American Journal of Economics and Business Management
Vol. 8 Issue 3 | pp. 1075-1083 | ISSN: 2576-5973
Available online @ https://www.globalresearchnetwork.us/index.php/ajebm

Article

Econometric Modeling of Intensity Measures of Resource Efficiency in Agrocluster Networks

Juraev Farrukh Dustmirzayevich

1. University of Economics and Pedagogy, PhD, professor

* Correspondence: -

Abstract: This article analyzes the importance of econometric modeling and mathematical programming methods for assessing and optimizing the intensity measures of efficient resource use in agrocluster networks. The development of agroclusters directly affects economic stability and innovative development. Therefore, improving production efficiency and optimal resource use is one of the important tasks. The article considers the possibilities of studying resource exchange and efficiency in agrocluster networks using econometric methods, including factor analysis and linear models, and panel data analysis. At the same time, the application of mathematical programming issues, including linear and dynamic programming models, to determine optimal solutions for resource allocation is justified. Also, the main intensity measures are recommended for assessing production, labor productivity, energy efficiency, and capital efficiency. The results of the study will serve to make optimal management decisions in agroclusters, develop long-term forecasts, and increase economic efficiency.

Keywords: agrocluster, resource efficiency, intensive production, econometric model, mathematical programming, optimal plan, optimal production

Citation: Dustmirzayevich J. F. Econometric Modeling of Intensity Measures of Resource Efficiency in Agrocluster Networks. American Journal of Economics and Business Management 2025, 8(3), 1075-1083.

Received: 21th Feb 2025
Revised: 05th Mar 2025
Accepted: 13th Mar 2025
Published: 19th Mar 2025

1. Introduction

The system of development and management of agroclusters should be built, first of all, on the basis of the smallest element in its structure, that is, the correct organization of the activities of the production entity, and optimal planning of its production. In other words, increasing the efficiency of farming and animal husbandry activities and reducing production costs depend primarily on skillful management of the farm, effective use of land, means of production and labor resources [1].

The effective development of agro-cluster industries is of great importance in the modern economy. Increasing the efficiency of resource use in these industries, determining and optimizing the intensity of production processes are among the urgent issues. Econometric modeling methods should be used to deeply analyze such processes and increase efficiency [2]. Agroclusters include interconnected agricultural, industrial and service sectors. The efficient use of resources in these sectors is considered one of the main conditions for economic sustainability and innovative development [3]. However, the level of utilization of these resources depends on various factors, which need to be accurately assessed and analyzed.

Econometric modeling is a convenient tool for determining and forecasting the resource intensity of agroclusters. Such models are important for studying the relationships between various indicators, identifying ways to improve efficiency, and making optimal management decisions [4].

2. Materials and Methods

Econometric modeling and mathematical programming for optimizing resource efficiency in agrocluster networks are the methodological frames of this study. To study key intensity measures, e.g. production, labor productivity, energy efficiency, capital allocation, factor analysis, linear regression models and panel data analysis are used in the combination. A mathematical programming technique is integrated in the study with such linear and dynamic programming models in order to draw an optimal resource allocation strategy within the agroclusters. Cost structures and efficiency indicators for the Kashkadarya regional agrocluster enterprise are used as the basis for data collection which reflects agricultural production records. Primary and secondary data sources have been used for the study to formulate systematic evaluation of resource utilization. The optimization proceeds with the simplex method so as to evaluate the constraints and figuring out profitability maximization. The study systematically compares various resource management options capital constrained and unconstrained model to find the most efficient allocation of land resources, labor resources, and the resources of inputs. We validate the accuracy of the model by looking at the trend of historical data and scenario testing to smooth out the process of decision making. The approach guarantees that resource distribution strategies increase economic stability and promote sustainability in agricultural practice. By linking econometric analysis to the mathematical programming, the study provides an empirical foundation for improving the efficiency of agrocluster based on the optimizing production process. Policy recommendations for sustainable resource utilization and economic resilience are made based on the findings.

3. Results

It is important for production entities to use the available land resources effectively. Several types of products are grown in the regional agriculture. Let's say the condition for producing several different types of products is reasonable. Despite the various requirements, the main result of this economic process is the optimal use of the available land reserves of the agrocluster, ultimately the highest amount of expected profit. Thus, the basis of production efficiency is the optimal implementation of land allocation, resource efficiency and capital management. In this case, the optimization process consists in achieving high production efficiency according to the value of the management function representing the production goal, in the presence of resource constraints [5].

The problem of inter-product land allocation to achieve the greatest value of profit, that is, the agro-plan constructed in relation to the available resource reserves and the minimum amount of products required to be produced, is a linear programming problem [6].

The Kashkadarya regional agrocluster enterprise specializes in growing cotton, grain, vegetables and melons, and the total land area of the farm is 50 hectares. For the 2024 season, it is planned to grow 43.4 tons of cotton and 52.8 tons of grain products under a state contract. The agrocluster has the ability to grow vegetables and nutritious melons, provided that the plan is implemented. [7]

Let's consider the process of drawing up an optimal plan for the agrocluster for one season that will achieve maximum profit from the production of agricultural products. For this, the internal agro-potential of the farm, that is, the resource reserve, and the total base capacity should be taken into account [8]. The farm has 2 tractors and 18 workers. Also, the total capital cost of the cluster is 666.25 million soums

To create an optimal annual plan in an agrocluster, we construct the following system of constraints based on resource allocation and costs:

$$\begin{cases} 3050x_1 + 1300x_2 + 5000x_3 + 1850x_4 \le 140000 \\ 2800x_1 + 2800x_2 + 2400x_3 + 1540x_4 \le 119250 \\ 3000x_1 + 1500x_2 + 5000x_3 + 760x_4 \le 128250 \\ 2500x_1 + 1500x_2 + 1500x_3 + 250x_4 \le 71875 \\ 3300x_1 + 3300x_2 + 3300x_3 + 1650x_4 \le 144375 \\ 2000x_1 + 1000x_2 + 1000x_3 + 1000x_4 \le 62500 \end{cases} \qquad \begin{cases} 2{,}75x_1 \ge 43{,}4 \\ 4{,}25x_2 \ge 52{,}8 \\ x_1 + x_2 + x_3 + x_4 \le 50 \\ x_3 \ge 0, x_4 \ge 0 \end{cases} \tag{1}$$

Here x_1, x_2, x_3, x_4 are the land areas [ha] allocated for growing cotton, grain, vegetables and melons, respectively. We write the managed function (objective function) for the farm [9]

$$F = f_1x_1 + f_2x_2 + f_3x_3 + f_4x_4 \to max \tag{2}$$

Here f_1, f_2, f_3, f_4 are the amounts of profit obtained from the four types of products, respectively.

The productivity of products in the region is 27.5 t/ha for cotton, 42.5 t/ha for grain, 222.5 t/ha for vegetables, and 202.4 t/ha for melon crops [10].

We calculate the real profit per unit of land, depending on the probability coefficients for all products, using the average of their values for the last seven years. According to it, this indicator for cotton products is 9.3 million soums per 1 ha, for grain products 10.35 million soums, for vegetables 29.275 million soums, and for nutritious melon products 26.45 million soums. From this, we get the following form of formula (2):

$$F = 9{,}30x_1 + 10{,}35x_2 + 29{,}28x_3 + 26{,}45x_4 \to max \tag{3}$$

Using the given, we will create an optimal plan for the production of products in the agrocluster. Here, plan 1 is an optimal plan based on the predetermination of resource costs; plan 2 is an optimal plan based on the generalization (unconstrained) of resource costs; plan 3 is an optimal plan based on the management of resource costs. (table 1)

Table 1. Results of a plan based on the predetermination of resource costs in the agrocluster (1)

<table>
<tr><td colspan="6">Capital allocation</td></tr>
<tr><th rowspan="2">Cost types by resource</th><th colspan="4">Planning (million soums)</th><th rowspan="2">Differences</th></tr>
<tr><th colspan="2">Initial plan</th><th colspan="2">Optimal plan</th></tr>
<tr><td>Total water consumption</td><td colspan="2">140,00</td><td colspan="2">121,609</td><td>+18,391</td></tr>
<tr><td>Total mineral fertilizer cost</td><td colspan="2">119,25</td><td colspan="2">113,785</td><td>+5,465</td></tr>
<tr><td>Total labor cost</td><td colspan="2">128,250</td><td colspan="2">111,111</td><td>+17,139</td></tr>
<tr><td>Total maintenance cost</td><td colspan="2">71,875</td><td colspan="2">71,875</td><td>0</td></tr>
<tr><td>Total cost of pharmaceutical products</td><td colspan="2">144,375</td><td colspan="2">135,711</td><td>+8,664</td></tr>
<tr><td>Total other expenses</td><td colspan="2">62,500</td><td colspan="2">62,500</td><td>0</td></tr>
<tr><td>Total expenses (million soums)</td><td colspan="2">666,250</td><td colspan="2">616,591</td><td>+49,659</td></tr>
<tr><th colspan="6">Profit</th></tr>
<tr><td colspan="3">Total total profit of the agrocluster (mln. soums)</td><td colspan="3">930,789</td></tr>
<tr><td colspan="3">Total net profit of the agrocluster (mln. soums)</td><td colspan="3">264,539</td></tr>
<tr><th colspan="6">Land distribution</th></tr>
<tr><td rowspan="2">Land area for products</td><td>X1</td><td>X2</td><td>X3</td><td>X4</td><th>Reserve land area</th></tr>
<tr><td>15,8</td><td>12,4</td><td>7,3</td><td>11,2</td><td>+3,3</td></tr>
</table>

Content of plan 1: costs for resources are assumed to be the full cost of capital, and the average cost of resources and expenses are predetermined in advance. A capital allocation plan for the agrocluster's resource consumption has been drawn up. It is planned to allocate 140.0 million soums for water supply, a total of 119.25 million soums for mineral fertilizers, 128.251 million soums for labor costs, 71.875 million soums for technical services, 144.376 million soums for pharmaceuticals, and 62.5 million soums for other resources. When forming these values, the average cost of resource consumption and the proportionality ratio corresponding to the type of optional product are used. In the initial planning, capital is fully allocated. [11].

To check the plan for optimality, we use the simplex method. In this case, the parameters of the optimal plan, which are constructed according to the current state, are optimally evaluated and give a certain efficiency (Table 1).

From the table 2 data, it can be seen that there is a capital constraint, based on the optimal plan, no more than 49 million soums of capital will be spent. However, this saving leads to the fact that more than 3 hectares of land are not included in the plan [12]. The constraint is observed in the distribution of labor and other costs. This indicates that capital is not properly distributed to them. The efficiency of the plan is estimated at 264.539 million soums. The payback is 314.198 million soums (264.539+49.659). (table 2)

Table 2. Results of a plan based on the generalization (non-restriction) of resource costs in the agrocluster (2)

<table>
<tr><td colspan="6">Capital allocation</td></tr>
<tr><th rowspan="2">Cost types by resource</th><th colspan="4">Planning (million soums)</th><th rowspan="2">Differences</th></tr>
<tr><th colspan="2">Initial plan</th><th colspan="2">Optimal plan</th></tr>
<tr><td>Total water consumption</td><td colspan="2" rowspan="6">X</td><td colspan="2">173,258</td><td rowspan="6">-134,808</td></tr>
<tr><td>Total mineral fertilizer cost</td><td colspan="2">131,282</td></tr>
<tr><td>Total labor cost</td><td colspan="2">174,954</td></tr>
<tr><td>Total maintenance cost</td><td colspan="2">90,782</td></tr>
<tr><td>Total cost of pharmaceutical products</td><td colspan="2">165,000</td></tr>
<tr><td>Total other expenses</td><td colspan="2">65,782</td></tr>
<tr><td>Total expenses (million soums)</td><td colspan="2">666,250</td><td colspan="2">801,058</td><td>-134,808</td></tr>
<tr><th colspan="6">Profit</th></tr>
<tr><td colspan="3">Total total profit of the agrocluster (mln. soums)</td><td colspan="3">1089,609</td></tr>
<tr><td colspan="3">Total net profit of the agrocluster (mln. soums)</td><td colspan="3">288,551</td></tr>
<tr><th colspan="6">Land distribution</th></tr>
<tr><td rowspan="2">Land area for products</td><td>X1</td><td>X2</td><td>X3</td><td>X4</td><td>Reserve land area</td></tr>
<tr><td>15,8</td><td>12,4</td><td>21,8</td><td>0,00</td><td>0</td></tr>
</table>

Case 2. A plan for the generalization of resource costs of the agrocluster is drawn up. In this case, in the initial plan, capital is fully spent. However, there is no distribution by type of resource. It is not possible to know which resource capital is limited by. All attention is paid to maximizing the total profit of the farm. Capital is not limited in resource costs. The limitation depends only on the land area. The main difference from the initial case is that capital is not previously limited in terms of resources [13].

From the table 3 data, it can be seen that the total total profit to be achieved requires more than 20 percent of the available capital. However, a full distribution of land area is achieved. The efficiency of the plan is estimated at 288.551 million soums. The payback period is 153.743 million soums (288.551-134.808).

Table 3. Results of a plan based on resource cost management in an agrocluster (3)

<table>
<tr><td colspan="4">Capital allocation</td></tr>
<tr><th rowspan="2">Cost types by resource</th><th colspan="2">Planning (million soums)</th><th rowspan="2">Differences</th></tr>
<tr><th>Initial plan</th><th>Optimal plan</th></tr>
<tr><td>Total water consumption</td><td rowspan="3">666,250</td><td>135,174</td><td rowspan="3">0</td></tr>
<tr><td>Total mineral fertilizer cost</td><td>120,884</td></tr>
<tr><td>Total labor cost</td><td>123,691</td></tr>
</table>

Total maintenance cost			75,669		
Total cost of pharmaceutical products			145,051		
Total other expenses			65,782		
Total expenses (million soums)	**666,250**		**666,250**		**0**
Profit					
Total total profit of the agrocluster (mln. soums)			**1067,91**		
Total net profit of the agrocluster (mln. soums)			**401,66**		
Land distribution					
Land area for products	X1	X2	X3	X4	**Reserve land area**
	15,8	12,4	9,7	12,1	**0**

Case 3. The plan of the agrocluster is based on resource cost management. In this case, the cost of resources is not allocated in advance, but it is determined that the total cost does not exceed the available capital. A restriction on land area is introduced. Thus, case 3 differs from cases 1 and 2 in the following ways:

- As in case 1, a restriction is imposed on capital not on each resource segment, but on the total resource cost;
- In case 2, a restriction on capital is not imposed on the total resource cost, as in case 3.

In the optimal plan based on resource cost management in the agrocluster, capital is fully spent on total resource costs. A full distribution of land area is achieved. The efficiency of the plan is estimated at 401.66 million soums. The payback condition is identical to the efficiency (401.66-0).

Now we will compare the results of the optimal plan in all cases and, using the above analysis, determine the most optimal one. In this case, we will analyze the plan drawn up in case 3, where the efficiency indicator is the highest. If there is no contradiction in the feasibility of the plan, this plan is accepted, otherwise the contradiction is eliminated by controlling resource costs. As is known, the efficiency indicator depends not only on capital, but also on the economic profit achieved from each product. This requires that the productivity indicator of products is not lower than the specified amount. This condition is met when it is controlled that the resources consumed for each type of product do not exceed the normative demand. [14] We compare the results of the plan with the normative indicators of resources:

1) Water resource – standard requirement 5600 cubic meters/ha, result 5406.96 cubic meters/ha, cost decreased by 4.826 million soums.
2) Mineral fertilizer resource – standard requirement 681.5 kg/ha, result 690.8 kg/ha, cost increased by 1.634 million soums (1.37%).
3) Labor resource – standard requirement 811.25 workers/hours per 1 ha, result 782.4 workers/hours, cost decreased by 4.559 million soums.
4) Technical service resource – standard requirement 7 workers/hours per 1 ha, result 7.4 workers/hours, cost increased by 3.794 million soums (5.3%).
5) Medicinal product resource - the standard requirement per 1 ha increased by 11 times, the result by 10.55 times, the cost by 0.676 million soums (0.46%).
6) Other resources - the standard requirement per 1 ha increased by 1.9 indicators, the result by 1.97 indicators, the cost by 3.282 million soums (5.25%).

From the above, it is clear that there is a need to control the costs of the fourth and sixth resources. We consider the integration of the 3rd optimal plan with the 1st optimal plan, that is, we pre-determine (limit) the costs of resources other than the fourth and sixth, since the largest losses fall on these resources (more than 5% from the norm).

As a result, we draw up the 4th optimal plan. As a result, the losses on the fourth resource are 1.418 million soums, or a deviation from the norm of 1.97%. So, it is possible to set a normative limit for this resource as well. As a result, the optimization plan will have the following values (Table 4).

Table 4. Results of an optimal plan based on resource cost management in an agrocluster (Optimal plan)

Capital allocation					
Cost types by resource	**Planning (million soums)**				**Differences**
	Initial plan		**Optimal plan**		
Total water consumption	140,00		125,613		+14,387
Total mineral fertilizer cost	119,25		118,274		+0,976
Total labor cost	128,250		110,822		+17,428
Total maintenance cost	71,875		71,875		0
Total cost of pharmaceutical products	144,375		140,043		+4,332
Total other expenses	X		65,782		-3,282
Total expenses (million soums)	**666,250**		**632,409**		**+33,841**
Profit					
Total total profit of the agrocluster (mln. soums)			**1062,46**		
Total net profit of the agrocluster (mln. soums)			**430,05**		
Land distribution					
Land area for products	X1	X2	X3	X4	**Reserve land area**
	15,8	12,4	6,7	15,1	**0**

4. Discussion

The above results show that the agrocluster, based on the total cultivated area, plans to produce 15.8 hectares of cotton, 12.4 hectares of grain, 6.7 hectares of vegetables, and 15.1 hectares of nutritious melons. It can be observed from the results obtained in all cases that it is not recommended to produce cotton and grain products in excess of the established plan [15].Here we would like to clarify that, in the above plans, the meaning of efficient use of land resources is not the creation of unallocated land from the existing land reserve, which is not a basis for saving land. Similarly, the fact that the share of existing capital that remains unspent, resulting from its non-expenditure in cases where production efficiency could be increased, does not mean a loss of capital, but rather indicates a low efficiency of capital use. (Table 5)

Table 5. Results of optimal planning of agricultural production in the agrocluster

Option	Modeling parameters				Growth in reserve capital (%)
	Capital allocation savings (mln. soums)	Profit (mln. soums)	Land distribution	Unallocated land area (hectares)	
1	+49,659	264,539	15,8	+3,3	139,7
			12,4		
			7,3		
			11,2		
2	-134,808	288,551	15,8	0,00	143,3
			12,4		
			21,8		
			0,0		
3	0,00	401,66	15,8	0,00	160,3
			12,4		
			9,7		
			12,1		
4	+33,841	430,05	15,8	0,00	164,5
			12,4		
			6,7		
			15,1		

According to the results of econometric modeling of optimal planning, the 4th optimal plan, which was formed on the basis of the optimal plan options, is the most effective. In this case, the amount of profit increases by 162.5% compared to plan 1, by 149% compared to plan 2, and by 107.1% compared to plan 3.[16] The volume of reserve capital increases by 117.8%, 114.8%, and 102.6%, respectively. (Table 6)

Table 6. Classification of optimal plans for the optimal organization of the subject's production activities

Indicator	Plan 1	Plan 2	Plan 3	Optimal plan
Demand	There is a limit on all resources and total capital	There is only a limitation on land resources, there are no limitations on other resources and capital.	There is only a limit on land resources and capital, there is no limit on other resource costs	There is a limit on land resources and capital, and restrictions on the remaining resources will be imposed based on the results of the 3rd plan.
Advantage	Capital savings are achieved	The land area is fully distributed.	The land area is fully distributed.	Capital savings are achieved and land area is fully allocated
Disadvantage	Capital for a given resource is not allocated properly. Land is not fully allocated	The entity's capital reserves are insufficient.	The entity's capital is fully utilized and no savings are achieved	-
Result	Capital is saved in the event that land distribution is not achieved	Excess capital is spent to achieve the most profitable land distribution	Capital is fully utilized to achieve the most profitable land distribution	The goal is achieved.

5. Conclusion

The conclusions drawn from the developed optimal planning are as follows::

1. The importance of land allocation for the effective use of land resources in the production of agricultural products is high. The use of the simplex method in land allocation allows for a broad analysis of planning and the development of optimal options.
2. Limiting oneself to the pre-determination of resource costs does not guarantee optimal efficiency, but this can be achieved by controlling resource costs using predetermined indicators. In targeted resource cost management, it is necessary to control the normative requirements for each resource in the region.
3. For optimal planning of product production, it is sufficient to effectively use 3 factors, namely, to correctly allocate the costs of the resources required for it, to correctly assess the productivity indicator, and to correctly determine the normative requirements for the amount of resources.
4. Reducing the production of cotton and grain products in the agrocluster and, as a result, shifting the production of other types of agricultural products to the reserved land will lead to an increase in the production efficiency of the farm.

In this case, two approaches are appropriate to increase production efficiency in the agrocluster. In case 1, reducing resource consumption is achieved, and in case 2, increasing productivity. Reducing resource consumption leads to a quantitative change in the parameters of the constraint system, increasing productivity is achieved. In case 1, simple, low-cost factors such as intensive irrigation, increasing the amount of organic fertilization, and localizing seed production are used, while in case 2, the use of a repeated cropping regime is more effective.

According to the calculation results, the critical points for the change in land distribution for each type of product, or more precisely, the expansion of the crop area, were calculated for current values. According to this, it is recommended to increase the crop area if:

– the price of 1 kg of grain, combined with grain and the crop grown in rotation with it, will exceed 9900 soums (in practice, 2200 soums for grain, based on the total gross yield of the 2nd type of product per total land area);
– a 23 percent reduction in water consumption as a result of intensive irrigation for vegetable crops (in the current situation, the area under cultivation increases from 9.7 hectares to 11.7 hectares for this change alone);
– a 33.5 percent reduction in water consumption or a 3.96 percent increase in yield for melon crops as a result of intensive irrigation will lead to an increase in the area under cultivation.

The change in the area under cotton is not due to any reduction in resource consumption due to the low yield in the region (27.5 t / ha for the producer entity). In this case, it is recommended to first significantly improve the yield indicator. So, in our case, increasing productivity is considered primary over reducing resource consumption to increase the income of the producer entity. However, at the same time, the possibility of reducing resource consumption is valued higher.

According to the calculation results, limiting the cluster to a predetermined resource cost does not guarantee optimal efficiency, but it can be achieved by controlling resource costs using predetermined indicators. In targeted resource cost management, it is enough to control the normative requirements of each resource in the region, effectively use 3 factors for optimal planning of activities, namely, to correctly allocate the required resource costs, correctly assess the productivity indicator, and correctly determine the normative requirements for the amount of resources.

REFERENCES

[1] Samatov F.A. va boshqalar. Qishloq xo‘jaligi ishlab chiqarishini tashkil etish. Darslik. “O‘zbekiston milliy ensiklopediyasi” davlat ilmiy nashriyoti. Toshkent.: - 2005. 500 b (153 b)

[2] Dao Riao et al. Non-overlap of suitable areas of agro-climatic resources and main planting areas is the main reason for potato drought disaster in Inner Mongolia, China. Agricultural Water Management. Volume 275, 1 January 2023, 108033 / https://doi.org/10.1016/j.agwat.2022.108033

[3] Anjan Ray et al. Examining alternative carbon resources for sustainable energy generation: A comprehensive review. Next Energy. Volume 6, January 2025, 100194 / https://doi.org/10.1016/j.nxener.2024.100194

[4] Sh. Marathe et al. Agro-industrial waste utilization in air-cured alkali-activated pavement composites: Properties, micro-structural insights and life cycle impacts. Cleaner Materials. Cleaner Materials, Volume 14, December 2024, 100281/ https://doi.org/10.1016/j.clema.2024.100281

[5] Obal T.M. et al. Biogascluster: A clustering algorithm to identify potential partnerships between agribusiness properties. Renewable Energy Volume 206, April 2023, Pages 982-993

[6] Арашуков В. П. Состояние и перспективы раз- вития кооперации в аграрном секторе экономики. М.:ООО «НИПКЦ Восход–А», 2011. 220 с

[7] Peter F. Drucker. People and Performance: The Best oj Peter Drucker on Management. First published by Butterworth-Heinemann This edition published 20 II by Routledge 2 Park Square, Milton Park, Abingdon, New York, NY 10017, USA .: 1977. – p. 371

[8] Мордовченков Н.В., Николенко П.Г., Клюева Ю.С. Агрокластер как инновационный организационно-экономический механизм управления технологическими процессами в АПК. Азимут научных исследований: экономика и управление. 2015. № 1(10), - 89-94 стр

[9] Kotler Ph. Marketing Management, Millenium Edition. PCP. USA. 2006. -P.-456 / https://muhasib-az.narod.ru/kitab/menecment/Philip_Kotler_Marketing_Management.pdf

[10] John M. Letiche. Adam Smith and David Ricardo on Economic Growth. Source: The Punjab University Economist , January 1960, Vol. 1, No. 2 (2022), pp. 7-35 / https://cooperative-individualism.org/letiche-john_adam-smith-and-david-ricardo-on-economic-growth-1960-jan.pdf

[11] J.H.J. Spiertz, M.J. Kropff. Adaptation of knowledge systems to changes in agriculture and society: The case of the Netherlands. NJAS: Wageningen Journal of Life Sciences. Volume 58, 2011 - Issue 1-2. https://doi.org/10.1016/j.njas.2011.03.002

[12] Rakhimov, A. N., & Jo'rayev, F. D. (2022). A Systematic Approach To The Methodology Of Agricultural Development And The Strategy Of Econometric Modeling. resmilitaris, 12(4), 2164-2174.

[13] Juraev, F. D., Mallaev, A. R., Aralov, G. M., Ibragimov, B. S., & Ibragimov, I. (2023). Algorithms for improving the process of modeling complex systems based on big data: On the example of regional agricultural production. In E3S Web of Conferences (Vol. 392, p. 01050). EDP Sciences. // https://doi.org/10.1051/e3sconf/202339201050

[14] Jo'rayev Farrukh Do'stmirzayevich, & Aralov G'ayrat Muhammadiyevich. (2023). ANALYSIS OF FUNCTIONS OF BELONGING AND ASSESSMENT OF THE STATE OF THE CONTROL OBJECT. World Economics and Finance Bulletin, 23, 85-90. Retrieved from https://scholarexpress.net/index.php/wefb/article/view/2895.

[15] Juraev, F. D. S. (2021). Problems Of Informatization Of Management Of Agricultural Industry And Modeling Of Agriconomic System In A Market Economy. The American Journal of Applied sciences, 3(02), 49-54.

[16] Mukhitdinov, K. S., & Juraev, F. D. Methods of Macroeconomic Modeling. International Journal of Trend in Scientific Research and Development (IJTSRD), e-ISSN, 2456-6470.