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MODELING THE IMPACT OF LABOR PRODUCTIVITY AND PRODUCTIVITY OF FIXED ASSETS ON RETURN ON ASSETS AND EQUITY

Profitability is one of the key characteristics for enterprises, as it measures the efficiency of their activities. It is worth noting that if a company makes a profit, it does not mean that it is profitable [1]. In order to determine the profitability of the company, you can calculate special indicators that can help investors, shareholders, owners, top managers, as well as ordinary employees determine the efficiency of a particular entity. One of the most popular profitability indicators are ROA and ROE. They show how profitable a company is relative to its total assets and how efficient a company generates profits respectively [2].

Having done a profound financial analysis of one the most prominent companies in pharmaceutical industry in Ukraine, Farmak, it was found out that ROA in 2019-2020 was declining. It was decided to examine whether it`s connected with the productivity of employees and fixed assets. In the period from 2018 to 2020 there was a decrease in ROE, and we can also draw conclusions about how productivity and fixed assets affect the amount of net income and find out whether this reduction was due to the growth of equity, which consists directly of retained earnings [3].

So, we formulate the hypothesis that the increase of labor productivity, that itself depends on the number of employees and the volume of medical items during the financial year, will lead to the increase of production and it will increase the revenue of the company, taking in the consideration the moderate growth of assets. Also, if we speculate the decrease of labor productivity, that will decrease the rate of revenue, working and financial income too. Whereas company`s assets will grow faster than the revenue due to increase of accounts receivable, cash and inventories. This will reduce ROA, as we observe the reduction of efficiency economic entity`s assets to generate net income.

According to the second hypothesis, the growth of productivity of fixed assets, which in turn depends on the amount of fixed assets left after the depreciation deduction and output during the financial year, there will be an increase in drug production, which, ultimately, will lead to the increase in gross profit and EBIT, which should ultimately lead to increase of ROA, as fixed assets play an important part among other assets. If the productivity of fixed assets is reduced, production will also decline, which will lead to a slower growth rate of sales, which in its turn will lead to a reduction in EBIT.

In addition, the impact of labor productivity on ROE will be studied too. When the amount of net income increases, at a constant level of equity, the rate of ROE will increase too. Because, as noted earlier, the higher is the productivity, the higher is the level of production, which will affect sales, and thus contribute to the growth of gross

income, operating income and pre-tax income and net income. In the event of a decrease in labor productivity, the production of medicines will be reduced, as in the previous case, which will lead to a reduction to net income finally. Accordingly, the return on equity will decrease if labor productivity is reduced, which will negatively affect the growth rate of net profit.

Also, increasing the level of productivity of fixed assets will increase the production capacity of the enterprise, it will indicate the more efficient usage of equipment during the production process, and also have a positive impact on EBIT. If the level of productivity of fixed assets is reduced, ROE will decrease, as the company is not able to use equipment at full capacity, which may be associated with significant depreciation of its equipment, which will further reduce growth of production, respectively its sold products and net income [4].

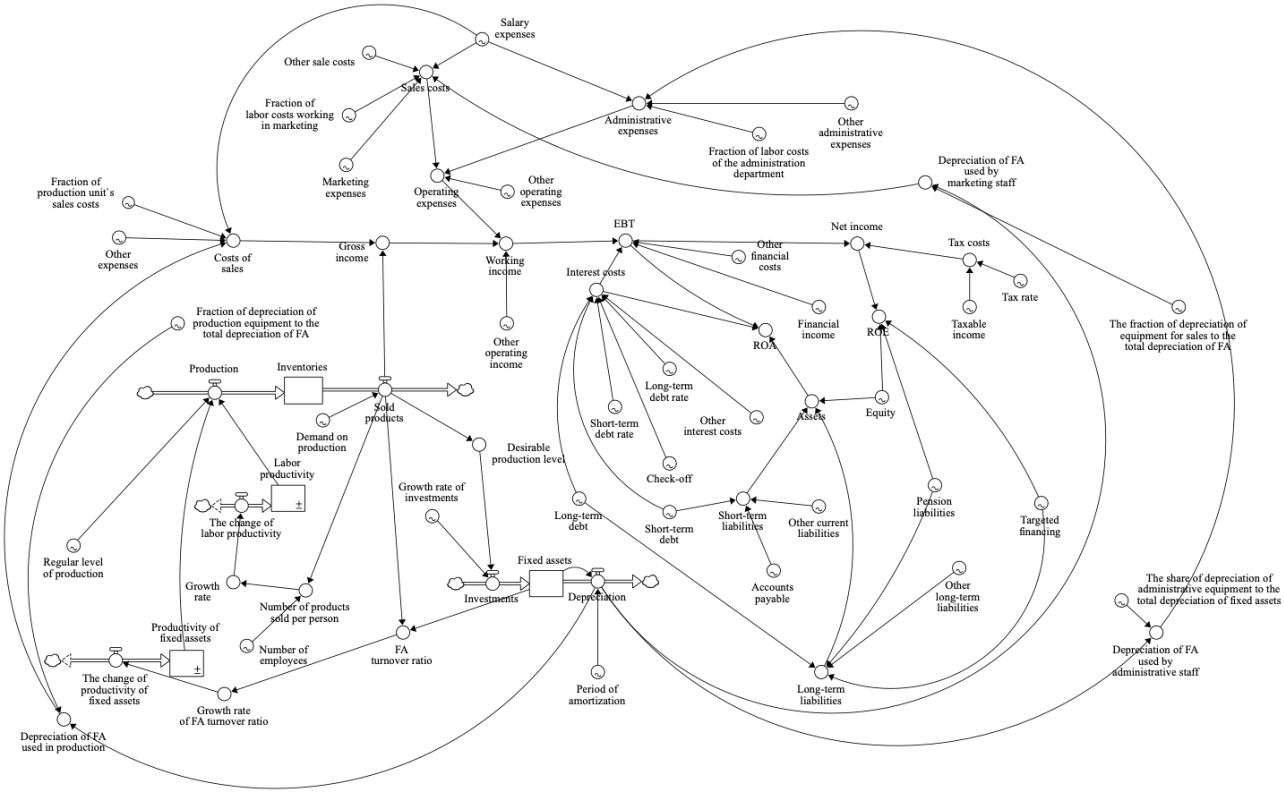

Figure 1. The model of determining the impact of productivity and fixed assets on the value of return on assets and equity

Accordingly, the model is built using the methods of system dynamics (Figure 1). Thus, we determine that the stocks in our model are "Inventories", "Fixed assets", "Productivity of fixed assets" and "Labor productivity", while the flows are "Production" and "Sales" for the stock "Inventories"; "Investments" and "Depreciation" for stock "Fixed assets"; "Change in the level of productivity of fixed assets" and "Change in the level of labor productivity" for stock "Productivity of fixed assets" and "Productivity" respectively.

In our model we can determine two loops. One of them is reinforcing that is on Figure 2. The increase in inventories lead to the increase of sold products during the financial year. It also leads to the number of products sold per person and here we can

observe the growth rate of its indicator. The the increase of growth rate lead to the change of labor productivity with positive sign. As the reason the labor productivity will be rising and it directly affects the level of production [5].

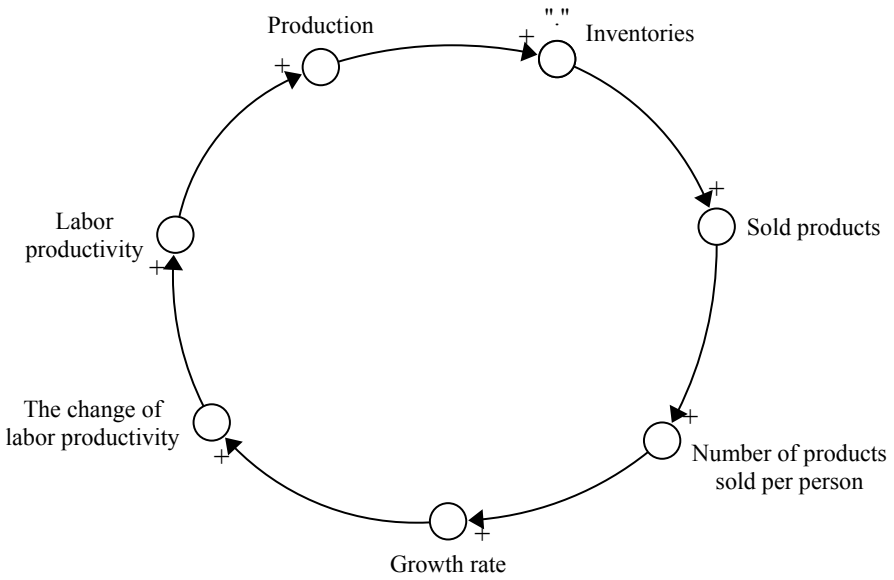

Figure 2. The impact of labor productivity on production and sales

Another one is a balancing loop that is presented on Figure 3. The increase in inventories lead to the increase of sold products during the financial year. It also influences on the desirable level of production with positive sign. As there is the increase of desirable production level, it affects the increase in investments. The rise of investments lead to the increase of company`s fixed assets. The increase of fixed assets will negatively affect on FA turnover ratio. Notwithstanding, FA turnover ratio influences on the growth rate of FA turnover ratio positively and respectively leads to the positive value of the change of Fixed assets` productivity. As conclusion it leads to the increase of production [6].

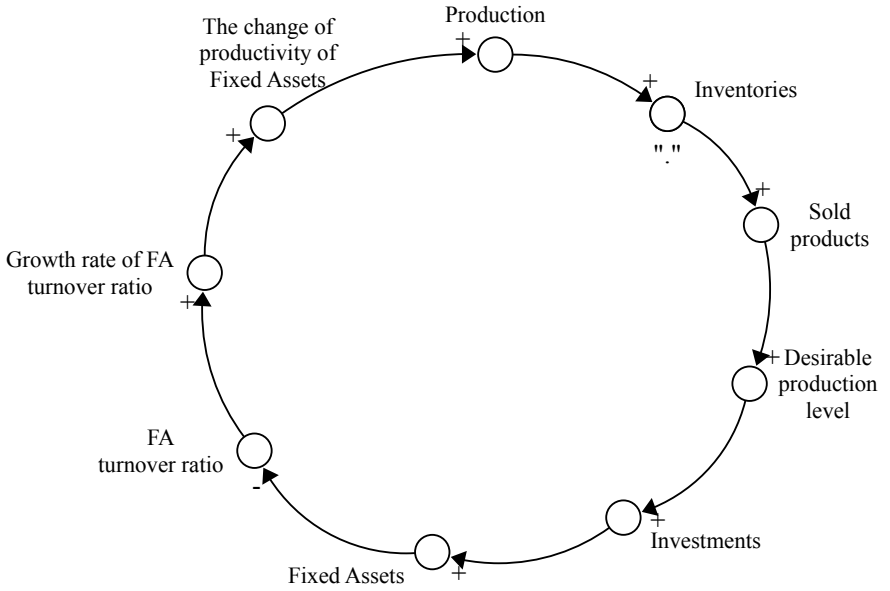

Figure 3.The impact of productivity of fixed assets on production and sales

Accordingly, during the simulation of the model, we obtained indicators of labor productivity and fixed assets, which are shown in Figure 4. We observe that in the period from 2013 to 2016 the level of labor productivity and fixed assets increases, while from 2017 the productivity of fixed assets decreases, and from 2018 - labor productivity.

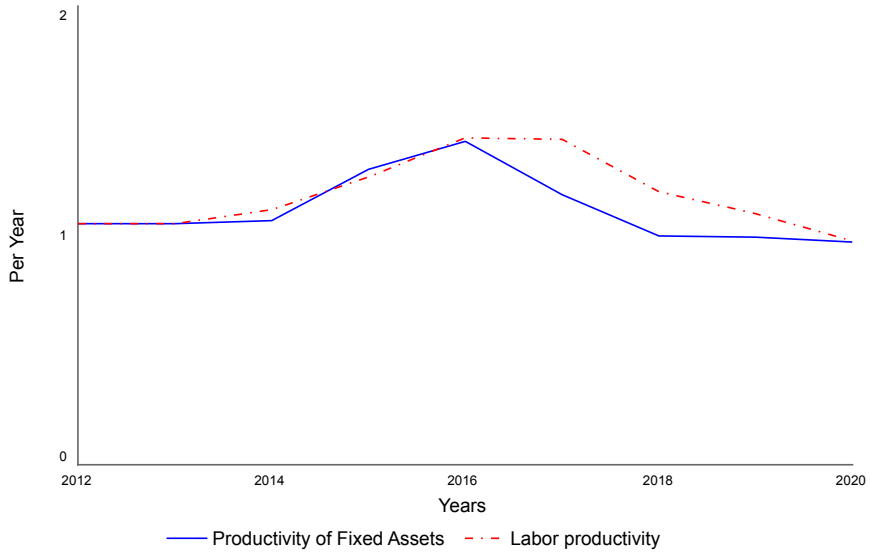

Figure 4. The value of productivity of fixed assets and labor productivity of the company "Farmak" during 2012-2020

According to Figure 5, ROE and ROA also decrease in the same period as the productivity of labor and fixed assets, which in turn leads to the fact that the company has reduced the efficiency of fixed assets and this leads to a slower growth rate of production and as a result, slower growth of enterprise revenue. Also, this leads to a decrease in the growth rate of net income especially in 2019-2020, when they were the lowest (1% and 8%, respectively).

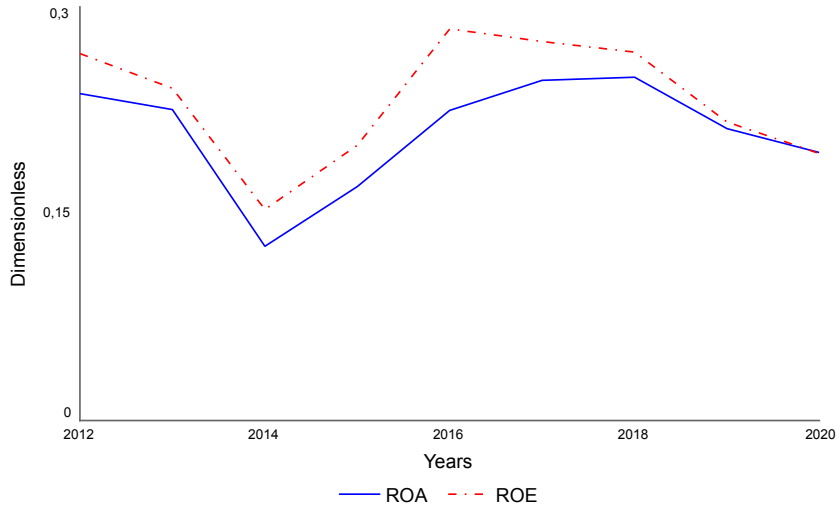

Figure 5. The value of ROA and ROE of the company "Farmak" during 2012-2020

According to the constructed model and simulation, applying the modes of system dynamics, during 2012-2020, the hypotheses built in the beginning about the reduction of ROA and ROE of the company "Farmak" due to reduced productivity of labor and fixed assets in 2018-2020 were confirmed. In addition, it was explained that as a result of the reduction, the value of return on assets and equity corresponds to the real values, which were calculated earlier and presented in Figures 5, which is an additional factor confirming the application of this model and its results.

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