# Econometric Assessment Of The Efficiency Of Enterprise Management Through The Supply Of Raw Materials In Oil Enterprises.

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### Abstract

The need to comprehensively use the whole system of generalizing and individual indicators in the assessment of management efficiency in oil enterprises arises from the complexity of assessing the efficiency of the management process. Because, the effectiveness of management activities in relation to the subject of management can be characterized by quantitative and qualitative indicators.

## INTRODUCTION

Quantitative indicators of the management system are a set of labor indicators - saving live labor in the field of management (number of management processes, reduction of labor intensity), etc.; indicators of financial efficiency of the management system (reduction of management costs, etc.); includes many factors such as time-saving indicators (reduction of management cycles due to the introduction of information technology, organizational procedures).

Qualitative indicators of the social effectiveness of management: increasing the scientific and technical level of management; integrated level of management processes; training of managers; increase the level of validity of the decisions made; formation of organizational culture; controllability of the system; job satisfaction; gain public trust; strengthening the social responsibility of the organization; environmental consequences are of particular importance. The effectiveness of qualitative indicators of social efficiency of management can be characterized by facilitating and improving working conditions, improving the psychological environment in the team, establishing normal relations between managers and executives, etc.

If, as a result of management rationalization, it is possible to achieve a high level of the above indicators, then there will be a positive shift in the organization of the management system and economic efficiency will be achieved. To improve the management of the organization, to

introduce information technologies, a certain amount of investments is required, which requires the evaluation of the management of these investment projects.

Currently, other approaches to evaluating management efficiency are being developed, in particular, the resource-potential approach to evaluating the effectiveness of the management system. In it, the absolute efficiency of management is expressed as the ratio of production potential to the actual cost of its use. Relative efficiency is defined as the ratio of total management effect to costs.

**Methods** In preparing the article, such research methods as the method of horizontal and vertical analysis, the formal-logical method, the method of scientific abstraction, and econometric analysis were used.

**Results.** Thus, in a generalized form, the following criteria of management efficiency can be distinguished:

1. The level of production planning and achievement of these goals (the ratio between the business plan and the actual value was determined).

2. Efficiency - the ratio of required and actual consumption of resources.

3. Profitability is the ratio between income and total costs.

4. Productivity - the ratio of the volume of physical, cost and other indicators of products (services) in a certain period and the ratio of the price of resources corresponding to a certain volume of production (resources: labor, material, financial, etc.).

In our opinion, as a general sum of these mentioned criteria, it is appropriate to evaluate the management efficiency in the enterprise. Because the cited criteria covers the period from the production of the management process to the product's readiness, even to the management of the product's cost, the analysis of the category of efficiency, its determining factors, the content and results of the management work, allows us to conclude that the groups of indicators that can function as measurement and efficiency criteria, depending on the organization's purpose and its working conditions, correspond to the content and forms of the manifestation of efficiency.

In the research work, the efficiency of management was determined in the selected objects, and an econometric analysis of the factors affecting the effective management process in these enterprises was carried out. Its purpose is to help them determine what factors should be paid attention to and what measures should be developed in the management process to develop the future prospects of the enterprise.

**Analyses.** To do this, first of all, we will perform an econometric analysis of the influence of factors such as production costs - X1, energy consumption - X2 and raw material consumption - X3 on the change of management efficiency - Y calculated using the statistical data of the Fergana oil and oil enterprise for the years 2008-2020. First, we can check the degree of correlation (strong or weak) between these factors and the resulting factor by conducting econometric analyzes and the correlation coefficient based on the order of selection of factors (Table 1).

**Table 1**

**Correlation coefficient of factors affecting management efficiency of "Fergana oil-oil" JSC**

|  | *Y* | *X1* | *X2* | *X3* |
|---|---|---|---|---|
| Y | 1 |  |  |  |
| X1 | 0.779227 | 1 |  |  |
| X2 | 0.687639 | 0.574075 | 1 |  |
| X3 | 0.781067 | 0.649826 | 0.526122 | 1 |

1 above- it can be seen from the data of the table that the resulting factor is all factors related to the management efficiency of "Fergana oil-oil" JSC, including production costs - X1 ( energy consumption - X2 ( and raw material consumption - X3 $r_{Y,X1} = 0,779227$) $r_{Y,X2} = 0,687639$)($r_{Y,X1} = 0,781067$)was found to be correctly connected with average density. Among the selected factors($r_{X1,X3} = 0,6498 < 0,8$; $r_{X1,X2} = 0,5741 < 0,8$; ($r_{X2,X3} = 0,5261 < 0,8$)conditionally, multicollinearity was not observed, and the process can be continued using Eviews software, which is now widely used in conducting econometric analyzes (Table 2).

**Table 2**

**The result of checking the regression equation coefficients and quality criteria of changes in the management efficiency of "Fergana oil-oil" JSC as a result of the influence of selected factors**

Dependent Variable: LNY
Method: Least Squares
Date: 04/24/21 Time: 10:21
Sample: 2008 2020
Included observations: 13

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LNX1 | -0.00771 | 0.216697 | -0.03557 | 0.0311 |
| LNX2 | -0.01445 | 0.147317 | -0.0981 | 0.0069 |
| LNX3 | 0.350867 | 0.13009 | 2.69711 | 0.0473 |
| C | 1.3842 | 4.851573 | 0.28531 | 0.0191 |
| | | tjad=2.262157 | | |
| R-squared | 0.924230 | There is a mean dependent | | 4.155419 |
| Adjusted R-squared | 0.767693 | SD dependent | | 0.386273 |
| SE of regression | 0.417406 | Akaike info criterion | | 1.338143 |
| Sum squared resid | 1.568047 | Schwarz criterion | | 1.511974 |
| Log likelihood | -4.697932 | Hannan-Quinn criterion. | | 1.302413 |
| F-statistic | 65.42555 | Durbin-Watson stat | | 1.961808 |
| Prob(F-statistic) | 0.000074 | Fjad=8.8123 | | |

2 above- according to the data of the table, taking into account that there is a large difference between the indicators of the selected factors and the indicator of management efficiency, we logarithmized the indicator of the factors. According to these values, only from the parameters$t_{X3} = 2.697$according to the inequality since$t_{жад} < t_{X3}$raw material consumption – X3the significance of the parameter is derived. In fact, the rest of the parameters are insignificant or insignificantMAPE<10 is checked by the criteria of very close reliability (Mean Absolute Percentage Error) and TIC<1 (Tayl inequality coefficient - an alternative measure of Tayl forecast accuracy) (1- picture).
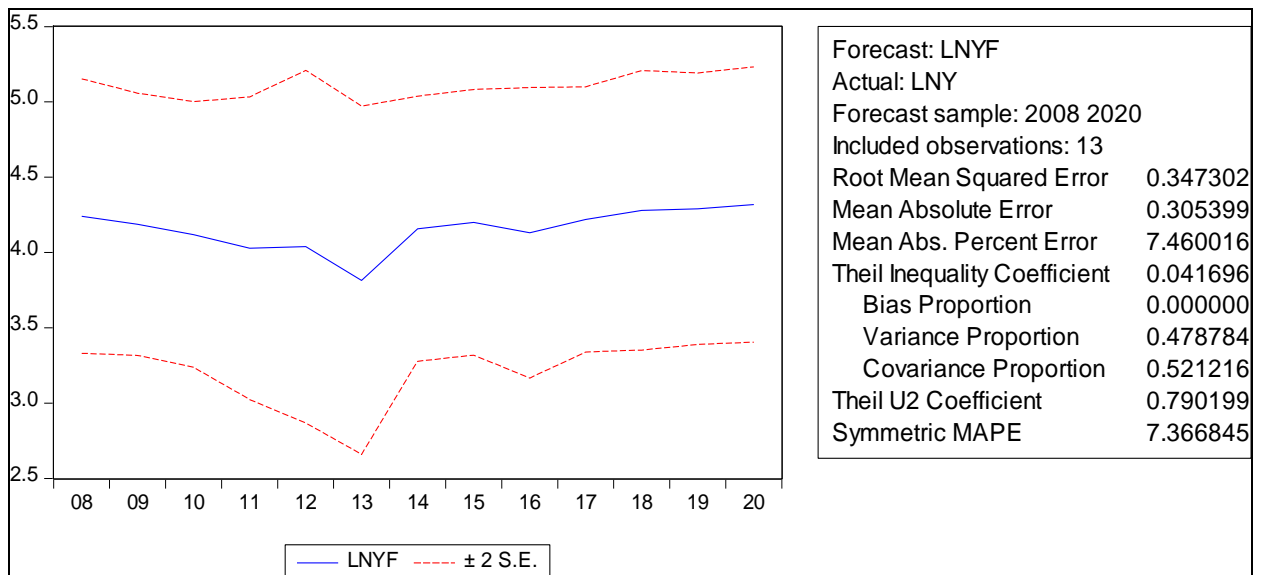
**Figure 1. of parameter X1 and X2Result of MAPE and TIC criteria**

1st p. abovebased on the information provided in the nameSince MAPE=7.46<10 and TIC=0.042<1X1 and X2 parameters were proved to be significant. Now, the significance of the regression equation based on the Fisher criterion is determined when α=0.05, k1=8; at k2=3$F_{жад}$ =8.81from the equality to .and from the equality according to the condition$F_{жад} < F_{хисоб}$$F_{хисоб} = 65,4$Since DW=1.96 there is no autocorrelation(---)-regression equation defined below:

$$LnY = 0,35LnX3 - 0,01LnX1 - 0,01445LnX2 + 1,4 (---)$$

is reliable and adequate, this (---)-regression equation is exponentiated to get rid of the logarithm, and the (---)-regression equation becomes:

$$Y = \frac{X3^{0,35} * e^{1,4}}{X1^{0,01} * X2^{0,01445}} (--)$$

If we give an economic interpretation to this (--)-regression equation, it was found that if production costs and energy consumption in the enterprise are reduced by 100%, the efficiency of enterprise management will increase by 0.014% and 0.02%, respectively. However, if the raw material consumption is increased by 100%, the management efficiency is found to increase by 0.47%. In turn, it is appropriate to provide the enterprise with raw materials as much as possible while promoting the relations of economic cooperation in the management of the enterprise, and in this regard, any available opportunity should be used.

Now we will carry out an econometric analysis of the influence of factors such as production costs - X1, energy consumption - X2 and raw material consumption - X3 on the change of management efficiency - Y, calculated using the statistical data of "Koqon oil-oil" JSC for the years 2008-2020. First, we can check the correlation coefficient between these factors and the resulting factor (strong or weak) by conducting econometric analyzes and the order of selection of factors (Table 3).

Table 3
**"Kokan oil-oil" JSC managementcorrelation coefficient of factors affecting efficiency**

|  | Y | X1 | X2 | X3 |
|---|---|---|---|---|
| Y | 1 |  |  |  |
| X1 | 0.82415 | 1 |  |  |
| X2 | 0.880117 | 0.794133 | 1 |  |
| X3 | 0.983351 | 0.697799 | 0.735471 | 1 |

Table 3 aboveIt can be seen from the data that all the factors in relation to the management efficiency factor of "Koqon oil-oil" JSC with the participation of foreign investors, including production costs - X1 (energy consumption - X2) and raw material consumption - $X3 r_{Y,X1} = 0,82415) r_{Y,X2} = 0,880117)(r_{Y,X1} = 0,983351)$with is found to be correctly connected in strong density. Among the selected factors$(r_{X1,X3} = 0,7941 < 0,8;\ r_{X1,X2} = 0,6978;\ (r_{X2,X3} = 0,7355 < 0,8)$conditionally, multicollinearity was not observed, and the process can be continued using Eviews software, which is now widely used in conducting econometric analyzes (Table 4).

Table 4
**"Kokan oil-oil" JSC managementthe result of the regression equation coefficients and the quality criteria of the change of efficiency as a result of the influence of the selected factors**

Dependent Variable: LNY
Method: Least Squares
Date: 06/19/21 Time: 21:00
Sample: 2008 2020
Included observations: 13

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LNX1 | 0.675208 | 0.04289 | 15.74278 | 0.0000 |
| LNX2 | -0.06084 | 0.027348 | -2.2247 | 0.0532 |
| LNX3 | -0.24515 | 0.03102 | -7.90308 | 0.0000 |
| C | 0.284267 | 0.087672 | 3.242392 | 0.0122 |

| | | | |
|---|---|---|---|
| R-squared | 0.973849 | There is a mean dependent | 1.565319 |
| Adjusted R-squared | 0.965132 | SD dependent | 0.017584 |
| SE of regression | 0.003283 | Akaike info criterion | -8.352205 |
| Sum squared resid | 9.70E-05 | Schwarz criterion | -8.178375 |
| Log likelihood | 58.28933 | Hannan-Quinn criterion. | -8.387935 |
| F-statistic | 111.7185 | Durbin-Watson stat | 1.818960 |
| Prob(F-statistic) | 0.000000 | | |

Table 4 aboveaccording to the data of the selected factors, taking into account that there is a large difference between the indicators of the selected factors and the indicator of management efficiency, we logarithmized the indicator of the factors. According to these values, only from the parameters$t_{X1} = 15.74$according to the inequality since$t_{жад} < t_{X3}$production costs -X1the significance of the parameter is derived. In fact, the rest of the parameters are insignificant or insignificantChecked by MAPE<10 and TIC<1 criteria (2-picture).
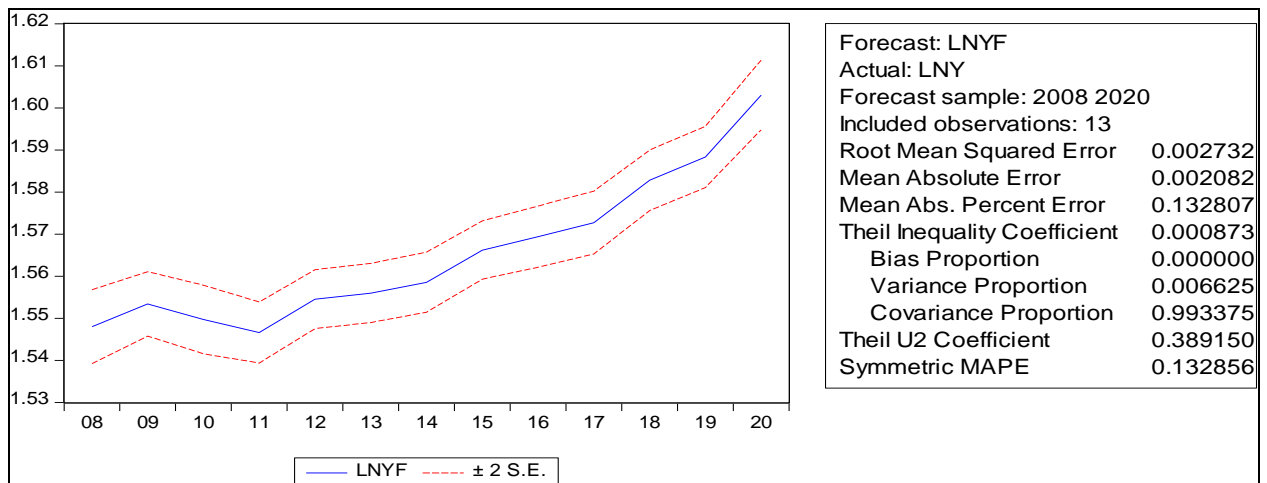
**Figure 2. of parameter X2 and X3Result of MAPE and TIC criteria**

Figure 2 abovebased on the information providedSince MAPE=0.133<10 and TIC=0.0009<1X1 and X2 parameters were proved to be significant. Now, the significance of the regression equation based on the Fisher criterion is determined when α=0.05, k1=8; at k2=3$F_{жад}$ =8.81from the equality to .and from the equality according to the condition$F_{жад} < F_{хисоб}$$F_{хисоб}$ = 111,7Since DW=1.82 there is no autocorrelation(---)-regression equation defined below:

$$LnY = 0,6752LnX1 - 0,06LnX2 - 0,24515LnX3 + 0,284 (---)$$

is reliable and adequate, this (---)-regression equation is exponentiated to get rid of the logarithm, and the (---)-regression equation becomes:

$$Y = \frac{X1^{0,6752} * e^{0,284}}{X2^{0,06} * X3^{0,24515}} \text{ (--)}$$

If we give an economic explanation to this (--)-regression equation, if today the production costs in the enterprise are 100 mln. if it is increased to 334,000 soums, the efficiency of management will be increased by 334,000 soums, which, in turn, requires the company to revise the future cost estimates and search for optimal cost options. Also, it was determined that if the consumption of energy and raw materials in the enterprise is reduced by 100 million, the management efficiency of the enterprise will increase by an additional 189,000 soums. If we make a general conclusion based on the obtained results, taking into account the fact that raw materials are limiting the possibility of working at full capacity at the enterprise, it is appropriate to revise the economic cooperation agreements in the management of the enterprise and develop measures for the seasonal organization of production.

Defined above"Fergana oil-oil" JSCwas a model for determining management efficiency:

$$Y = \frac{X3^{0,35} * e^{1,4}}{X1^{0,01} * X2^{0,01445}} \text{ (--)}$$

(--)-regression equation and selected factors as a function of time (when t=14):

Production costs - X1=38605.3+2470.4*t;

Energy consumption – X2=5695.7+5053.4*t;

Raw material consumption – X3=36582.8+875.5*t.

Using the system of formulas, we determine the multi-factor forecast of the management efficiency of the Fergana oil-oil enterprise (5-table).

**Table 5**

**Results of multi-factor forecasting of management efficiency of "Fergana oil-oil" JSC**

| Years | Management efficiency, mln. soum | Production costs, million sums | Energy consumption million soums | Raw material consumption million soums |
|---|---|---|---|---|
| 2021 | 134.9 | 73190.9 | 76443.3 | 48839.8 |
| 2022 | 135.5 | 75661.3 | 81496.7 | 49715.3 |
| 2023 | 136, 2 | 78131.7 | 86550.1 | 50590.8 |
| 2024 | 136.9 | 80602.1 | 91603.5 | 51466.3 |
| 2025 | 137.5 | 83072.5 | 96656.9 | 52341.8 |
| 2026 | 138.2 | 85542.9 | 101710.3 | 53217.3 |

Table 5 aboveas can be seen in 2021 compared to 2020, the management efficiency of the enterprise is 134.9 mln. soums, production costs 73190.9 mln. soums, energy consumption is expected to be 76,443.3 million soums and raw material consumption is 48,839.8 million soums.

As a result of the multi-factor forecast of the management efficiency of Fergana oil-oil JSC using the formula system, in 2026 compared to 2021, the management efficiency of the enterprise is expected to increase by 102.4%, production costs by 116.8%, energy consumption by 133.1%, and raw material consumption by 109%.

In 2021-2026, the growth of the enterprise's management efficiency by 102.4% is small compared to other factors. Because the increase in the size of the production capacity of the enterprise proportionally leads to an increase in the management efficiency of the enterprise.

Multifactor econometrics of management efficiency of Kokan oil enterprise $Y = \frac{X1^{0,6752}*e^{0,284}}{X2^{0,06}*X3^{0,24515}}$ **(--)**

model and selected factors depend on time (when t=14):

Production costs - X1=98791.3+16319.4*t;

Energy consumption – X2=43550.7+8891.4*t;

Raw material consumption – X3=64892.0+16847.2*t.

Using the system of formulas, we determine the multi-factor forecast of the management efficiency of the Kokan oil-oil enterprise (table).

**Table 6**

**"Kokan oil-oil" JSC managementthe results of multifactorial forecasting of efficiency**

| Years | Management efficiency, mln. Soum | Production costs, million sums | Energy consumption million soums | Raw material consumption million soums |
|---|---|---|---|---|
| 2021 | 155.1 | 327262.9 | 168030.3 | 300752.8 |
| 2022 | 157.6 | 343582,3 | 176921.7 | 317600 |
| 2023 | 160.1 | 359901.7 | 185813.1 | 334447.2 |
| 2024 | 162.6 | 376221.1 | 194704.5 | 351294.4 |
| 2025 | 164.9 | 392540.5 | 203595.9 | 368141.6 |
| 2026 | 167.2 | 408859.9 | 212487.3 | 384988.8 |

Table 6 aboveit can be seen that in 2021, compared to 2020, the management efficiency of the enterprise is 155.1 mln. soums, production costs 327262.9 mln. soums, energy consumption is expected to be 168,030.3 million soums and raw material consumption is 300,752.8 million soums.

## Discussion

As a result of the multi-factor forecast of the management efficiency of "Ko'qon Oil-Moy" JSC using the formula system, in 2026 compared to 2021, the management efficiency of the enterprise is expected to increase by 107.8%, production costs by 124.9%, energy consumption by 126.5%, and raw material consumption by 128%.

In 2021-2026, the size of the increase in the management efficiency of the enterprise by 107.8 percent is small compared to other factors, which means that it is necessary to increase the stock of raw materials in order to increase the management efficiency of the enterprise. Because the increase in the size of the production capacity of the enterprise proportionally leads to an increase in the management efficiency of the enterprise.

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