Management of the Reproduction Process of the Main Capital of the Railway Company

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Abstract- **In the paper have been investigated aspects of management of the reproduction process of the main capital of the railway company. By author was proposed results of the analytical alignment of indicators of movement and the state of fixed assets of the railway company 2008-2017   and was calculated also value of indicators of reproduction by groups of fixed assets of the railway company. In research was tried to develop mechanism for managing fixed capital in rail transport and was scientifically founded reproduce and use their production resources to manage adequately the market real conditions based on the principles of increasing the company's capitalization.**

Keywords: Railway Company, movement, indicators, reproduction process, fixed assets.

I.   INTRODUCTION

Transformation of the country's economy towards the real market economy poses enormous challenges for all sectors as a whole, and user satisfaction towards the quality of services provided, quick response to market changes, maximization of capitalization and company profits and increasing labor productivity. Speaking at the 26th anniversary of the adoption of the Constitution of the Republic of Uzbekistan, Sh.M. Mirziyev said: "We must openly admit: if we want to build a stable economy in our country, live as richly and safely as developed states, then this is not obliged to introduce the mechanisms of a real market economy, and to do this not formally, somehow, but deeply thought out." [1]

In the transition to a real market economy, such concepts as capital and capitalization take on special significance. To search for reserves to improve the efficiency of a company, it becomes important to study similar and related concepts. The study of domestic and foreign researchers, legal documents and educational literature has shown that the economic category of capital is treated differently. For example, it is defined as a value characterizing the economic benefits of an economic entity at a certain point or an investment resource used for its simple and expanded reproduction, where the management of the reproduction process of a company or enterprise plays the most important role.

II.   ANALYSIS AND RESULTS

Management of the reproduction process to determine its impact on fixed capital can be carried out on the basis of two main indicators in the context of structural units and species structure: the depreciation rate is an indicator characterizing the degree and amount of the need to update fixed assets, and the growth rate is an indicator characterizing the intensity of fixed asset renewal.
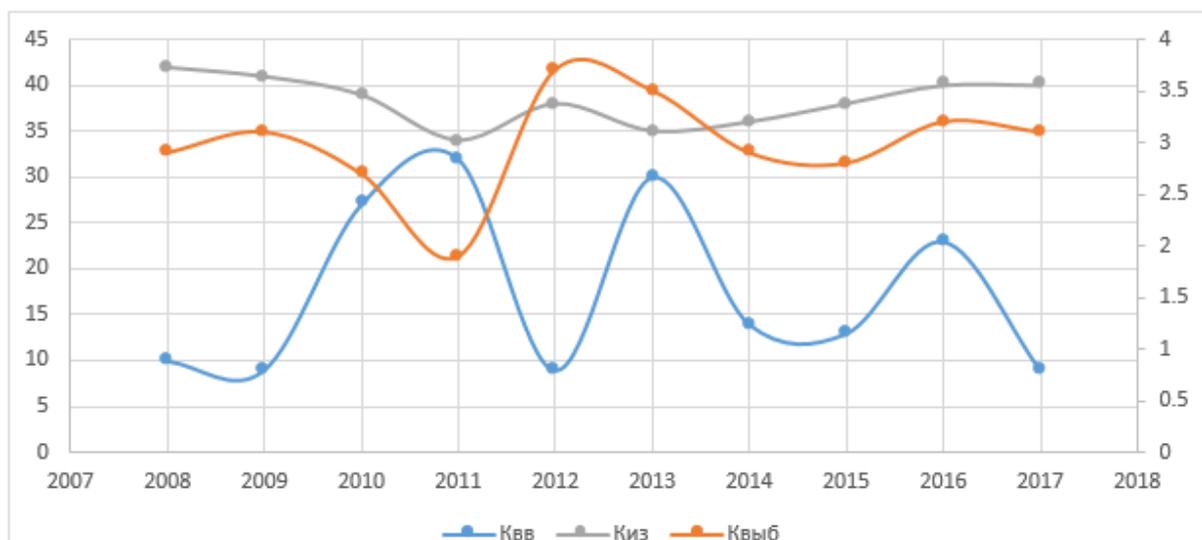

Fig. 1. The value of indicators of reproduction of fixed assets of the railway company

Fig. 1 above presents the values of indicators for a number of years characterizing the process of reproduction of fixed assets of the joint stock company Uzbekistan Temir Yollari.

As it can be seen from fig. 1 from 2007 to 2011, a decrease in the wear rate has been observed. Since 2011 on 2017 the wear rate is constantly increasing, despite the fact that the update rate remains high. This is due to the large depreciation of the active part of fixed assets, which constitute more than 60% of all fixed assets. In general, the depreciation ratio of the company's fixed assets dropped from 42.7% in 2007 to 40.3% in 2017. [10]

TABLE 1: The results of the analytical alignment of indicators of movement and the state of fixed assets of the railway company 2008-2017

Indicator	Equation of a second order parabola	Value of approximation reliability	Equation of power function	pproximation confidence value	Standard deviation
$K_{вв}$	$y = -0{,}6119x^2 + 6{,}6605x + 4{,}8905$	0,2447	$y = 12{,}861x^{0{,}1378}$	0,0366	9,483
$K_{выб}$	$y = -0{,}0014x^2 + 0{,}0489x + 2{,}8047$	0,046	$y = 2{,}7984x^{0{,}0422}$	0,0318	0,480
$K_{из}$	$y = 0{,}2898x^2 - 3{,}3327x + 45{,}803$	0,7207	$y = 40{,}718x^{-0{,}036}$	0,1442	2,665

Source: author`s calculation.

When analyzing indicators of the state and movement of fixed assets of a railway company using the Excel spreadsheet editor, various forms of the trend were identified. Most adequately describing the actual dynamics of indicators, are trends of the second order parabola equation and power function. This is explained by the fact that according to the smallest standard deviation, which describes the actual dynamics of the considered indicators most adequately, the above mentioned functions are. [2]

From the calculated two equations, it can be concluded that the most stable and consistent trend is observed in the wear coefficient (R = 0.72), which means the growth of levels is close to continuous, which confirms the aging of the equipment.

It should be noted that to measure the trend of dynamics and variability it is necessary to have data for at least 10 years. Attempts to measure the sustainability of a company's performance over a period of 3–4 years lead to unreliable trend indicators.

TABLE 2: The value of indicators of reproduction by groups of fixed assets of the railway company

Fixed asset groups	Indicators of reproduction of CF					
	2008			2017		
	$K_{вв}$	$K_{выб}$	$K_{изн}$	$K_{вв}$	$K_{выб}$	$K_{изн}$
Building	10,56	3,43	27,91	13,4	3,35	31,2
Facilities	3,73	1,19	18,15	3,31	1,08	25,93
Transfer devices	4,00	0,63	55,7	9,88	0,65	54,48
Machinery and equipment	19,34	14,61	55,32	12,77	15,11	53,83
Vehicles	11,44	2,34	54,9	11,04	5,10	56,8
Other	19,54	10,50	59,2	13,21	13,81	58,57
Total	10,07	2,90	42,7	9,20	3,14	40,3

Source: author`s development.

Analyzing the data presented in table. 2, it should be noted that along with the general decrease in depreciation of fixed assets as a whole, an increase in depreciation is observed for certain groups of fixed assets. In particular, the largest increase in the depreciation rate can be traced in the following groups:

1) Buildings and structures - from 2007 to 2017. This ratio increased 3.29% and 7.75%, respectively;

2) Vehicles - for the period 2000-2009. This ratio increased by 1.9% and amounted to 01.01.2009. 56.8%.

Indicators of the dynamics of fixed assets were calculated on the basis of the statistical reporting of the company (Form No. 3 - "Report on the movement of fixed assets") for the analyzed period.

Consider the theoretical part of the issue, it is well known that the wear rate is determined by the formula (1), and the growth rate by the formula (2). [3-4]

$$\text{К}_{\text{из}} = \frac{\sum \text{Из}}{\text{ОФ}}, \quad (1)$$

where $\sum \text{Из}$ - the amount of accrued depreciation, soum;
CF - capital embodied in fixed assets, UZS.

$$\text{К}_{\text{пр}} = \frac{\Delta \text{ОФ}}{\text{ОФ}}, \quad (2)$$

where $\Delta \text{ОФ}$ - capital gains embodied in fixed assets, UZS.

Considering the formula (1), it can be noted that the process of calculating depreciation is continuous, which is carried out as services are rendered. The change in the value of the denominator is a discrete process, which is carried out either with the acquisition or with the disposal of fixed assets. Revaluation also affects the denominator, but there is an adequate decrease in the numerator.

After the write-off of fixed assets, knocked out occurs, given that formula (1) can be converted as follows:

$$\text{К}_{\text{из}}^{i} = \frac{\sum \text{Из}^{i-1} + \text{Из}^{i} + \text{Н}_{\text{ам}}^{\text{вв}} \cdot \text{ОФ}_{\text{вв}}^{i} - CF_{\text{выб}}^{i}}{CF + CF_{\text{вв}}^{i} - CF_{\text{выб}}^{i}}, \quad (3)$$

where i is the period for which the calculation is performed;
Из^{i} – depreciation accrued for the current period on available fixed assets, UZS;
$\text{Н}_{\text{ам}}^{\text{вв}}$ – fixed asset depreciation rate, %;
$CF_{\text{вв}}^{i}$ - input of fixed assets, UZS;
$CF_{\text{выб}}^{i}$ – disposal of fixed assets, UZS.

Provided that the wear ratio is low, formula (3) the required amount of investment can be displayed by the following formula:

$$CF_{\text{вв}}^{i} = \frac{\text{Из}^{i} - \text{ОФ}_{\text{выб}}^{i} \cdot (1 - \text{К}_{\text{из}}^{i})}{\text{К}_{\text{из}}^{i} - \text{Н}_{\text{ам}}^{\text{вв}}}. \quad (4)$$

Provided that the fixed assets are not fully written off, the required number of investments is determined by the formula:

$$CF_{\text{вв}}^{i} = \frac{\text{Из}^{i} - \text{ОФ}_{\text{выб}}^{i} \cdot (\text{К}_{\text{из}}^{\text{выб}} - \text{К}_{\text{из}}^{i})}{\text{К}_{\text{из}}^{i} - \text{Н}_{\text{ам}}^{\text{вв}}}, \quad (5)$$

here $\text{К}_{\text{из}}^{\text{выб}}$ – depreciation rate of retired fixed assets.

If there is a share of non-depreciable objects in fixed assets, the need for investments is determined taking into account this share and their depreciation rate.

It is advisable when calculating the volume of investments to plan the coefficient of wear in the following way:

$$\text{К}_{\text{из}}^{i} = \text{К}_{\text{из}}^{i-1} \cdot J_{\text{К}_{\text{из}}}, \quad (6)$$

$\text{К}_{\text{из}}^{i-1}$ – wear coefficient in the i-1 period (past period);
$J_{\text{К}_{\text{из}}}$ – planned index of decrease (increase) in the wear rate.

Thus, to determine the required investment upon disposal of fully depreciated objects, you can use the following formulas:

$$CF_{\text{вв}}^{i} = \frac{\sum \text{Из}^{i-1} \cdot (1 - J_{\text{К}_{\text{из}}}) + \text{Из}^{i} - \text{ОФ}_{\text{выб}}^{i} \cdot (1 - \text{К}_{\text{из}}^{i})}{\text{К}_{\text{из}}^{i} - \text{Н}_{\text{ам}}^{\text{вв}}}, \quad (7)$$

$$\text{Из}^{i} = CF^{i} \cdot \text{Н}_{\text{ам}}^{\text{ср}}, \quad (8)$$

where - the average depreciation rate for fixed assets of the enterprise,%.

Based on the study of patterns of change in the coefficients of wear and growth of fixed assets, their indifference lines are constructed, which are shown in Fig. 2.
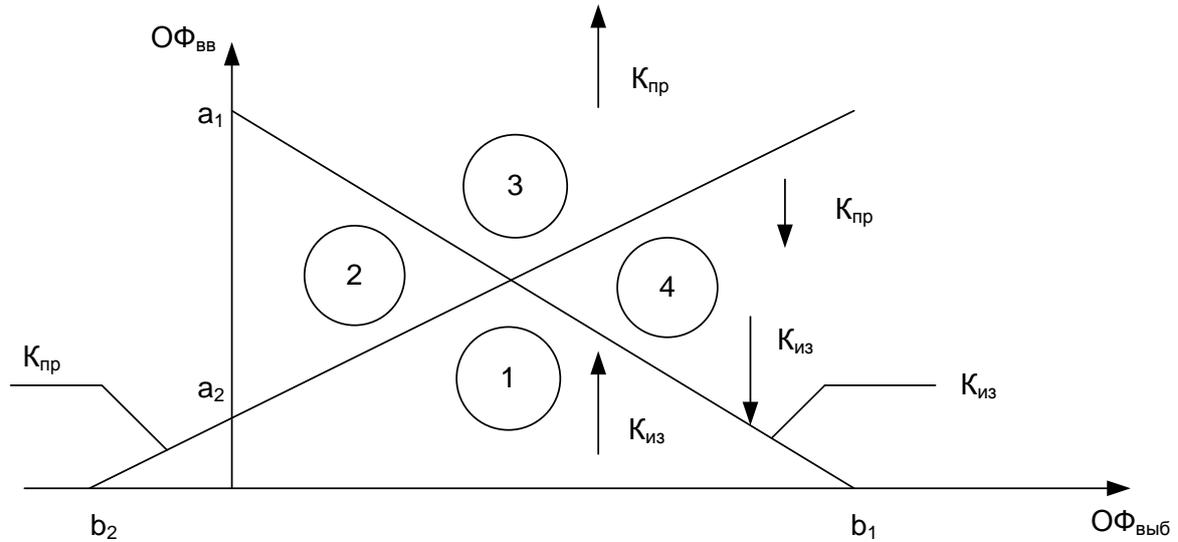
Fig. 2. Lines of indifference growth and wear rates

The main parameters of the figure are determined by the formulas:

$$a_1 = \frac{Из^i}{К_{из}^i - Н_{ам}^{вв}},\qquad (9)$$

$$b_1 = \frac{Из^i}{1 - К_{из}^i},\qquad (10)$$

$$a_2 = -b_2 = \Delta CF = К_{пр} \cdot CF^{\,i-1}.\qquad (11)$$

The indifference line of the coefficient means that with an adequate change of input (axis CFвв$)$ and disposal of fixed assets, (axis CFвыв$)$ the coefficient remains unchanged. It should be noted that the line characterizing the growth rate is more mobile and can shift left and right while intersecting the origin (0; 0), while the line characterizing the wear rate can only be in the positive plane.

The indifference line of the growth factor always has the same angle of inclination, while the indifference line of the coefficient of wear can change the angle of inclination depending on the depreciation rate, i.e. Potentially from the useful life of the introduced and operated objects of fixed assets and their level of depreciation (the smaller the coefficient characterizing the angle (axis CFвыб$)$, the worse the situation with the state of fixed assets). Studies have shown that the higher the depreciation rate, the more investment is needed in fixed assets to maintain it at a certain level and maintain production potential. [5]

The position of the indifference line of the growth rate is characterized by the renewability of fixed assets. The following three options are possible for the line of indifference of the growth rate relative to the axes of coordinates.

1. The indifference line of the growth rate crosses the axis in the positive plane (axis CFвыб$)$, which indicates the predominance of the disposal of fixed assets over the input, i.e. gain factor is characterized by a negative value. [6]

Considering the particular case of intersection of growth and wear lines at pointb_1, it can be concluded that the retirement of $CF_{выб}^{i+1}$ during the planned period will ensure the preservation of the level of the wear rate and the growth rate in the planned period at the same level:

$$CF_{выб}^{i+1} = \frac{Из^i}{1 - К_{из}^i},\qquad (12)$$

$$CF_{вв}^{i+1} = 0.\qquad (13)$$

The indifference line of the growth rate may not intersect with the indifference line of the wear coefficient, i.e. go to the right of theb_1, point. This means that either the enterprise disposes of obsolete fixed assets and does not replace them with new ones, or expensive objects are being disposed of, which leads to such a decrease in the growth rate.

2. The indifference line of the growth coefficient intersects the origin of the coordinates at the point (0; 0). To

ensure a constant level of the growth rate equal to zero and the depreciation rate, it is necessary to ensure the volumes of input and disposal of fixed assets, determined on the basis of the system:

$$\begin{cases} CF_{вв}^{i+1} = \dfrac{Из^i - CF_{выб}^i \cdot (1 - К_{из}^i)}{К_{из}^i - Н_{ам}^{вв}}, \\ CF_{вв}^{i+1} = CF_{выб}^{i+1}, \end{cases} \quad (14), (15)$$

$$CF_{вв}^{i+1} = \frac{Из^i}{1 - Н_{ам}^{вв}}. \quad (16)$$

The solution of this system allows you to determine the required investment required for simple reproduction of fixed assets while maintaining the existing level of wear.

3. The indifference line of the growth rate crosses the axis CF in the positive plane, which indicates the predominance of the input of basic funds over the retirement, i.e. the growth rate is characterized by a significant value.

Considering the special case of the intersection of growth and wear lines at a_1, it can be concluded that the input of fixed assets in the planned period in the amount of $CF_{вв}^{i+1}$ ensures the preservation of the level of the wear coefficient and the growth rate in the planned period:

$$CF_{вв}^{i+1} = \frac{Из^i}{К_{из}^i - Н_{ам}^{вв}}, \quad (17)$$

$$CF_{выб}^{i+1} = 0. \quad (18)$$

The indifference line of the growth rate may not intersect with the indifference line of the wear coefficient, i.e. pass above point a. This means that the commissioning of fixed assets in operation is ahead of the required investment to maintain the shelf life of fixed assets and their expanded reproduction takes place. This situation is usually characterized by an increase in the production potential (throughput) of the enterprise as a whole at the stage of its creation and a high degree of investment attractiveness. [7]

In fig. 3 shows four sectors, each of which indicates the tendencies of the investment process in the enterprise:
1. Reduction in the growth rate and increase in the wear rate;
2. The growth of growth and wear rates;
3. Growth of the growth rate and reduction of the wear rate;
4. Reduction of growth and wear rates.

The effect on the company's capitalization of the position of indifference lines of wear and growth rates can be represented as follows (tab. 3).

TABLE – 3: The impact of the entry and disposal of fixed assets on the company's capitalization

Rate	Sectors characterizing the trend of reproduction of fixed capital			
	1	2	3	4
input	From o to $\dfrac{Из^i + \Delta OФ \cdot (К_{из}^i - 1)}{2 \cdot К_{из}^i - Н_{ам}^{вв} - 1}$	from $К_{пр} \cdot CF^{i-1}$ to $\dfrac{Из^i}{К_{из}^i - Н_{ам}^{вв}}$	from $\dfrac{Из^i + \Delta CF \cdot (К_{из}^i - 1)}{2 \cdot К_{из}^i - Н_{ам}^{вв} - 1}$ to $\dfrac{Из^i}{К_{из}^i - Н_{ам}^{вв}}$	From o to $\dfrac{Из^i}{К_{из}^i - Н_{ам}^{вв}}$
retirement	From o to $\dfrac{Из^i}{1 - К_{из}^i}$	From o to $\dfrac{Из^i + \Delta CF \cdot (К_{из}^i - Н_{ам}^{вв})}{2 \cdot К_{из}^i - Н_{ам}^{вв} - 1}$	From o to $\dfrac{Из^i}{1 - К_{из}^i}$	From $\dfrac{Из^i + \Delta CF \cdot (К_{из}^i - Н_{ам}^{вв})}{2 \cdot К_{из}^i - Н_{ам}^{вв} - 1}$ to $\dfrac{Из^i}{1 - К_{из}^i}$
Wear level	Will rise	Will rise	Will go down	Will go down
Capitalization	Will go down	Will rise	Will rise	Will go down

Source: author`s development.

In order to increase the company's capitalization through this methodology, one can draw conclusions about the investment attractiveness, as well as predict the further reproduction of the company's fixed capital.

The first stage (sector 3) is characterized by a high growth rate of fixed assets (commissioning of new or additional capacities) and, as a result, a decrease in the depreciation rate and an increase in the growth rate, which indicates a high level of capitalization of the company.

The second stage (sector 4) indicates a decrease in the growth of fixed assets, however, its decline does not lead to an increase in the depreciation rate. In this case! Capitalization of the company decreases. [8]

The third stage (sector 1) shows a decrease in the growth of fixed assets and an increase in the coefficient of wear, which is explained by the low level of renewal of fixed assets and the presence of worn fixed assets at the enterprise, which leads to a sharp decrease in the capitalization of the company.

The fourth stage (sector 2) is characterized by the resumption of growth in the coefficient of growth, an increase in the volume of input of fixed assets, which, however, is not enough to reduce the wear rate, i.e. the level of depreciation of fixed assets increases. Despite this, the level of the company's capitalization is increasing, which indicates the prevalence of positive trends in the company's capitalization index. [9]

Building indifference lines allows you to determine the company's need for investment to maintain and develop its production potential, to give a preliminary assessment of the company's development based on the changing capitalization rate.

From the solution of the equations, it follows that in order to maintain the trend of changing the level of coefficients, it is necessary in 2018 to put machines and equipment into operation in the amount of 14.212 billion soums and remove from the machinery and equipment in the amount of 7.764 billion rubles, which will reduce the company's capitalization generally. Analysis of the reporting data and the results shows that the depreciation charged for 2017 (25.93 billion soums) allows the dynamics of growth and depreciation rates to be maintained in 2018. However, in the conditions of growth in traffic volumes, such a statement of the problem as maintaining the level of coefficient wear and tear, not entirely legitimate. Funds should be directed not only to maintain its level, but also to preserve the production potential of railways, and in the context of the projected growth in demand for transport services - and to its development (expansion). [10] When you enter fixed assets in 2018, the amount of accumulated depreciation in 2017 and maintaining the trend of the growth rate coefficient will reduce the depreciation of fixed assets by 0.9-1.1%. If the trend of change in the growth rate is not observed, the wear rate in 2017 will increase by 1.4-2.5%. At the same time, the company's capitalization is increasing.

According to this method, it is possible to calculate the indifference lines of growth and depreciation coefficients, which will give the required amount of commissioning and remove from fixed assets to maintain the trend of changes in the level of coefficients.

III. CONCLUSIONS

The proposed approach to determining the need for investment has drawbacks; however, it makes it possible to identify negative trends and determine the direction of measures to prevent their occurrence in order to increase stability and capitalization of the company.

In addition, this technique will allow:

➢ To predict the change in the depreciation rate for groups of fixed assets in the context of railway administrations;

➢ Determine the boundaries of changes in the value of investments necessary for the reproduction and restoration of fixed assets;

➢ Justify the priority areas of investment in fixed assets in order to reduce their level of wear and increase the company's capitalization;

➢ To establish threshold indicators of changes in the coefficient of depreciation, beyond the boundaries of which controllability of reproduction of the basic capital is lost and a tendency of a sharp decrease in capitalization is observed.

Thus, the improvement of the mechanism for managing fixed capital in rail transport will allow developing methods and techniques for managing each group of fixed assets to increase the efficiency of their use, reproduce and use their production resources to manage adequately the market real conditions based on the principles of increasing the company's capitalization.

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