show that in the farms of the 1st group, with an indifferent attitude to risk (the risk aversion coefficient is zero), wheat (75.0%) and flax (25.0%) are included in the production structure. The expected margin income per 1 hectare is 75.5 thousand tenge, the variability is 47.0%. As the coefficient of relative risk aversion increases (the entrepreneur is more careful when making a decision), the share of wheat decreases, and barley is included in the structure. With a "normal" degree of risk aversion characteristic of most entrepreneurs (in the conditions of the problem, this corresponds to a coefficient of relative risk aversion for marginal income of 0.3), the shares of wheat, barley, and flax are 66.9%, 8.1%, and 25.0%, respectively. The expected marginal income per 1 ha is 75.4 thousand tenge with a variability of 46.6%. In case of risk aversion with a coefficient of 0.6 or higher, barley (75.0%) and flax (25.0%) remain in the optimal production plan, and wheat is excluded.

On the farms of the 2nd group, the optimal sowing plan includes wheat, peas and flax with any attitude to risk. The change in the value of the risk aversion coefficient affects the ratio of the share of these crops in the plan. In the case when the value of the risk coefficient is zero, wheat, peas and flax occupy 23.5%, 51.5% and 25.0%, respectively. The expected margin income from 1 ha is 85.4 thousand tenge with a volatility of 56.6%. With an increase in the degree of risk aversion, the dominance of wheat in the structure of crops increases. With the coefficient of relative risk aversion for marginal income equal to 1.2, the optimal structure of crops is as follows: wheat occupies 65.8%, peas 9.2%, and flax 25.0%. The expected margin income per 1 ha is reduced to 77.5 thousand tenge, but the variability is also reduced to 46.8%.

For the 3rd group of farms, agricultural crops include wheat, peas and flax, while the share of each of these crops varies depending on the degree of risk aversion by the farmer. With the entrepreneur's indifferent attitude to risk, the share of wheat is 6.6%, peas 68.4%, flax 25%. The expected margin income per 1 hectare is 117.3 thousand tenge with a variation of 55.9%. With an extreme degree of risk aversion (it corresponds to the coefficient of relative risk aversion for margin income of 1.2), the share of wheat increases to 65.7%, the share of peas decreases to 9.3%, and the share of flax remains unchanged. The amount of expected income from 1 ha of crops is reduced to 105.1 thousand tenge, the variability also decreases to 44.0%.

The structure of crops of the 4th group of farms with an indifferent attitude of the entrepreneur to the risk includes wheat (75.0%) and flax (25.0%). At the same time, the expected marginal income from 1 hectare is 89.2 thousand tenge, the variability is 46.3%. If the coefficient of relative risk aversion for margin income is 0.9, peas are included in the crop structure, and the share of its crops increases as risk aversion increases. With extreme reluctance to take risks, wheat (70.2%), peas (4.8%) and flax (25.0%) are included in the optimal structure of crops. The amount of expected income from 1 ha of crops is reduced to 86.3 thousand. tenge, the coefficient of variation is reduced to 41.4%.

Wheat (75.0%) and rapeseed (25.0%) are included in the production structure of the 5th group of farms with an indifferent attitude to risk. At the same time, the expected margin income per 1 hectare is 96.9 thousand tenge, the variability of income is 36.2%. The composition of crops and the structure of crops with a coefficient of relative risk aversion of 0.3 looks like this: wheat (66.7%), buckwheat (8.3%), rapeseed (25.0%). The expected margin income per 1 hectare with such a degree of risk aversion is 96.7 thousand tenge, the variability is 33.1%.

On the farms of the 6th group, wheat (75.0%) and flax (25.0%) predominate in the production structure. With an extreme degree of risk aversion, barley appears in the optimal plan: wheat (42.4%), barley (32.6%), and flax (25.0%). The amount of expected marginal income per 1 hectare of crops is decreased from 122.6 thousand tenge to 121.3 thousand tenge, the variability of income is reduced from 45.7% to 44.5%.

Note that when solving the problem, it was assumed that there were no restrictions on the volume of sales of products. The presence of such conditions, of course, will make changes to production plans.

In general, there is a certain pattern in changes in the structure of production, depending on the degree of farmer’s risk aversion. This pattern is manifested in the fact that the stronger the risk aversion, the more diversified the structure of crops becomes. This feature is consistent with the findings previously made by many international and national researchers who studied issues related to agriculture risk, [16]. It is worth noting that the long-term predominance of cereals, in particular wheat, in northern Kazakhstan, inherited from the former Soviet agriculture, certainly affects the pace and features of crop diversification in the region. About 60% of the acreage is still occupied by grain crops. About 70% of the sown area is still occupied by grain crops, and wheat is the only sown crop on some farms. In the last decade, the government, by providing subsidies, began to encourage farmers to introduce other crops. As a result, oilseed crops have significantly increased and currently account for over 20%.

4 Concluding Comments

Farmers in Northern Kazakhstan have limited flexibility in the choice of activities, which is caused by relatively unfavorable geographical and climatic conditions, as well as policy and market conditions. In these circumstances, it seems that the size of the farm does not matter much to influence the choice of a farm plan. The results indicate that the degree of risk aversion of the farmer affects the optimal farming plan. Having only two or three activities, which is normal, can often capture the majority of risk-reducing benefits from diversification. The choice of a portfolio is influenced not only by considerations of profitability and riskiness of crops, but also by grain production traditions deeply rooted among the farmers of the region, and the skills and knowledge associated with them, as well as the existing infrastructure. These circumstances constrain the wider spread of oilseed crops in the region. And it seems that the size of the farm does not significantly affect the choice of portfolio. The potential benefits of farming diversification are an empirical issue, and it should be addressed on a case-by-case basis. The question is to choose the utility function and its parameters that most accurately reflect the preferences of a particular farmer.

The study suggests several ideas for further research. Firstly, no financial management option was included in the model. Fischer's separation theorem implies that it is better to diversify through capital markets than through activity combinations. In Kazakhstan, the financial markets of agricultural products are not well developed either in terms of price or volume. However, a possible extension of the model would be to include some types of financial activities, such as insurance agreements.

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APPENDIX

Table 1. Marginal income by crops in North-Kazakhstan region, thousand tenge per hectare

Year	Crops						
	Wheat	Barley	Oats	Buckwheat	Peas	Rapeseed	Flax
Farms with an area of arable land up to 49 ha							
2017	34.1	38.7	-	-	63.3	-	49.4
2018	19.6	36.1	-	-	-22.7	-	63.7
2019	45.9	32.0	-	-	38.2	-	82.2
2020	80.8	65.3	-	-	38.8	-	114.1
2021	83.1	87.1	-	-	49.3	-	147.6
2022	108.2	108.0	-	-	99.9	-	143.7
Average	62.0	61.2	-	-	33.4	-	91.4
Variability, %	54.8	51.0	-	-	85.8	-	38.6
Farms with an area of arable land of 50 to 125 ha							
2017	35.9	32.2	-	-	126.4	-	57.3
2018	20.7	30.0	-	-	-45.2	-	73.6
2019	48.4	26.6	-	-	75.9	-	94.9
2020	85.2	54.3	-	-	77.4	-	132.1
2021	87.6	72.4	-	-	97.7	-	169.9
2022	106.5	80.5	-	-	164.3	-	137.1
Average	64.1	49.3	-	-	82.8	-	110.8
Variability, %	52.8	47.2	-	-	85.8	-	38.6
Farms with an area of arable land of 126 to 344 ha							
2017	41.2	33.8	32.3	-	141.0	-	102.3
2018	23.7	31.5	-14.0	-	-50.4	-	131.4
2019	55.5	28.0	21.9	-	84.7	-	169.5
2020	97.6	57.1	33.9	-	86.3	-	235.8
2021	95.6	78.7	20.9	-	108.9	-	303.5
2022	116.3	87.5	16.8	-	183.2	-	244.9
Average	71.6	52.8	18.6	-	92.3	-	197.9
Variability, %	51.2	48.9	93.1	-	85.8	-	38.6
Farms with an area of arable land of 345 to 799 ha							
2017	42.3	30.8	55.2	-	59.6	-	67.3
2018	24.4	28.7	-24.0	-	-21.3	-	86.5
2019	57.0	25.5	37.4	-	35.8	-	111.5
2020	100.4	52.0	58.0	-	36.5	-	155.2
2021	103.2	69.3	65.5	-	46.0	-	199.8
2022	125.5	77.0	52.8	-	77.4	-	161.2
Average	75.5	47.2	40.8	-	39.0	-	130.3
Variability, %	52.8	47.2	81.0	-	85.8	-	38.6
Farms with an area of arable land of 800 to 1734 ha							
2017	42.2	35.4	47.9	162.0	97.7	159.8	50.2
2018	24.3	33.1	-20.8	92.0	-34.9	146.6	64.5
2019	56.9	29.4	32.5	-19.5	58.7	167.8	83.2
2020	100.1	59.9	50.4	66.3	59.8	153.2	115.7
2021	102.9	79.8	56.9	37.4	75.5	102.8	148.9
2022	125.2	88.7	45.9	96.8	126.9	241.2	120.2
Average	75.3	54.4	35.5	72.5	63.9	161.9	97.1
Variability, %	52.8	47.2	81.0	84.4	85.8	27.8	38.6
Farms with an area of arable land of more than 1735 hectares							
2017	54.2	57.6	42.9	-	67.5	-	103.7
2018	31.2	53.8	-18.6	-	-24.1	-	133.2
2019	73.0	47.7	29.1	-	40.5	-	171.7
2020	128.5	106.2	45.1	-	41.3	-	239.0
2021	132.1	129.8	50.9	-	52.2	-	307.5
2022	160.7	160.6	41.0	-	87.7	-	248.2
Average	96.6	92.6	31.7	-	44.2	-	200.6
Variability, %	52.8	50.5	81.0	-	85.8	-	38.6

Source: Authors ' calculationsнаbased on agricultural statistics Bureau of National Statistics Republic of Kazakhstan

Table 2. Optimal crop structure depending on the degree of risk aversion

Relative risk aversion ratio *r(z) / r(W)*	Sown area by crops, %							Margin income, thousand tenge/hectare	Standard deviation, thousand tenge	Risk ratio, %
	Wheat	Barley	Oats	Buckwheat	Peas	Rapeseed	Flax			
Farms with an area of arable land up to 49 ha										
0/0	0.750	0.000	-	-	0.000	-	0.250	75.5	35.5	47.0
0.5/0.15	0.750	0.000	-	-	0.000	-	0.250	75.5	35.5	47.0
1/0.3	0.669	0.081	-	-	0.000	-	0.250	75.4	35.1	46.6
2/0.6	0.126	0.624	-	-	0.000	-	0.250	75.0	33.4	44.5
3/0.9	0.000	0.750	-	-	0.000	-	0.250	74.9	33.2	44.3
4/1.2	0.000	0.750	-	-	0.000	-	0.250	74.9	33.2	44.3
Farms with an area of arable land of 50 to 125 ha										
0/0	0.235	0.000	-	-	0.515	-	0.250	85.4	48.4	56.6
0.5/0.15	0.237	0.000	-	-	0.513	-	0.250	85.3	48.3	56.6
1/0.3	0.288	0.000	-	-	0.462	-	0.250	84.4	46.4	55.0
2/0.6	0.471	0.000	-	-	0.279	-	0.250	81.0	40.5	50.0
3/0.9	0.591	0.000	-	-	0.159	-	0.250	78.7	37.5	47.7
4/1.2	0.658	0.000	-	-	0.092	-	0.250	77.5	36.3	46.8
Farms with an area of arable land of 126 to 344 ha										
0/0	0.066	0.000	0.000	-	0.684	-	0.250	117.3	65.6	55.9
0.5/0.15	0.102	0.000	0.000	-	0.648	-	0.250	116.6	64.0	54.9
1/0.3	0.277	0.000	0.000	-	0.473	-	0.250	113.0	56.9	50.3
2/0.6	0.507	0.000	0.000	-	0.243	-	0.250	108.2	49.4	45.7
3/0.9	0.606	0.000	0.000	-	0.144	-	0.250	106.2	47.2	44.4
4/1.2	0.657	0.000	0.000	-	0.093	-	0.250	105.1	46.3	44.0
Farms with an area of arable land of 345 to 799 ha										
0/0	0.750	0.000	0.000	-	0.000	-	0.250	89.2	41.3	46.3
0.5/0.15	0.750	0.000	0.000	-	0.000	-	0.250	89.2	41.3	46.3
1/0.3	0.750	0.000	0.000	-	0.000	-	0.250	89.2	41.3	46.3
2/0.6	0.750	0.000	0.000	-	0.000	-	0.250	89.2	41.3	46.3
3/0.9	0.721	0.000	0.000	-	0.029	-	0.250	87.2	40.3	42.4
4/1.2	0.702	0.000	0.000	-	0.048	-	0.250	86.3	38.9	41.4
Farms with an area of arable land of 800 to 1734 ha										
0/0	0.750	0,000	0.000	0.000	0	0.25	0	96.9	35.1	36.2
0,5/0,15	0.750	0,000	0.000	0.000	0	0.25	0	96.9	35.1	36.2
1/0,3	0.667	0,000	0.000	0.083	0	0.25	0	96.7	32.0	33.1
2/0,6	0.597	0,000	0.000	0.153	0	0.25	0	96.5	30.2	31.3
3/0,9	0.576	0,000	0.000	0.174	0	0.25	0	96.4	29.9	31.0
4/1,2	0.566	0,000	0.000	0.184	0	0.25	0	96.4	29.8	30.9
Farms with an area of arable land of more than 1735 hectares										
0/0	0.750	0.000	0.000	-	0.000	-	0.250	122.6	56.0	45.7
0.5/0.15	0.750	0.000	0.000	-	0.000	-	0.250	122.6	56.0	45.7
1/0.3	0.750	0.000	0.000	-	0.000	-	0.250	122.6	56.0	45.7
2/0.6	0.750	0.000	0.000	-	0.000	-	0.250	122.6	56.0	45.7
3/0.9	0.750	0.000	0.000	-	0.000	-	0.250	122.6	56.0	45.7
4/1.2	0.424	0.326	0.000	-	0.000	-	0.250	121.3	54.0	44.5

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

- Talgat Kussaiynov, Gulnara Mussina carried out the simulation and the optimization.
- Sandugash Tokenova has organized and executed the experiments.
- Saltanat Mambetova was responsible for the Statistics.

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Conflict of Interest
The authors have no conflict of interest to declare.