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Procedia Economics and Finance 6 (2013) 748 – 753

Procedia
Economics and Finance

www.elsevier.com/locate/procedia

International Economic Conference of Sibiu 2013 Post Crisis Economy: Challenges and Opportunities, IECS 2013

Implication of Human Capital in the Development of SMEs through the ICT Adoption

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Abstract

ICT adoption in SMEs and the attraction of benefits from use of these technologies remains a key point in their development. For an enterprise to take part in the digital economy must have a defined basis for innovative adopting, meaning a premise for the development of ICT infrastructure. Given that firms are not a self-driven machinery, human capital is a major factor of influence in enterprise digitization. Considering this, in this paper will analyze the effects generated by human capital on the level of ICT adoption in SMEs in Romania.

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Selection and peer-review under responsibility of Faculty of Economic Sciences, Lucian Blaga University of Sibiu.

"Keywords: human capital, SMEs, TIC"

1. Introduction

Related to human capital and its implications in the evolution of enterprise (Antlova, 2009 or Wymer, Regan, 2005) shows the human capital of particular importance in the development of enterprise and especially in increasing its competitiveness. This is understandable since, according to theory based enterprise resources, this resource provides enterprise quality hard copied by other companies. Enterprise personnel capacity and knowledge regarding the use of ICT, is an important issue both in large companies and SMEs, this significantly influencing the adoption of innovative technologies in the enterprise (Ilesanmi, 2007). Lack of trained personnel to provide value to the enterprise, and managerial capabilities are catalogued with great importance in the adoption of ICT (Martin, 2005).

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A major problem of human capital to SMEs is that many of the owners / managers of enterprises are not familiar with concepts related to the use of ICT within their company, and then the open of them to these technologies is limited and often ineffective. (Costello et al., 2007) shows the personal characteristics of the managerial staff of particular importance in the adoption of new technologies. Their enthusiasm is the main reason for adopting ICT. Lack of skills and knowledge, both at management level and in other departments, also lead to the generation of other barriers to ICT adoption, namely, the related internal reluctance.

A low capacity storage within the enterprise knowledge generated by a level of human resources capacity to assimilate inadequate level of innovation of adopting ICT in the enterprise creates a lack of information. (Kalanje, 2002) concludes that the most important barrier to ICT adoption in enterprises is the lack of knowledge about the benefits of this technology and the enterprise value felt by using them.

2. Methodology

As noted above, human capital can have a significant impact on the adoption of ICT. Thus we tested the hypothesis that the proportion of employees who use ICT during activity, influence the adoption of ICT. In the summaries research on SMEs in Romania we use the information analysed from carrying out a survey among SMEs in Sibiu. Survey we conducted on a sample of 100 SMEs in all fields of Central Development Region.

In hypothesis testing we use two variables: the proportion of employees who use ICT during activity (ICTemp) score and variable levels of ICT adoption (ICTrank). To see the level of ICT adoption scoring we created a variable calculated as:

$$ICTrank = (ICTu + ITu) / Emp - Emp / Obs \quad (1)$$

ICTrank is calculated using the following variables:

- ICTU - highlights the internal infrastructure of SMEs in terms of ICT. Variable is calculated by combining existing technologies analysis
- ITU - highlights the uptake of the Internet (largely) in SMEs. This I calculated by summing the points obtained for different feature from use of ICT. Specifically it shows the extent to which businesses use technology available.
- Emp - number of employees at the time of analysis
- Obs - indicate the obstacles that influence ICT adoption, which is the main reasons for reluctance in ICT adoption.

ICTemp is a variable that shows the degree to which employees use ICT during activities in the enterprise. This index we have calculated by summing points depending on the class (percentage of employees using ICT) to frame each SME analysed for various facilities.

3. Data analysis and regression testing

For starters, let's analyse the level of knowledge of the companies analysed. As shown in Figure 1, the companies have a share of employees with higher education between 25% and 50% significantly differ from the other classes analysed. Thus it is expected to influence the degree to which businesses have adopted ICT.

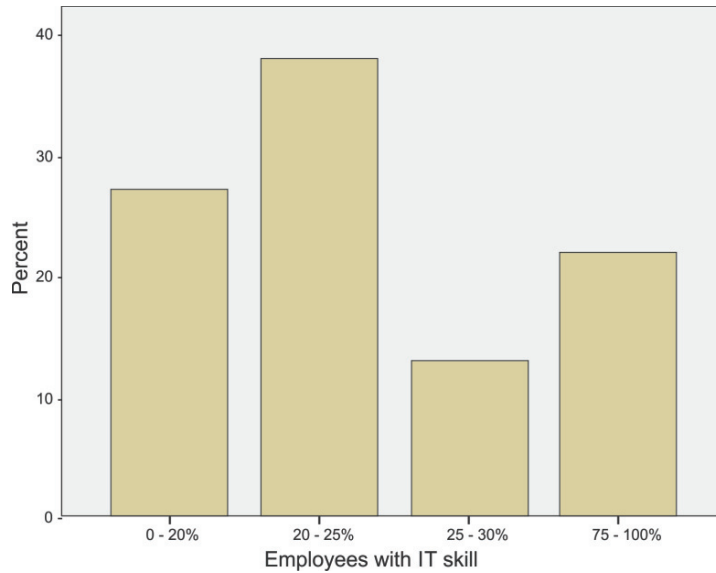


Fig. 1. Share of employees with IT skill in the sample analyzed.

Also, as shown in table 1, the share of employees with higher education of all employees of the company, very powerful influence three component factors of the variable: proportion employees who use ICT during activity (ICTemp). This follows from the fact that if variables: the proportion of employees who use the computer during the activity, the proportion of employees who use e-mail during the activity, the proportion of employees using the Internet during the activity; Pearson correlation coefficients has a high value and the significance value (Sig.) proper is less than the significance threshold of 0.01, thus highlighting a highly significant correlation between the dependent variables and independent variables analysed.

Table 1. Influences on the component variables of ICTemp

r		Use computer	Use email	Use Internet
Share of employees with higher education	Pearson Correlation	,915**	,947**	,945**
	Sig. (2-tailed)	,000	,000	,000

In the descriptive analysis of correlation between the variable proportions of employees who use ICT during activity (ICTemp) and the score variable ICT adoption level (ICTrank) resulted in a strong correlation. Significance value corresponding to this correlation is less than 0.01 which allows us to affirm that the two variables are significantly related. Starting from this, we tested the existence of a Quadratic regression model between the two variables. Regression result is shown in Table 2, the independent variables are ICTemp and ICTemp2 (ICTemp is ICTemp squared) and dependent variable ICTrank.

Table 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,764	,583	,574	2,02665	2,362

As seen in Table 2, the correlation coefficient between the two variables is 0.764 and generated an R2 equal to 0.583, showing that over 50% of the selected model can be used in predictions, but obviously we are talking about probability.

Table 3. ANOVA test

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	516,946	2	258,473	62,930	,000
Residual	369,659	90	4,107		
Total	886,605	92			

ANOVA regression test result that the proportion of employees who use ICT during activity (ICTemp) score explain the variation in the level of ICT adoption (ICTrank). This shows the significant value of the test and Fischer significance value corresponding to Z statistics is smaller than the significance threshold of 0.01, highlighting the existing variation. Resulting regression model is $Y = 2.797 - 1.003 * X + 1.702 * X^2$ ie:

$$ICTrank = 2.797 - 1.003 * ICTemp + 1.702 * ICTemp^2 \tag{2}$$

This can be assumed since the significance value of the constant and of the variables is below 0.01.

Given the causal effect, the adoption of ICT in the enterprise will generate economic growth which in turn will lead to an increasing complexity of the production process. At the same time, an increase in the complexity of the production process will generate increasing functional complexity of the enterprise, making it more competitive and adaptable in the context of the digital economy. If the company did not adopt ICT and there is a large percentage of staff that handle the processing and generation of information, the complexity of the production process is an obstacle to development. In other words, there is a limit in terms of the ability to manipulate information. Thus, the adoption and development of information and communication technology enables enterprises to overcome this obstacle. The existence of computers, information handling systems and communication systems, enables enterprises (and staff) to be more productive in the use of information.

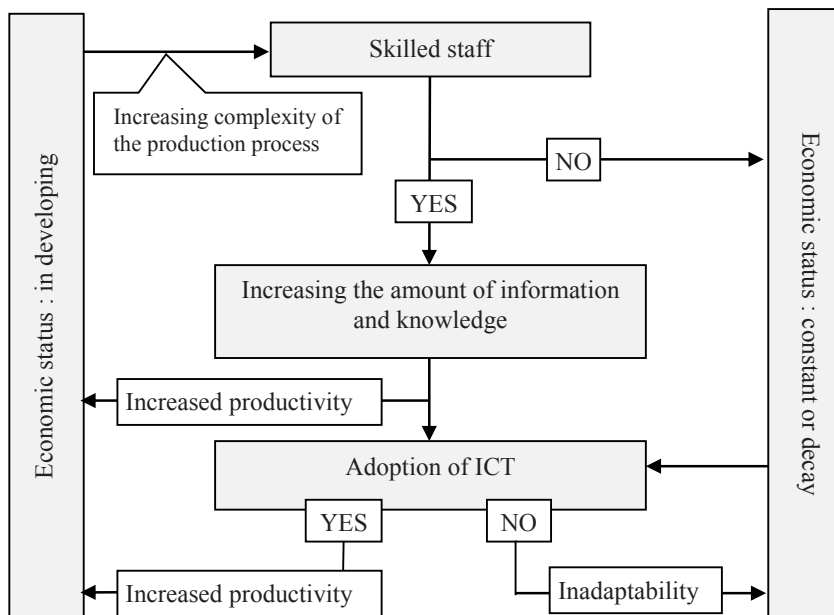


Fig.2. Effect of adoption of ICT on economic condition of the enterprise

Studies of (Katz, 2009) concludes that the highest percentage of the labor force used generating and processing of information is greater than the capital invested in acquiring ICT infrastructure material. So it is natural that labor productivity influenced by the number of employees working in processing or generation of information (administrative staff, managers, instructors, staff in the marketing department, etc.) to directly depend on the level of investment in information and communication technology.

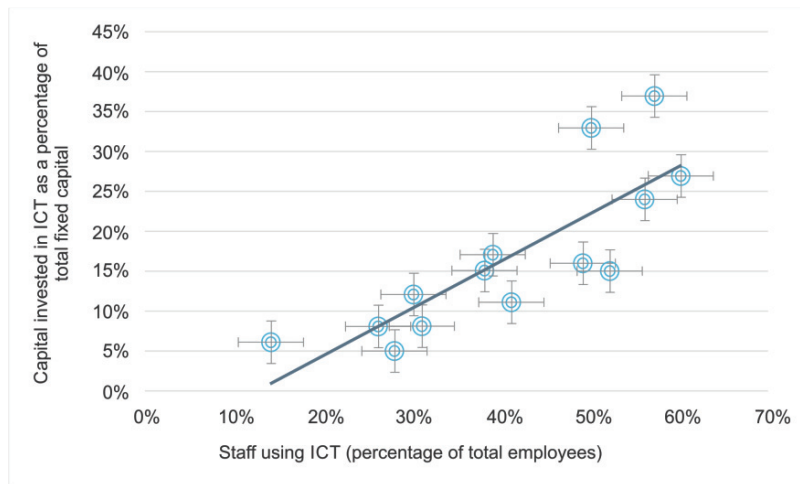


Fig.3. Staff and investment in ICT ; *Source: adapted from (Katz, 2009)*

In Figure 3 is evidenced the direct relationship between the percentages of staff using ICT and the ICT capital, in the context of the digital economy. Thus that, as we can see, an increase in staff using ICT will generate a capital growth in information and communication technology.

4. Conclusions

Increased productivity at the microeconomic level is not only a result of technological progress but, even more, it is an effect of ICT diffusion in the human capital level. Pilat and Lee (2001) show that an economy not need to have an ICT production sector, in order to draw benefits from ICT. We can say the same, it is not enough for a company to dispose of technology and personnel but must be able to use these technologies so that businesses can draw benefits from ICT adoption. Adoption of ICT in terms of SMEs is important pawn in sustainable economic development. It also should not overlook any important policies to support ICT adoption, given that it is important that businesses can successfully absorb and apply the knowledge gained.

5. References

- Antlova Klara, "Motivation and barriers of ICT adoption in small and medium-sized enterprises", E & M *Ekonomie a Management*, 2009, pp. 140-155
- Costello P. and Chibelushi C. and Sloane A., "ICT adoption issues in ICT SMEs in the West Midlands UK: beyond the differences". ECIME 2007, France
- Ilesanmi Ayokunle, "Issues and Barriers Affecting the Development of E-Commerce on Small and Medium Enterprises (SMEs) in Development", 2007, [site ac. 01.07.2012] http://dagda.shf.ac.uk/dissertations/2006-07/External/Ilesanmi_Ayokunle_MScIS.pdf
- Ivan I. and Ciurea C., "Quality characteristics of collaborative systems," in Proc. The Second International Conference on Advances in Computer-Human Interactions, vol. I, Cancun, Mexico, 2009, pp. 164-168.
- Kalanje Christopher, "Enhancing the Competitiveness and Growth of SMEs: Marketing Challenges for SMEs", 5th NASME International Conference and Exhibition, 2002 <http://www.wipo.int/sme/en/documents/pdf/nasme.pdf> [24.03.2013].
- Martin Lynn, "Internet Adoption and Use in Small Firms: Internal Processes, Organisational Culture and the Role of the Owner-Manager and Key Staff, New Technology, Work and Employment", 2005, Vol. 20(3), pp. 190-204

Pilat D. and Lee F.C., “Productivity growth in ICT-producing and ICT-using industries: A source of growth differentials in the OECD”, 2001, STI Working Papers 2001/4, Paris

Wymer Scott and Regan Elizabeth, “Factors Influencing e-commerce Adoption and Use by Small and Medium Businesses”, *Electronic Markets - EM* , 2005, vol. 15, no. 4, pp. 438-453, DOI: 10.1080/10196780500303151