HUMAN CAPITAL'S IMPACT ON THE PERFORMANCE OF ROMANIAN KNOWLEDGE BASED COMPANIES

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To meet the desiderata expressed by the implementation of knowledge-based economy, companies must reconsider development strategies and must facilitate the shift from a management largely based on resource consumption to knowledge-based management. In this view, the importance of the human factor increases, becoming a precious resource that creates value and competitiveness. This paper shows the interaction between company performance and human capital, exemplifying this aspect through a case study based on a regression model in Romanian software companies. The obtained results show the strong connection between company performance, expressed by net income, and the quality of the human capital, synthesized by labour productivity.

Keyword: human capital, performance, labour productivity, knowledge assets
JEL Classification: L25, M54

1. Introduction

Knowledge based economy requires companies to rethink the role of production factors in creating value and increasing performance. Human resources represent the active and determining factor in the activity of companies. Human capital has a decisive role on the results obtained by companies through the substitution of ideas for physical matter in the process of creating value (Sheehan, 2010). A study conducted by Ernst&Young for 98 listed European companies concluded that human capital contributes an average of 30% to the market capitalisation of a company (Binvel et al., 2010).

Since 1996, Handy has identified that a key element for boosting organisational changes in companies is the good management of employees' knowledge and skills. Thus, human capital opens up new opportunities for economic growth by exploiting the potential of knowledge, creation and innovation of the company. It creates the most important segment of intangible assets and, to the extent that it is used efficiently, it contributes decisively to company performance. Currently, the management strategies applied by companies take into account expanding the techniques of knowledge based management and adopting an integrated vision where the intellectual capital management is promoted in direct connection with organisational learning management and organisational knowledge management. As the implementation of these strategies takes place, the conditions for improving performance through productivity and higher quality arise, which happens through a continuous process of innovation (Minnone and Turner, 2009).

Being in an ongoing process of reorganization of the productive, organizational and legal structures, especially after joining the European Union (2007), Romania has experienced a strong dynamism in the economic sectors, including the software industry. According to Eurostat, between 2006 and 2010, the information technology expenditure recorded an increase of 30.4%.

This study aims to highlight the interaction between performance and human capital within Romanian software companies.

In analyzing the correlations between the performance recorded at microeconomic level and human capital, an important issue is choosing the indicators so that their specific content will

better serve the pursued goal. Of the many indicators used to study performance, we chose Net income, which synthetically expresses the efficiency of companies.
Another reason to choose the indicator is that companies don't recognize the intellectual capital used in their practice as an element of asset. Although it is generally accepted that creating value is closely linked to the presence and quality of the intellectual capital, the current financial reports don't provide information regarding the value of these important intangible assets. Therefore, the performance calculated as return on assets (Profit/total assets) is distorted, it excludes intellectual capital and it forms only on the basis of physical and financial assets (Westphalen, 1999).
To show the contribution of human capital to the process of creating value and financial results, the analysis used the labour productivity indicator. This indicator is expressed as a ratio between turnover and number of employees and it reflects the quality of human capital, which has a crucial role in the activity of companies because of its know-how and skills.
To achieve the main objective of this paper, we used an econometric analysis method, namely the multifactor analysis. The analyzed data regards 138 software companies in 2008 and 2009.
The obtained results show that in the Romanian software industry, human capital is a factor that leverages the firm, providing a competitiveness advantage. Directing decision-making factors to better monitor and manage these assets is an important way to increase performance and competitiveness in knowledge-based companies.
Measuring the performance obtained by a company on the basis of its intellectual capital is a difficult problem. First, it is necessary to define the company's knowledge assets, the intellectual capital and its components for a better management and, of course, it is necessary to use appropriate methods for assessing the impact on financial results.
Most frequently, the concept of human capital refers to a combination of skills, experience and competencies that gives staff a productive potential (Foong and Yorston, 2003).
Traditionally, the contribution of human capital to the economic performance of a company may be assessed by studying aspects regarding employment of personnel and the influences exercised by employees on performance indicators (Burja, 2003). It is believed that currently there is no comprehensive system for the financial expression of human capital, which can also be an instrument used by companies to monitor and control the conversion of knowledge assets, and therefore of human capital, into value, which makes it necessary to introduce a new performance measurement and accounting system (Daum, 2003).
In practice, there have been a series of researches conducted to quantify the connection between human capital and the performance measured through shareholder value. An example is the study conducted for companies from Europe and Asia by Watson Wyatt (2001). With the score provided by Human Capital Index, the study highlighted the existence of a cause and effect relationship between human capital management and the future share price of a company.
Another way to measure the value created by knowledge assets is the one based on the production function concept, according to which economic performance is a function of various production factors synthesized in physical assets, financial assets and intangible assets (Gu and Lev, 2001).
For Romania, a study conducted by a group of American researchers through panel data techniques on 297 small enterprises showed that human capital has a low impact on growth (Brown et al., 2004).

2. Data and methodology

The exploratory research presented in this paper aims to determine the relationship between human capital and economic performance in Romanian knowledge-based companies, contributing to widening the perspective on ways to increase the competitiveness of companies.

The information about software companies was gathered from the database "Total Firme Romania", which is the biggest electronic catalogue of companies in Romania. It includes identification data and financial data going back to the year 2006.
The data sample taken into account for this research includes companies involved in manufacturing software on commission, CAEN 6201 (CAEN means Romanian National Classification for Economic Activities - NACE). The reason for choosing software companies consists in the fact they are active in the area of knowledge management.
When we consulted the database (November 29, 2011) there were 161 companies enlisted under CAEN 6201. We conducted a selection according to the criterion "more than 10 employees" and the existence of complete information about financial indicators. We chose a number of 138 companies with information available for the period 2008-2009, companies that manufactured software on commission. At the end of this selection, we had a balanced panel data of 276 firm-year observations.
Our study used the multifactor regression analysis, which allowed taking into account the factors relevant for analyzing company performance.
In this study, company performance was measured by Net income, having information provided by the financial statements of the studied companies. The indicator Earnings before interest and taxes was used in the analysis of performance and of the value created by human capital in several German companies (Scholz and Muller, 2010).
To quantify the influence of the determining factors, we used the approach suggested by F. Gu and B. Lev (2001), according to which, at microeconomic level, economic performance is a function of physical capital, financial capital and human capital used in production. The lack of explicit information in the database, particularly for the various forms of financial capital, has led to the use of the indicator Total capital, which largely includes the stable funding sources used to finance the business.
According to data presented by Foong and Yorston (2003), companies from Great Britain use various indicators to measure human capital: Employee Turnover, Absentee Statistics, indicators regarding: Competencies/Training (Performance reviews, appraisal completion, Training per employee, Staff with professional qualifications, Competency ratings, Mistakes, Exam passes, Quality of leadership based, Average educational level), Employee productivity (Profit per Employee, Revenue per Employee, Wealth Created per Employee, Cost per Employee, Productivity measures), Workforce profile, Employee attitude/Engagement, Employee Compensation, Recruitment, Health and Safety etc.
Of these indicators, our paper used Employee productivity calculated as the ratio between sales revenue and number of employees. Due to its content, this indicator connects human capital management to company performance, which corresponds with opinions formulated in various studies that analyzed labour resources and performance (Gratton, 2000), (Foong and Yorston, 2003). Sales revenue per employee ratio expresses the contribution of the personnel to revenues and profit from the sale of production and provides information about the efficiency and financial health of the company (Vause, 2009). This indicator is particularly useful for studying the impact of human capital in the same company during a period of time or for the analyses conducted by operators in the same industry.
The dependent variable used to assess performance is Net income (NI). The explanatory variables are Total capitals (TC) and Sales revenue per employee ratio (SRER), which valuates the contribution of human capital to value creation. The descriptive statistics of the variables used in the analysis are presented in table 1.

Table 1. Descriptive statistics of variables

Variables	Mean	Maximum	Minimum	St. Deviation
Net income, lei	395820.7	12711734.0	-1042753.0	1408500.0
Total capitals, lei	1067135.0	43242701.0	-2010270.0	4072814.0

Sale revenue per employee ratio, lei/pers	129235.2	1186248.0	3000.0	150325.8

Source: realized by the author based on data available on www.totalfirme.com

The average net income achieved between 2008 and 2009 by the analyzed software companies was 395,8 thousand lei, recording a maximum of 12711,7 thousand lei and a minimum of -1042,7 lei. The average capital used by software companies was 1067,1 thousand lei, and the largest capital was 43242,7 thousand lei; however, there are companies that use sources other than their own to finance their business. The average productivity of an employee was 129,2 thousand lei, with a maximum of 1182,2 thousand lei/person and a minimum of 3000 lei/person.

3. Human capital's impact on performance- Empirical analysis

To investigate the behaviour of the performance indicator, one can use two models. The first model expresses the interdependency between net income and total invested capitals. The second model reflects the interaction between net income and the variables Total capitals (TC) and Sales revenue per employee ratio (SRER):

$$NI = \beta_0 + \beta_1 \cdot TC_{it} + \varepsilon_{it} \quad (1)$$

$$NI = \beta_0 + \beta_1 \cdot TC_{it} + \beta_2 \cdot SRER_{it} + \varepsilon_{it} \quad (2)$$

where: ε is the residual variable;

β_0- intercept;

β_1, β_2 - regression coefficients that indicate independent variables' effect on the dependent variable;

i - firms (cross-section dimension)

t - years (time-series dimension)

Estimating the impact of human capital on performance in the selected software companies was achieved with the help of the cross-section SUR PCSE methodology, which is appropriate for the analysis of data with many cross-sectional units and relatively short time-series (Beck and Katz, 1995). Assessing the accuracy of the models and their trust level for future predictions was based on the results of statistical tests regarding the violation of basic hypothesis of linear regression, namely: non-normality of variables, non-stationarity of time series data, multicollinearity of variables, autocorrelation and heteroscedasticity. The predictions for the two models and the results of the regression analysis are presented in table 2.

Table 2. Regression analysis - Performance determinants for software companies – 138 Romanian software companies, 2008-2009

Dependent variable - Net income				
Model	**Explanatory variables**	**Regression coefficient**	**t-Statistic**	**VIF**
M1 R^2 ajust 0.812 F-prob 0.0000	Intercept	63031.3	-	-
	Total capitals	0.312	7.30 (0.0000)	1.00
M2 R^2 ajust 0.817 F-prob 0.0000	Intercept	-17762.5	-	-
	Total capitals	0.307	6.92 (0.0000)	1.04
	Sales revenue per employee ratio	0.667	2.31 (0.0214)	1.04

Source: realized by the author

Note: in parentheses are p-values robust for heteroskedasticity and contemporaneous correlation resulted by cross-section SUR (PCSE) using Panel Correlated Standard Error methodology standard errors & covariance correction

Model 1. The regression results obtained by model 1 indicate that the financial results of the selected software companies were positively influenced by the size of the capitals used in their activity. The increase of the capitals by one value unit led to a profit increase of 0.312 lei.
The calculated value of statistic *t* for Total capitals exceeds the table value, $|t_{TC}| > t_{0.05;274} = 1.96$, which indicates that the prediction is statistically significant, having a 95% probability to guarantee the results. In these conditions, it can be said that the corresponding explanatory variable influences the dependent phenomenon. At the same time, the low value of Variation Inflation Factor suggests that the prediction can be slightly modified by the presence of multicollinearity.
Using the OLS technique with panel-correlated standard errors (PCSE) treated the potential problems related to group-wise heteroskedasticity and contemporaneous correlation.
The coefficient of multiple determinants (R^2 adjusted) shows that the performance of software companies is largely determined by the managed assets, so that the variation of profitability may be explained in proportion of 81.2% by the indicator Total capitals.
Model 2. The second model is run by using the dependent variable Net income and the explanatory variables are Total capitals and Sales revenues per employee ratio.
The coefficient of multiple determinations is 81.7%, being higher that the one of model 1, which shows that the second model is better at explaining the factors that determine the profitability variation of companies.
By monitoring the obtained coefficients, one can notice that there is a positive relationship between the two influence factors and the profitability of the studied companies. The coefficient for Total capitals is 0.307 (p value is 0.0000), and for sales revenue per employee ratio is 0.667 (p value is 0.0000). The low values of VIF indicate the absence of multicollinearity between estimators, which are significant for the studied phenomenon.
The obtained results suggest that increasing or decreasing capitals and human capital influences significantly the performance of software companies. The size of the estimators for the two explanatory variable shows that the change in company performance was mainly due to the influence of human capital, whose impact was two times higher than the impact resulted from the use of other capital forms.

4. Conclusions

The analysis performed on a representative sample of 138 Romanian software companies for the years 2008-2009 highlighted the existence of a positive connection between performance and the elements of the capitals managed by these companies.
The regression coefficients obtained for Total capitals (model 1 and model 2) suggest that the profitability variation was due in proportion of approximately 31% to the influence exercised by the management of the assets. However, the influence of the human capital identified by using the second model was decisive, the impact of quality and of the efficiency of the human factor causing a change in performance of 66.7%.
The coefficient of multiple determinations (model 2) shows that approximately 81.7% of the manifestation law of profitability may be explained by the identified factors.
The results back-up the conclusions of studies regarding knowledge-based economy, where it is considered that in addition to technology and connectivity, human capital plays an increasingly dominant role, which reflects in the financial results of a firm (Low, 2000), (Seetharaman, Sooria, & Saravanan, 2002), (Gratton, 2000),).
This study shows in the Romanian software industry, the close dependence between performance and the human factor is obvious, the human capital being the main element in creating value. Making better use of the creative and innovation potential and of the potential of the labour force,

especially of the high-skilled staff, is an important way to increase company performance and competitiveness, aspects that give them a qualitative economic development and helps them to survive in a competitive environment.

The findings of the study show that at least in Romanian software companies, managers can create more value for their shareholders by increasing the knowledge of labour force. At the same time, the findings can be useful for decision makers from other enterprises and institutions that play a role in the education and training of the labour force, in identifying real strategies to create, use and improve human assets, thus stimulating performance growth and the development of elements specific for Knowledge economy.

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