The Impact of Financial and Performance Indicators on Labor Productivity in Construction and Engineering Companies Listed on the BVB

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Abstract

Labor productivity is the result of the interaction of a number of complex factors, including employee motivation, allocated resources, the work environment, the level of education and experience, and the financial performance of the economic entity. Integrating effective strategic approaches aimed at increasing performance indicators can contribute significantly to the overall productivity growth and long-term success of the organization. To this end, databases of companies operating in the construction and engineering industry were used to pursue this analysis and the relationships between labor productivity and performance indicators were tracked. The results indicated a significant positive correlation demonstrating the association between productivity and performance. We conclude in the present study that labor productivity can be influenced by the increase in financial performance and the way top management integrates strategic decisions aimed, at the expense of investment in human capital, at increasing productivity.

Key words: labor productivity, economic-financial performance, employee motivation, correlation, regression
J.E.L. classification: M41, M45

1. Introduction

Work productivity is significantly influenced by a number of factors, including the level of employee motivation, the implementation of effective occupational health and safety policies, the provision of competitive salary rights and benefits, and the provision of modern work equipment and advanced technologies that can significantly contribute to increased employee engagement and satisfaction. Organizations with a positive organizational culture and effective leadership are able to maintain a high level of motivation among their human resources, thus boosting productivity.

2. Literature review

Investments in high-quality projects, intangible assets, research and organizational development can have a significant impact on productivity. Implementing modern and advanced technologies that make it easier for employees to do their jobs can lead to an increase in individual and team-wide efficiency and productivity (Ferrando and Ruggieri, 2018; Lessa, 2022).

Some authors argue that well-structured reward systems can additionally motivate employees, leading to increased productivity (Bocean and Sitnicov, 2015; Smoluk, 2019). Other authors emphasize the role of formal education obtained in the public school system and on-the-job experience in increasing individual productivity (Chowdhury, 2014). Also, other studies (Afonso et al, 2021; Chen et al, 2022) correlate the financial performance of companies with the level of labor productivity, highlighting the role of economic and financial indicators as determinants. Thus, indicators such as turnover (Turnover), net profit (NP), average number of employees (NmA), economic rate of return on assets (ROA), financial rate of return (ROE) and commercial rate of

return (ROS) provide an overview of the company's financial performance and how it utilizes available resources.

Through the efficient use of resources, top management can contribute to increased labor productivity through decisions related to the purchase of modern machinery, equipment and infrastructure, automation of repetitive processes allowing employees to focus on more complex and higher value-added tasks, investment in employee education and training to better adapt to new technologies and competitive market requirements, allocation of capital to stimulate innovation, integration of ERP systems which brings numerous benefits including increased productivity (Relich, 2017; Meiryani et al,2021). From this point of view financial indicators can be predictors in determining high productivity.

A detailed analysis of these financial indicators, in correlation with the other determinants of labor productivity, can provide a complex picture of how they influence profitability at the company level. Integrating decision-making solutions that help to improve financial indicators as well as motivational factors can significantly contribute to increased work profitability and long-term organizational success.

The economic and financial indicators mentioned above can influence labor productivity in several ways:

- Turnover indicates the level of demand for products or services and a higher level of this indicator reflects an increase in output through the efficient use of resources, increasing productivity;
- Net profit indicates the level of profitability of the entity. A high level of this indicator suggests that the firm is efficiently managing costs and generating value. Net profit can be reinvested or distributed as dividends to shareholders;
- The average number of employees can contribute to labor productivity by allowing for an even distribution of work-related tasks and preventing overwork. This can lead to better work organization and increased efficiency;
- Ratios for determining profitability, such as the economic rate of return (ERR) and the rate of return on equity (ROE), indicate how well companies' resources are being utilized.A higher value of these rates indicates efficient use of company resources leading to productivity. A high level of financial ROE can provide the company with the resources to invest in new technologies, modern work equipment and also in employee training, which would contribute to increased labor productivity in the long run;
- Commercial profitability rate reflects the profitability per unit sold on the efficiency of the entity's core operations. A higher value of this indicator demonstrates a greater ability to generate more profit from sales, stimulating production and innovation.

We track financial indicators to estimate the level of labor productivity within companies so that top management can more effectively allocate resources to the departments or projects that have the greatest potential to contribute to productivity growth.

3. Research methology

The research is determined by its aims and objectives and consists in analyzing the relationship between labor productivity and performance indicators. The relationship is analyzed by various statistical methods such as correlation, multiple linear regression and mathematical determination of the regression equation. These methods make it possible to identify the factors that have a significant influence on productivity and to quantify the magnitude of the impact of each factor.

Data were collected for 16 companies in the construction and engineering industry, as presented in the "Industrial & Commercial Services" section and the "Construction & Engineering" subsection of the "Industrials" category of the LSEG - Eikon data platform. Information on turnover, net profit, average number of employees, economic rate of return on assets (ROA), financial rate of return (ROE) and return on revenue (ROS) were selected from the financial reports. Labor productivity was calculated as the ratio of turnover to average number of employees. Data were selected for the period 2014-2023, i.e. for 10 fiscal years, from companies listed on the Bucharest Stock Exchange.

After establishing the economic-financial performance indicators, the correlations between the dependent variable "Labor Productivity" and the independent variables (CA, Pn, NmA, NmA, ROA, ROA, ROE, ROS) were tested and a multiple linear regression model was performed, having "Labor Productivity" as dependent variable.

The correlation analysis and the application of the regression model was carried out using *SPSS version 26.0* statistical analysis software. The regression model was performed with the help of *analysis* function, through *regression* section and the method used was *enter* method (Siminică et al, 2017).

The regression equation to model the complex relationships between variables and obtain valuable information for econometric analysis will be of the form:

$$\mathbf{PM = c1*y1+c2*y2+c3*y3+c4*y4+c5*y5+c6*y6+\varepsilon},$$

where: y1 = turnover (Turnover);
y2 = Net profit (Pn);
y3 = Average number of employees (NmA);
y4 = Return on Assets (ROA);
y5 = Return on Equity (ROE);
y6 = Rate of Return on Sales (ROS);
c1...c6 = the valence of coefficients;
ε = Error.

The research on which this paper is based is formative. The information that has been collected from companies operating in the construction and engineering industry and which are listed on the Bucharest Stock Exchange, are the basis of our analysis to determine the main objective.

4. Fidings

Correlation is an efficient measurement tool of statistical analysis that helps us to better understand the relationship between variables. With this tool, we can assess causal or interdependent relationships between two or more variables. The main purpose is to determine whether there is a significant association and to describe the nature of this association. Descriptive statistical analysis allows the identification of potential problems with the data, such as missing values, measurement errors or non-normal distributions. It also provides valuable information about the central tendencies, variability and shape of the distribution of each variable.The process of correlation analysis involves a number of essential steps, the first of which is descriptive statistical analysis.

Table no. 1. Analysis of descriptive statistics

Variable	Mean	Std. Deviation	N
PM	77,35	43,000	142
CA	81,50	44,035	142
PN	79,75	44,828	142
NmA	36,46	25,626	142
ROA	74,18	40,012	142
ROE	75,47	42,497	142
ROS	74,51	40,172	142

Source: table taken from SPSS

The descriptive statistical analysis presents relevant information for a total of seven variables. The table gives an overview of the mean values, standard deviation and number of observations for each variable.

The standard deviation values are lower than the mean which means that the data are more concentrated around the mean values and the study is a relevant one and one can perform the correlation level analysis and the appropriate regression model.

In order to identify the relationships between variables, Pearson correlation coefficient is determined as a first step in this analysis process.

Table no. 2. Pearson correlation between financial indicators and labor productivity

Correlations		PM	CA	PN	NmA	ROA	ROE	ROS
Pearson Correlation	PM	1,000	,608	,648	,048	,500	,422	,483
	CA	,608	1,000	,502	,747	,099	,035	,141
	PN	,648	,502	1,000	,136	,800	,590	,801
	NmA	,048	,747	,136	1,000	-,242	-,264	-,194
	ROA	,500	,099	,800	-,242	1,000	,779	,833
	ROE	,422	,035	,590	-,264	,779	1,000	,586
	ROS	,483	,141	,801	-,194	,833	,586	1,000

Source: table taken from SPSS

The Pearson correlation analysis revealed significant correlations between the dependent variable labor productivity and the independent variable turnover, the Pearson coefficient being .608 with a sig. significance level of less than 0.01; a significant correlation between net profit and labor productivity, the correlation coefficient being .648 and a sig. less than 0.01; a significant correlation between the economic rate of return and labor productivity with a sig. significance level of less than 0.01; a significant correlation between the financial rate of return and labor productivity with a sig. significance level of less than 0.01; a significant correlation between the income rate of return and labor productivity with a sig. significance level of less than 0.01.

An insignificant correlation was obtained between labor productivity and the average number of employees, the correlation coefficient being .048. The indicator has a sig. sig.

Following the correlation analysis, tests were conducted to obtain the appropriate multiple linear regression model. The first test performed in the econometric analysis is given by the summary model in which the R and R^2 values are presented.

Table no. 3 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change
1	,880a	,775	,765	20,855	,775

Source: table taken from SPSS

The values of R and R^2 tend towards level 1. These results demonstrate that the regression equation is significant for this study. The multiple correlation coefficient (R-squared) has a value of 0.775. The value provided, 0.880a, represents approximately 0.88, but the letter "a" indicates that the p-value associated with R-squared is statistically significant at a certain α (alpha) level of 0.05. The closer the R-value is to 1, the more the model explains more of the variance of the dependent variable.

The value $R^2 = 0.775$, represents the proportion of the variance of the dependent variable that is explained by the independent variables included in the model. In this case, the model explains about 77.5% of the variance of the dependent variable "Labor productivity".

Another test is the ANOVA F-test. This must be as high as possible to obtain statistical significance of the differences between groups. The value of the F-test and its significance level are presented in the ANOVA table:

Table no. 4 ANOVA test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	201998,369	6	33666,395	77,409	,000
	Residual	58713,723	135	434,916		
	Total	260712,092	141			

Source: table taken from SPSS

The ANOVA table confirms that the multiple linear regression model fits the data well. The independent variables included in the model explain a significant part of the variance of the dependent variable.

According to ANOVA test, F = 77,409 and Sig. =,000, that the statistical validation of the regression model gives us confidence in the accuracy of the coefficients of the equation and its mathematical form. The results obtained are presented in the following table:

Table no. 5 Coefficients of the regression equation for the independent variables

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15,804	5,888		2,684	,008
	CA	1,118	,078	1,144	14,243	,000
	PN	,051	,105	,053	,482	,631
	NmA	-1,294	,120	-,771	-10,816	,000
	ROA	,111	,117	,103	,948	,345
	ROE	,064	,068	,063	,944	,347
	ROS	,007	,093	,007	,080	,936

Source: table taken from SPSS

The mathematical form of the regression equation can be determined using the coefficients presented in the table above:

PM=15,804+1,118*CA+0,051*PN-1,294*NmA+0,111*ROA+0,064*ROE+0,007*ROS+ε

By deriving the regression equation, it is shown that economic-financial performance indicators have a direct influence on labor productivity through the mathematical expression of this relationship.

5. Conclusions

In this study, we analyzed the relationship between financial indicators and labor productivity for 16 companies operating in the construction and engineering sector, listed on the Bucharest Stock Exchange. There is a significant and positive correlation between financial indicators and labor productivity, which indicates that an increase in the financial performance of companies is associated with an increase in labor productivity. Thus, through the correlation relationships between the dependent variable "Employee Productivity" and the independent variables "Turnover", "Net Profit", "Average Number of Employees", "Economic Rate of Return on Assets", "Financial Rate of Return" and "Commercial Rate of Return", it can be stated that our study demonstrates a significant and positive correlation between financial indicators and labor productivity, emphasizing the crucial role of effective financial management in boosting productivity.

The multiple linear regression model developed explains 78% of the variance of labor productivity. This result confirms the robustness of the model and the relevance of the financial variables included in the analysis.

The results of this study have significant practical implications for companies in the construction and engineering sector such as:

- effective financial resource management essential for increasing productivity by focusing on improving financial performance, increasing turnover and profitability;
- by investing in human capital through training courses, the acquisition of modern infrastructure and technology and the implementation of effective digital solutions;
- a positive and motivating work environment that encourages creativity, collaboration and employee engagement.

Implementing these recommendations can make a significant contribution to improving the overall performance of companies in the construction and engineering sector, strengthening their competitiveness in the market.

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