PRODUCTIVITY, TECHNICAL EQUIPMENT AND SALES. EMPIRICAL EVIDENCE FROM THE ROMANIAN COMPANIES

DEMYEN SUZANA
ASSISTANT, PHD CANDIDATE, UNIVERSITY "EFTIMIE MURGU" OF REŞIŢA
FACULTY OF ECONOMIC SCIENCES
e-mail: s.demyen@uem.ro
MILOŞ LAURA RAISA
ASSOCIATE PROFESSOR, PHD, UNIVERSITY "EFTIMIE MURGU" OF REŞIŢA
FACULTY OF ECONOMIC SCIENCES
e-mail: l.milos@uem.ro

Abstract

The relationship between turnover and organizational performance represented the field of interest for various authors in literature, some of the studies identifying even a strong association between the organizational performance and the management of human resources itself. Turnover thus represents an indicator of results which has a fundamental role in characterizing the efficiency of the activity carried out by a company.

The final results are conditioned by the volume of resources, which are however, limited, an efficient strategy of management being necessary for the correct accomplishment of the previous established objectives and capitalization of its real potential. Findings regarding the size of a business or a company and its variation in time are necessary in attracting and securing the resources which are indispensable for achieving the objectives and goals proposed. To fully understand a company's activity, any analysis of an indicator must include a description of its dynamics. Thus, the analysis of the turnover in time can be achieved using conventional statistical models. In concrete terms, it is part of the economic and financial results indicators, helping to diagnose and to evaluate the company, estimating efficient management practices. The present paper aims at illustrating the relevance of a factorial analysis model for a sample of enterprises selected, the results highlighting the connection between the sales and labor productivity, but also between sales and the degree of technical equipment. The study revealed the following aspects: a positive and direct connection between labor productivity and sales, so we can state that higher levels of productivity produce higher sales, but also a negative connection between the degree of technical equipment and the level of sales, relation which is very important since we want to know how well a business is employing its assets to generate sales.

Keywords: *enterprise, turnover, sales, performance, productivity, technical equipment*

JEL Classification: *L25, M19*

1. Introduction

Enterprise behaviour is widely „described and explained by profit maximization" [33], still, when discussing about organizational behaviour, performance has to be taken into consideration as the main goal. According to Bevan et al. [5], the concept of „enterprise performance" is „relatively fluid" [5], reason why it becomes necessary to perform an analysis attempting to determine „the relevant indicators" [5] in order to select the proper determining factors.

A company „may use different methods and diverse" financial or nonfinancial indicators in order to „estimate business success" [24]. Several authors in literature have examined the relationship between turnover and organizational performance [22], designing a widely developed perspective, not only from economical point of view, but also sociological and managerial approaches were stated, still, one of the most applied method reffers to financial analyses that use profitability ratio „as the key measure of the firm's overall efficiency and performance" [24]. Baron, Hannan and Burton [2] show a negative association between turnover and organizational outcomes (sales, profit), while others (Keck, Romanelly) [17] identity a positive relationship between concepts. Turnover represents mainly the total income derived from the current commercial activities of an enterprise, being considered one of the most important indicators [6-7] for measuring the economic performance of the company. It also determines the position on the market for a company, „providing information about the dynamics of the activity, while indicating the chances of expanding the business or the degree of importance gained by the enterprise in a specific field of activity" [6-7].

Thus, we identify ideas according to which the performance reached at enterprise level improves while being reflected in indicators such as profitability, efficiency or other outcomes [3].

2. Theoretical background

The available resources or the ones at the disposal of the company are always limited. Enterprises are forced thus to manage them in a reasonable efficient manner, so that they may achieve or fullfill a set of goals previously established, but at the same time, they have to ensure a certain level of performance, competitiveness and capitalization of real potential. Human resources represent a category that is vital for every business process and also an element that demonstrates a double set of features: not only phisical, but also intellectual ones.

When speaking about performance, we note that the concept is present in every area and can often be associated with efficiency, effectiveness and competitiveness [12]. However, from economic point of view, performance at a company level "includes the ability to access resources, allocate and use them optimally in order to cover remuneration sufficient to justify the risk assumed and the interest, for a future sustainable developments path. The performance lies therefore in the efficiency and effectiveness of the resources consumed (effort) and generated results (effect) that would ensure and develop his sphere of interest" (Petcu) [25]. At the microeconomic level, on the other hand, performance is characterized as a state of competitiveness of the economic entity, reached by a level of productivity and efficiency which ensures a lasting presence in the market (Niculescu, Lavalette) [21].

At enterprise level, we may discuss performance as a „result of managing various economic resources and of their efficient use within operational, investment and financing activities" (Burja) [8].

Literature (Jamal, Asadi) [16], studied the relationship between management efficiency and profitability, finding a "high degree of correlation" [1] between the two indicators analysed – profitability and enterprise efficiency. Some authors (Iqbal & Mati) [15] assign a high productive capacity for the fixed assets, especially in manufacturing companies, but also stated that the based assets are considered "the basis to generate and accumulate the current assets" (Barbulescu) [4]. However, the economic efficiency reveales the complex relationship that occurs between effects or results of an activity, on one hand, and the efforts incurred in order to obtain them. "Efficiency will be greater as the same quantity of inputs generates a higher level of outputs" [4].

From efficiency point of view, literature (Băileşteanu) [3] identifies the following system of indicators, consisting of three main categories, namely analytical indicators, synthetical indicators and complex indicators.

The first category includes:

- Analytical indicators of effort, namely the average number of employees, the average number of workers, the average number of directly productive workers, the average number of specialized workforce, the total work-time, the total wage fund;
- Analytical indicators of effects, like: turnover, profit, production and natural resource savings;
- Social indicators: job security, access to leisure, healthcare degree;
- Analytical indicators of structure: the share of skilled workers in total employees, the share of qualified specialists in total employees;

The category of synthetical indicators includes: *the productivity of human resources*, calculated as the ratio of production, turnover or profit and the average number of employees, or *the profitability of human resources*, computed as the ratio between gross profit and the total number of employees, which aims to express "their ability to generate profit" [3].

The category of complex indicators is represented by the efficiency gross complex coefficient, which aims to illustrate "the total effect equivalent as nature, obtained at 1 unit of wages" [3] and also by the efficiency net complex coefficient, which indicates "the net effect equivalent to 1 unit of wages" [3].

Labour productivity represents a complex qualitative indicator, which ensures and guarantees the competitiveness and efficiency of an enterprise, when registering a positive evolution [23]. At macroeconomic level, on the other hand, labour productivity manifests influence upon the increase of national income and country performance evolution.

Economic progress requires a well established economic and financial mechanism for businesses, which emphasize the evolution based on the achievement of the planned production. When determining labour productivity, we have to consider it as an efficiency indicator of the production process, as well as the expression of a ratio between effects and efforts (Paşa) [23]. Labour productivity becomes further an expression of economic efficiency, which is characterized by a system of indicators: workforce, the use of fixed assets, the use of raw materials, investments, financial resources and commercial activity.

By analyzing labor productivity we primarily intend to assess the level of this indicator, but also the variations in time, aiming to identify the main factors influencing the change. The objective of any organization, from this

perspective, will consist in the increase of labour productivity and efficiency of the business. An enterprise development is possible only through a continuous growth of this indicator.

Factors affecting the level of labor productivity are numerous: technological developments, improvement of organizational management, production and employment; qualifications, professional development and the increased ability of contractors, the quality of human factor.

According to literature (Buglea, Lala) [5-6], elements that influence labour productivity exert their influence as follows:

- Average number of hours worked by an employee directly determines the change in the level of labor productivity, in proportion to the base period level of hourly labour productivity;
- Changes in the average length of working hours determines the change in labour productivity through their impact on the number of hours worked on average by an employee, directly proportional to levels corresponding to the basis period of the level of hourly labour productivity;
- The number of days worked on average per employee influence change in labour productivity through their impact on the change in the number of hours worked on average by an employee, directly proportional to the level of the basis period of the hourly productivity of labour and the current period of the average length of working day;
- Changes in the hourly labour productivity directly affect the overall labour productivity, proportional with the level in the current period regarding the average number of hours worked by an employee;
- Changes affecting the structure of production influence change of labour productivity through their impact manifested on the variation of hourly labour productivity, in the same direction and proportional with the level of the current period of the average number of hours worked by employees;
- Changes in the hourly productivity per product generates changes of the overall labor productivity by their impact on the hourly labour productivity change, in direct proportion to the current period, of the average number of hours worked per employee.

Labour productivity growth imposes new working relationships in all areas of professional development and activities, as well as for each component of the assembly work, namely individual and collective responsibility. Human factor contribution to economic development highlights a complex and comprehensive process, which requires equally a rational occupation, use of workforce and social productivity evolution.

Fixed assets represent the main elements of the enterprise patrimony, participating at their full value in the labour process, value that gradually transmited on the products.

In the analysis of fixed assets we aime the following aspects:

- The analysis of the volume and dynamics of fixed assets;
- The analysis of the structure of fixed assets;
- The analysis of the use of technical potential.

The quality of technical potential can be assessed not only through the structure of fixed assets or their technological composition, but also by the degree of use.

It is known that in the production process, a fixed asset transfers a part of its value to the products or activities to which is directly connected. Therefore, the quality of technical potential must be assessed by the degree of their depreciation.

The degree of production capacity (GUCP) shows the maximum production that can be obtained in a time using fixed assets (technical equipment) in return to the predicted results, by the provided design and optimal operation. It is used in determining the cost of secondary activities, respectively the cost of non-using machinery. The main aspects arising from this analysis are:

a) the structure of fixed assets;

b) the degree of capitaliation regarding the working-time.

According to Al Ani [1], Li [20] (in Al Ani Mawik [1]) explaines the negative association between fixed assets, future profitability, and stock returns, through a study which analyzed the financial statements for a panel of firms from 1962 to 2002. The result consisted in presenting a negative association between the investment variable and future profitability variable [20].

The correct valuation of the economic dimensions for the activity of an enterprise and also the recognition of changes that occur in time are mandatory for providing the neccesary resources in order to achieve the organizational goals. Any sustainable business involves a rational reason of existance, measured mainly by the economical and financial performance, as an expression of the efficiency of production. The analysis of the turnover of an enterprise, regardless of its field of activity, should clarify the present position of the enterprise, the dynamics of the main

performance indicators, but also the most important sources of income. A factorial analysis of turnover is ussualy conducted differentiated, according to the field of activity. We can thus identify specific determining factorial analysis models, also specific causal relations.

The starting point for the present study consisted in the factorial analysis of turnover, which contributes in „highligting the correlation between the workforce and turnover", according to Lala Popa and Miculeac [18], as well as the analysis models expressing „the correlation between technical potential and turnover" [19].

Arguments can be therefore translated as follows [6]:

1. in the case of the factorial model that espresses the correlation between the average number of employees and turnover, the factorial model will be established as:

$$CA = \overline{N_s} * \frac{Q_f}{\overline{N_s}} * \frac{CA}{Q_f} \quad (1)$$

where $\overline{N_s}$ = the average number of employees

$\frac{Q_f}{\overline{N_s}}$ = the labour productivity

$\frac{CA}{Q_f}$ = the leverage of manufactured products

When identifying the factors of influence, we observe that the intensity of action for each factor can be measured as follows:

$$\Delta CA = CA1 - CA0 \quad (2)$$

Assessing the intensity of [6-7]:

- the dynamics of the average number of employees:

$$\Delta CA(\overline{Ns}) = \overline{Ns_1} \times \frac{Qf_0}{Ns_0} \times \frac{CA_0}{Qf_0} - \overline{Ns_0} \times \frac{Qf_0}{Ns_0} \times \frac{CA_0}{Qf_0} = (\overline{Ns_1} - \overline{Ns_0}) \times \frac{Qf_0}{Ns_0} \times \frac{CA_0}{Qf_0} \quad (3)$$

- the dynamics of the labour productivity;

$$\Delta CA(Qf/\overline{Ns}) = \overline{Ns_1} \times \frac{Qf_1}{Ns_1} \times \frac{CA_0}{Qf_0} - \overline{Ns_1} \times \frac{Qf_0}{Ns_0} \times \frac{CA_0}{Qf_0} = \overline{Ns_1} \times \left(\frac{Qf_1}{Ns_1} - \frac{Qf_0}{Ns_0}\right) \times \frac{CA_0}{Qf_0} \quad (4)$$

- the dynamics of the leverage of manufactured products;

$$\Delta CA(CA/Qf) = \overline{Ns_1} \times \frac{Qf_1}{Ns_1} \times \frac{CA_1}{Qf_1} - \overline{Ns_1} \times \frac{Qf_1}{Ns_1} \times \frac{CA_0}{Qf_0} = \overline{Ns_1} \times \frac{Qf_1}{Ns_1} \times \left(\frac{CA_1}{Qf_1} - \frac{CA_0}{Qf_0}\right). \quad (5)$$

The total deviation will be therefor determined as the following equation:

$$\Delta CA = \Delta CA_{(\Delta Ns)} + \Delta CA_{(\Delta Qf/Ns)} + \Delta CA_{(\Delta CA/Qf)} \quad (6)$$

The action of inputs will result in the following explanations [12-13]:

- changes in the number of employees determine the level of changes of turnover, directly and in the same direction as the level recorded in the basis period;
- the changes in labour productivity determine the variation of turnover directly and to the same extent as the level of the average number of employees, and the degree of manufactured products leverage respectively;
- changes regarding the leverage of manufactured products determines changes in the level of turnover, directly and at the same extent as the average number of employees and the labour productivity during the same period of time.

2. In the case of the factorial model that highlights the relationship between the organizational potential and turnover, the factorial model will be established as follows:

$$CA = \overline{N_s} * \frac{\overline{Mf}}{\overline{N_s}} * \frac{\overline{Mf^1}}{\overline{Mf}} * \frac{Qf}{\overline{Mf^1}} * \frac{CA}{Qf} \quad (7)$$

Where:

$\overline{N_s}$ – the average number of employees

$\overline{Mf}$ – the average annual value of fixed assets

$\frac{\overline{Mf}}{\overline{N_s}}$ – the degree of technical equipment

$\overline{Mf^{'}}$ – the average annual value of fixed assets which are directly productive

$\frac{\overline{Mf^{'}}}{\overline{Mf}}$ – the share of directly productive fixed assets in total fixed assets

$\frac{Qf}{\overline{Mf^{'}}}$ – the return of directly productive fixed assets

$\frac{CA}{Qf}$ – the leverage production or average turnover at 1 lei manufactured production

When identifying the factors of influence, we observe that the intensity of action for each factor can be measured as follows:

$$\Delta CA = CA1 - CA0 \quad (8)$$

Assessing the intensity of [6-7]:

- the dynamics of the average number of employees

$$\Delta CA_{(Ns)} = \left(\overline{Ns_1} - \overline{Ns_0}\right) \times \frac{\overline{Mf_0}}{\overline{Ns}} \times \frac{\overline{Mf_0^{'}}}{\overline{Mf_0}} \times \frac{Qf_0}{\overline{Mf_0^{'}}} \times \frac{CA_0}{Qf_0} \quad (9)$$

- the dynamics of i the average annual value of fixed assets

$$\Delta CA_{(Mf/Ns)} = \overline{Ns_1} \times \left(\frac{\overline{Mf_1}}{\overline{Ns_1}} - \frac{\overline{Mf_0}}{\overline{Ns_0}}\right) \times \frac{\overline{Mf_0^{'}}}{\overline{Mf_0}} \times \frac{Qf_0}{Mf_0^{'}} \times \frac{CA_0}{Qf_0} \quad (10)$$

- the dynamics of the degree of technical equipment

$$\Delta CA_{(Mf^{'}/Mf)} = \overline{Ns_1} \times \frac{\overline{Mf_1}}{\overline{Ns_1}} \times \left(\frac{\overline{Mf_1^{'}}}{\overline{Mf_1}} - \frac{\overline{Mf_0^{'}}}{\overline{Mf_0}}\right) \times \frac{Qf_0}{Mf_0^{'}} \times \frac{CA_0}{Qf_0} \quad (11)$$

- the dynamics of the average annual value of fixed assets which are directly productive

$$\Delta CA_{(Qf/Mf^{'})} = Ns_1 \times \frac{\overline{Mf_1}}{\overline{Ns_1}} \times \frac{\overline{Mf_1^{'}}}{\overline{Mf_1}} \times \left(\frac{Qf_1}{Mf_1^{'}} - \frac{Qf_0}{Mf_0^{'}}\right) \times \frac{CA_0}{Qf_0} \quad (12)$$

- the dynamics of the leverage production;

$$\Delta CA_{(CA/Qf)} = \overline{Ns_1} \times \frac{\overline{Mf_1}}{\overline{Ns_1}} \times \frac{\overline{Mf_1^{'}}}{\overline{Mf_1}} \times \frac{Qf_1}{Mf_1^{'}} \times \left(\frac{CA_1}{Qf_1} - \frac{CA_0}{Qf_0}\right) \quad (13)$$

The total deviation will be therefor determined as the following equation:

$$\Delta CA = \Delta CA_{(Ns)} + \Delta CA_{(Mf/Ns)} + \Delta CA_{(Mf^{'}/Mf)} + \Delta CA_{(Qf/Mf^{'})} + \Delta CA_{(CA/Qf)} \quad (14)$$

3. Data and methodology

3.1. Data

The data that we used in the present study was provided by the following sources: the National Institute of Statistics [30], through the official Reports, the National Council of Small and Medium Sized Enterprises, through the studies conducted during the analysed period of time (2012-2014) [31]. The sample consisted in 56 companies, selected on the following criteria: the category of SME's (micro level, small enterprises, medium sized enterprises) and the field of activity (constructions, industry, services, commerce/trade).

The starting point of the study was represented by the available data for the year 2013 regarding small and medium sized enterprises at the level of the Western Region. It is important, however, to mention that this region occupies the penultimate position among the development regions of Romania, according to the following chart:

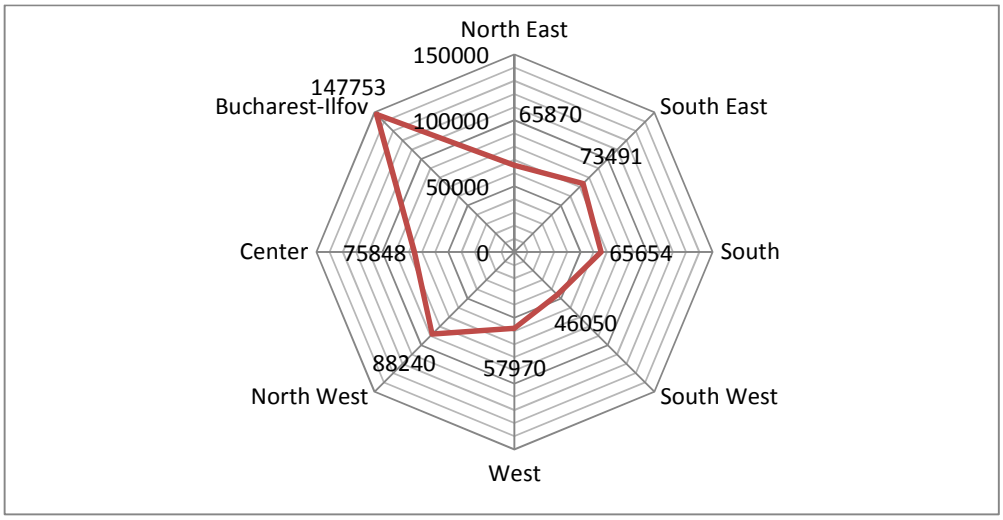

Figure 1 – Number of SMEs – national level – 2013
Source: The White Book of SMES [31]

In accordance with the available data, the structure of the sample was determined as follows:
- microenterprises –91,65%
- small enterprises – 7,03%
- medium sized enterprises - 1,32%

The structure of the sample based on the „field of activity" criteria show us the following situation:
- constructions – 8 enterprises
- services – 21 enterprises
- commerce / trade – 17 enterprises
- industry – 10 enterprises

For each company we selected the information regarding:
- the annual sales registered
- the labour productivity
- the average number of employees
-the value of fixed assets.

The previous mentioned information was individually selected for the years 2012 – 2014, for each company, by using the annual financial statements, published on the website of the Ministry of Public Finances [36]. Still, indicators like the labour productivity are not directly available, so we had to compute it as a ratio between the overall production and the number of employees.

We therefore study the impact of labour productivity and degree of technical equipment (computed as the ratio between the fixed assets and the number of employees) on the annual sales of a company, using a panel dataset of 56 enterprises. We identify as main advantages of this method: „a more accurate inference of model parameters", a simplified computation, but also a greater „capacity of capturing" the complexity of the managerial process [10], thus allowing control for other characteristics which are unobservable at first sight, especially the quality of management, which may also affect the overall performance and the labour turnover [27].

The main objective of the study was to determine the relationship between the input indicators and output indicators, by measuring the influence of the above listed variables upon the annual sales registered by the company.

In order to achieve this goal, we developed an econometric model, which offers us a simplified image of the relationship between the economic variables used [29], given not only their definition, but also identifying the relationship of mutual conditioning. Also, according to Campbell [9], regression analysis represents „one way to study company performance", recent literature analysing the profitability and performance of an enterprise through various variables [8].

3.2. Methodology

In statistical notation, the model can be described as it follows:

$$Sales_{i,t} = \alpha_0 + \alpha_1 W_{i,t} + \alpha_2 TE_{i,t} + \varepsilon_{i,t} \quad (15)$$

where $Sales_{i,t}$ is the dependent variable, the annual sales registered by the company, and the following independent variables: $W_{i,t}$, the labour productivity, respectively $GIT_{i,t}$, the degree of tehnical equipment, computed as the ratio between the fixed assets and the number of employees, and $\varepsilon_{i,t}$ is the error term.

From a methodological point of view, we will first run an OLS model regression. The major problems with the pooled OLS model is that it does not distinguish between the companies, ignoring the heterogeneity or individuality that may exist among these. Therefore we will also run an individual-specific effects model that allows for heterogeneity across companies.The main question is whether the individual-specific effects are correlated with the regressors. If they are correlated, then we will have a fixed-effects model and if they are not, we will deal with a random effects model. We applied Hausman-Test to check which model (Fixed Effect or Random Effect model) is more appropriate. A fixed effect model was found to be more appropriate.

4. Results and conclusions

Following the methodology, the equation specified above was finally estimated with Panel EGLS,alongside White diagonal standard errors & covariance. The results can be depicted in the table below (Table no.1).

Table 1

Dependent Variable: CA
Method: Panel EGLS (Cross-section weights)
Sample: 2012 2014
Periods included: 3
Cross-sections included: 56
Total panel (balanced) observations: 168
Linear estimation after one-step weighting matrix
White diagonal standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8292719.	143734.2	57.69481	0.0000
W	4.562571	0.943910	4.833693	0.0000
GIT	-19.54443	3.618898	-5.400658	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.994253	Mean dependent var	24265626
Adjusted R-squared	0.991275	S.D. dependent var	30946422
S.E. of regression	3221638.	Sum squared resid	1.14E+15
tiveF-statistic	333.8798	Durbin-Watson stat	2.446952
Prob(F-statistic)	0.000000		

The R^2 value is 0.99, meaning that the statistical connection between the dependent and the independent variables is strong. The obtained results for level of significance of the coefficients of the independent variables are significant (p-value<0.01). The Durbin-Watson statistics indicates the presence of some "right" autocorellations in what regards the residuals. On the whole, the quality of the model can be considered as satisfactory.

The results of the econometric model show:

- a positive connection between labor productivity and sales. Higher levels of productivity, produce higher sales.
- a negative connection between the degree of technical equipment and the level of sales. The degree of tehnical equipment should, in theory, be positively related with sales. The degree of technical equipment should reflect the investments in fixed assets that the company realized. However a negative effect could be explained by the fact that holding fixed assets larger than a certain threshold, or in other words the overinvestment in assets would lead to lower liquidity and reduce the firm sales and profitability. This could be generated by the fact that the larger investment needs a time delay before the new assets start generating revenues or that the firm has invested in areas that do not increase the operational capacity, resulting in no additional troughput. This relation is very important since we want to know how well a business is employing its assets to generate sales.

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