

## Human Capital and Efficient Decision Making

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### **Abstract**

*In the demanding environment of modern economy, firms and nations seek for competitive advantage through modern management and decision making processes that will lead them to innovation. Within this framework, human capital is considered as one of the most important determinants of economic development. In this paper we study the influence of human capital on labour productivity. We estimate an empirical model derived from Greek manufacturing firms, in which human capital appears as an independent variable. The results suggest that human capital has a positive and significant impact on labour productivity.*

Keywords: Human capital; Performance; Labour productivity.

### **Introduction**

The ability of creation, distribution and exploitation of knowledge is currently recognized as one of the main prerequisites for gaining competitive advantage. During the last decade this was reflected in the tendency of countries for the transition to the knowledge economy. The significance of education is depicted in the world market, where enterprises and modern economies seek to increase their productivity and competitiveness through specialized knowledge.

Within the framework of the knowledge economy, education policies for the distribution of knowledge are of great importance. Innovation acts as a catalyst not only for firms' economic growth but also for the growth of the economy as a whole. The exploitation of employees with high educational level is proved to be essential for any enterprise in order to achieve advantage in the increasingly competitive international environment.

Until recently, studies for the Greek economy focus mainly at the macroeconomic level and deal with the positive long run relation between education and economic growth. They also suggest that growth is promoted by the level of education (compulsory, secondary and tertiary education) and come up with the conclusion that there is a need for investments in human capital based on education for all countries.

University graduates and in particular those with postgraduate degrees (Masters, PhD), consist the proportion of population with the highest educational level. These graduates are able to produce knowledge and to contribute decisively to the development of research and

innovation, while simultaneously supporting the financial performance of the organization they work for. Taking into consideration the importance of educated employees as a factor of production that increases the output of the enterprise, it becomes evident that the study of the performance of this part of labour force is a promising research topic.

In this study we investigate the relation between human capital and labour productivity at the firm level. The literature review describes the connection of education to economic performance. In the core of the paper, an empirical model of labour productivity is being presented and estimated with the use of econometric techniques. The last section concludes the paper.

## **Literature Review**

The effect of education on the economic performance of firms is connected to the field of economics which studies Human Capital. According to this field, education is an investment in knowledge and, as a consequence, it increases labour productivity (Schultz, 1971).

By the 1950s, economists were increasingly concerned about the role of education and its impact on economic growth. Empirical observations confirmed that part of organizations' growth during the post-war period was due to the increase of the educational level of their labour force (Griliches, 1970).

The first studies that investigated the economic effects of knowledge investments revealed the positive influence of human capital on growth for individuals, firms and nations (Schultz, 1961). These studies pointed out that economies with well educated employees exhibited faster progress and more rapid increases in productivity than those with lower levels of education (Becker, 1962).

These views set the theoretical background for later researches. However, in the 1970's the educational system was highly criticized, mainly due to the reduced growth rates of economies with highly educated labour forces. The debate of the 70s ended up with the emergence of new technologies and their application in the production at the beginning of 80s.

During this period, the theory of endogenous growth stressed the interaction of technological progress and human capital. (Romer, 1986, Lucas, 1988 and Scott, 1989). According to this theory, investment in technological research as well as in education and professional training strengthens endogenously the growth rate by increasing labour quality and productivity (Romer, 1994).

Empirical testing of the endogenous growth theory pointed out that the economies with higher percentages of well educated employees were the ones that exhibited the higher rates of growth (Schultz, 1993). It was also revealed that higher labour specialization was connected with higher rates of growth in competitiveness and productivity (Blundell, 1999).

More recent empirical studies confirm the positive relationship between education and firm performance. Employees with specialized knowledge and know-how perform better in more complicated tasks. These

employees possess special capabilities such as communication and decision making skills, problem solving skills as well as adaptation in the continuous learning environment (Psacharopoulos and Patrinos, 2004, Agiomirgianakis *et al.*, 2002).

Moreover, it is now widely accepted in the relevant literature that human capital may even supercede physical capital in the ability to create competitive advantage. Youndt *et al.* (2004), using data from 208 organizations, found that investments in human capital are more productive than investments in other forms of capital.

Chen *et al.* (2005), using data for Taiwan listed companies, showed that intellectual capital (i.e. human capital plus structural capital) contributes significantly to firm profitability. Similar results were also obtained by Switzer and Huang (2007) for a sample of mutual funds in Canada. They found that the performance of mutual funds is directly related to managerial human capital characteristics.

On the other hand, Bollen *et al.* (2005) point out that the relationship between human capital and company performance is more complicated and differs among industries, depending on the degree of competition. The strongest links of human capital to firm performance are found in industries which are characterized by highly competitive conditions.

Summarizing the above, human capital leads to improvements in the development and diffusion of new technologies, which affect positively labour productivity. Consequently, skilled workers not only are considered as more productive than the unskilled ones, but they also contribute to their colleagues efficiency. It is also important to notice that specialisation and learning ability often generate new knowledge which improves the existing production process and helps enterprises to correspond flexibly in the increasing competitive global environment.

## **Methodology and Results**

In order to estimate the empirical model, that was developed, the following steps were followed:

The firm level data have been obtained from the ICAP data base, which is the only data base that collects balance sheet and demographic data for SA and Ltd companies in Greece. The initial sample consisted of 400 firms that were active both in years 2000 and 2002.

The data used concern:

- Demographic Statistics (Foundation year, Location of the Head office, Legal status, size and sector)
- Economic Statistics (sales, profits, capital, exports)
- Employment Statistics (number of employees in full-time equivalent units - FTE)

The above data were combined with information concerning the employees' education level, obtained after telephone contact with the Companies.

The final dataset includes 287 companies for the years 2000 and 2002 (a total of 574 observations) for which all necessary information was acquired. Among the most important variables that have been taken into account are:

- Labour productivity (LP, sales divided by employment)
- Firm Size (natural logarithm of sales).
- Export Performance (X, exports as a percentage of sales)
- Capital - labour ratio (K/L, Net fixed assets divided by employment)
- Leverage (Debt divided by total liabilities)
- Human Capital (number of employees with university degree as a percentage of total employees)
- Athens dummy (Dummy variable taking the value 1 if the firm is located in Athens, 0 otherwise)
- Salonica dummy (Dummy variable taking the value 1 if the firm is located in Salonica, 0 otherwise)

The empirical model we estimated with the panel data cross-sectional weights technique is:

$$LP = f(\text{Size, K/L, X, Leverage, Human Capital, Athens dummy, Salonica dummy})$$

Table 1 shows the regression results (estimated coefficients and their corresponding t-statistics) for this model:

**Table 1: Determinants of labor productivity**

	No. of observations: 574 ( $\alpha$ )	No. of observations: 574 ( $\beta$ )
<b>SIZE</b>	7.416*** (23.722)	7.422*** (24.732)
<b>HUMAN CAPITAL</b>	81.627*** (5.311)	73.409*** (4.943)
<b>K/L</b>	50.395*** (14.773)	53.009*** (17.656)
<b>LEVERAGE</b>	31.012 (1.243)	32.128 (1.526)
<b>X</b>	11.702** (1.882)	10.575** (2.243)
<b>Athens dummy</b>	17.399* (1.699)	-
<b>Salonica dummy</b>	3.126 (0.752)	-
<b>Adj. R<sup>2</sup></b>	<b>0.71</b>	<b>0.71</b>
	<b>8</b>	<b>3</b>

\* Significant at the 10% level (two-tailed test),

\*\* Significant at the 5% level (two-tailed test),

\*\*\* Significant at the 1% level (two-tailed test)

t ratios are in parentheses. Standard errors are White heteroscedasticity consistent.

All equations include 2-digit industry dummies (according to the NACE Rev. 1 classification)

The size of the firm came out as significant and positively affecting labour productivity. This positive relationship suggests that large firms are more productive than small ones. Large sized-firms are more efficient partly as a result of their larger capital base.

Exporters are more productive than non-exporters. This result suggests that the exposition to global competition forces firms to improve their efficiency in order to attain lower cost and achieve competitive prices.

Capital intensity (K/L) is also a significant determinant of labour productivity. This means that, in order to improve productivity, firms need to invest in physical capital and especially in quality capital applying new technology with emphasis on information and communication technology (ICT).

Firms located in the Athens area are more productive compared to firms in other areas in Greece. Knowledge spillovers, transportation cost efficiencies both for the supply and distribution of goods and higher level of management and employee training are the reasons behind this.

The Human Capital variable is also highly statistically significant at conventional levels of significance, and its impact on labour productivity is positive. Employees with specialized knowledge and know-how perform better than non-specialized ones, thus increasing the overall labour productivity ratio of a firm. Therefore, ignoring information about Human Capital has important consequences for the explanation of productivity.

## **Conclusions**

This paper examined the determinants of labour productivity of Greek manufacturing firms. The results are to a great extent consistent with expectations.

The factors found to significantly affect productivity in the Greek industry sector are:

- 1 The size of the firm. Large firms are found to be more productive than smaller ones.
- 2 Exports. Exporting firms are more productive forced by fierce competition in the global markets.
- 3 Capital-labour ratios. A greater capital intensity is associated with higher labour productivity
- 4 Location. Firms located in the Athens area show higher productivity due to information technology and education spillovers.
- 5 Human Capital. Human capital leads to improvements in the development and diffusion of new technologies, which affect positively labour productivity.

These results stress the importance of certain public policy measures which should be taken in order to increase the labour productivity of greek manufacturing firms and, as a consequence, enhance their competitiveness. Such measures could be the support of export activities and the encouragement of firms to invest in physical and human capital.

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