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ICT consolidate in European firms despite the economic crisis

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Abstract

The aims of this study are twofold, first to know if ICT has increased in European firms' despite the recent economic crisis and second, to know the differences between businesses ICT' implementation by firm size. The focus of the investigation is on ICT use of firms of the EU-29 Member States comparing a crisis period with an increasing economic period, using statistical information from EUROSTAT. The data was analysed with a multiple regression model and a nonparametric correlation coefficient, Kendall's tau. The results show that businesses consider ICT as a key component of their strategy because despite of the crisis, ICT indicators have increased in almost all European countries. The results also indicate that crisis began to affect to eCommerce from 2007 due mainly to the fall of consumer. Finally, related to firm size small firms improved their implementation of information technologies more than large ones but large firms are more active regarding eCommerce.

Keywords: Information and Communication Technologies (ICT), eCommerce, EU-29 countries, Economic crisis.
JEL: O31, O33, O38, O52, M15

Las TIC se consolidan en las empresas europeas a pesar de la crisis

Resumen

Esta investigación trata por un lado de saber si el uso de TIC se ha incrementado en las empresas europeas a pesar de la reciente crisis económica y por otro lado, se pretende analizar las diferencias existentes entre las empresas europeas en cuanto al grado de implementación de TIC en función de su tamaño. Se estudia el uso de TIC en las empresas de los 29 Estados miembros de la UE comparando el periodo de crisis y el periodo de crecimiento posterior. Los datos se analizaron con un modelo de regresión múltiple y un coeficiente de correlación no paramétrico, tau de Kendall. Los resultados muestran que las empresas consideran las TIC como un componente clave de su estrategia, porque a pesar de la crisis, todos los indicadores TIC han aumentado en la mayor parte de los países europeos. Los resultados también indican que la crisis comenzó a afectar al comercio electrónico a partir de 2007 debido principalmente a la caída del consumo. Por último, en relación con el tamaño de las empresas, las de menor tamaño mejoraron su implementación de tecnologías de la información más que las grandes, aunque éstas son más activas en el uso del comercio electrónico.

Palabras clave: Tecnologías de la Información y Comunicación (TIC), Comercio electrónico, EU-29, Crisis económica.
JEL: O31, O33, O38, O52, M15

1. Introduction

The Information and Communication Technologies (ICT) are nowadays one of the most important investigations on Management field (Coltman et al, 2005; Hendriks et al, 2007). It is confirmed the role of ICT in economic growth and productivity, its adoption by firms leads to deeper changes in business processes, principles of organization and management, just the kind of innovation that generates profits productivity and growth potential. Furthermore, fitting an organization with ICT increases the competitive advantages (Byrd and Turner, 200; Dehning and Strapoulos, 2004) so companies must have an adequate ICT system and especially ICT usability to take advantage of network economies for innovation, both supply and distribution. Nowadays it is widely accepted that technology and technological advances are a key component of innovation and economic growth (Grossmann, 2008; van Hemert, 2010). With ICT´s increasing sophistication and usage, managers now consider the use of ICT as a competitive tool used for the implementation of strategic plans and the support of firm core competencies (Oh and Pinsonneault, 2007). The use of ICT finally determines the ability to increase business productivity through the use of innovative business management tools that bring added value and competitive advantage to companies.

It is difficult for firms to recognize and adapt to change when it is drastic, sudden and externally forced (Hannan and Freeman, 1984; Tripsas and Gavetti, 2000), but at the same time, certain firms do sustain competitive advantages even during such major environmental changes (Abernathy and Clark, 1985; Tushman and Anderson, 1986). In this sense, ICT can be used to influence a firm´s ability to gain a competitive advantage (Ravichandran and Lertwongsatien, 2005). It is well known the benefits of ICT for a firm, savings on inputs, general cost reductions, greater flexibility and improvements in product quality (Arvanitis and Loukis, 2009), and even there are positive results on the impact of ICT on efficiency (Ayed-Mouelhi, 2009). According to the World Bank (2006), firms that use ICT grow faster, invest more, and are more productive and profitable than those that do not. Furthermore, the more intercommunication there is among companies, the greater

the likelihood of achieving diversification in their traditional business. The improvement of outside business relations, chiefly with foreign clients through their business website, is a significant factor. Nevertheless, it has also been pointed out that the challenges of successful development in the information society lie not so much in the availability of good technological infrastructure as in improving business disposition toward IT use (Scapens and Jazayeri, 2004), (Scapens, et al., 1998).

But what happened with ICT in this crisis times? Now, where financial and economic crisis has taken place it wondered if this situation has influenced European firm's decisions on adoption and use of ICT and that´s the way this study is conducted. It analyse, in European firms, five basic ICT variables defined by The Partnership on Measuring ICT for Development as key indicators to measure the ICT basic level and two more of eCommerce, with another two variables, year to know if this variable affect to ICT, and size to know the different results in this period about the adoption of ICT by firm size.

The results show, first that companies continue betting for ICT in spite of the economic crisis, even though they have increased the use of ICT in all terms and they also indicate that crisis has affected negatively to eCommerce from 2008 due mainly to the fall of consumer. Second, they show the differences between European countries and the differences between companies by size. Finally, with regard to results from firm size, small firms had improved their implementation and use of information technologies more than large ones, but with regard to eCommerce large firms have the most increased on electronic purchases and sales.

The contribution of this study to the empirical literature is to present a completely empirical comparative research about ICT on EU-29 firms with a focus on economic and financial crisis of 2008 and ICT on Europe Union countries. The main limitation of the present research is the lack of investigations on the impact of the crisis in the ICT which support it. So this paper provides new information for firms, Public Administrations and

academics. The increasing interest in the subject can lead to additional research about the consequences of the crisis on European firms on a widespread sense.

The structure of this article is as follows: the first section provides the state of the art. The research model and methodology are shown in Section two. Section three presents the analysis and findings. The final section presents the major conclusions and discusses issues for further research.

2. State of the art

In the last decades, the business world has been experiencing a profound transformation mainly motivated by the globalization and technological revolution which had led to an increasing complexity in the relationship between firms, suppliers and customers as well as in terms of the products and services being offered. These circumstances spell out the need for increasingly refined working tools, including ICT, in order to face the challenges posed by a changing and ever more demanding business environment. So the existing literature about ICT is widespread. There are studies that have been conducted on the relationship between business development and proper IT use (Dozier and Chang, 2006). These studies support the theory that proper IT use increases productivity, thereby having a decisive influence on a country's wealth and growth. According to the OECD, countries with greater IT investment also achieve the best productivity growth indexes (OECD, 2000-1). In recent years researchers have analysed the design and use of management systems as they relate to the environment, IT, structure, strategy, and size (Galloway and Mochrie, 2005). As Joseph and George (2007) had studied a poor integration between change initiatives and ICT poses a challenge in implementing change strategies, so integration of business strategy and information systems planning is critical for organizational success.

The contribution of ICT to an impact on firm performance is of critical importance and that's why in most developed and developing countries firms make big investments to acquire and use them. Despite of the ICT productivity paradox (Brynjolfsson and Hitt,

1996) there are recent studies that find a statistically significant positive effect of ICT on firm performance in Europe firms, in Germany (Bertchek and Kaiser, 2001; Wolf and Zwick, 2002; Hempell, 2004), Switzerland (Arvanitis, 2005), Spain or United Kingdom (Crespi et al, 2006).

There are increasing numbers of people and countries around the world that are enjoying access to the benefits from ICT, but International Telecommunication Union reports have indicated that disparities and inequality in access are evolving: the digital divide is taking on new forms in terms of differences in the speed and quality of access to ICT (Emrouznejad et al, 2008). In the European Union there are substantial differences between countries in terms of usage and access and there are some studies refer to households that suggest it (Orviska and Hudson, 2009).

Given the fact that information and communication technologies have been revealed to have remarkable impacts on economic development, disparities in ICT diffusion may lead to an increase in the disparities in terms of economic development. The adoption of these technologies in many developed countries has been found to have positive effect on the organization's performance, but not all countries are taking advantage of this kind of revolution in the same way at the same pace (Ayed-Mouelhi, 2009).

With regard to the current international financial and economic crisis, recent studies have focused on it, mainly determined on global financial markets (Bartram and Bodnar, 2009; Carmassi et al, 2009; Congleton, 2009; Corden, 2009) even though on European Union crisis (Ross, 2008), or how firms can transform this situation in an opportunity (Clair and Dufresne, 2007). But there isn´t still enough studies about what happened in this situation regarding the ICT implementation in firms. Firms have more problems (drastic drop of demand, financial difficulties…) now and it is interesting to know if they still consider ICT as a strategic tool as Cramm (2008) consider. He said that, even in moments of crisis such as the present time, firms do opt to continue investing in this type of technology to achieve continuous company improvement. By the end, existing literature

on ICT impacts has indicated that econometric techniques are widely used, and descriptive statistics is commonly used. And that is the way the present study conducts.

To determine whether the crisis has affected investment in ICT and eCommerce volume in European companies raised the following two research questions:

RQ1a: Have European companies increased their ICT investment despite the recent crisis?

RQ1b: Have European companies increased their volume of eCommerce despite the recent crisis?

There is a extend literature about the assimilation of ICT in large companies. Since 2000 there is an emergent interest on what happen with smaller ones with studies that had analysed the assimilation of ICT in SMEs (Pérez et al, 2010; Cragg et al, 2002, Levy and Powell, 2000) so the other objective of this investigation is to know if firm size has been a factor in the adoption of ICT in this period. The reason is that smaller firms suffer the recession in a higher way than bigger ones. But we have to see if this has been an advantage or a drawback to the implementation of ICT on them. Traditionally, in a spread sense, SMEs have been at a disadvantage cause they are more restricted when it comes to resources, but otherwise they enjoy greater flexibility in adapting to environmental changes (Nieto and Fernández, 2006) and (Dubois, 1993). SMEs have fewer financial resources, less technical experience and fewer management skills, and have begun to use IT later on (Caldeira and Ward, 2004), so their adoption of technology still lagging behind the big firms. Besides, factors that explain the differences between large companies and SMEs in relation to ICT adoption have been identified. Some of these differences are a greater uncertainty towards ICT, limited resources and lack of vision for the potential of ICT for the competitive advantages (Salmeron and Bueno, 2006).

Some authors have done empirical analyses to determine whether SMEs have managed to align IT use and strategy and whether this is a factor leading to an improvement in their financial and organizational results (Schubert and Leimstoll, 2007), (Azizi and King, 2005), (Cragg, et al., 2002), (Lesjak, 2001), (Chan et al., 1997), because an optimal implementation of IT by SMEs means adapting more successfully to a changing environment, making it possible to manage long-distance relationships and show a high degree of competitiveness, thus enhancing the dynamic character of a company (Castillo and García, 2006), (Davis and Sun, 2006). Furthermore, the more intercommunication there is among companies, the greater the likelihood of achieving diversification in their traditional business and another significant factor is the improvement of outside business relations, chiefly with foreign clients through their company website, and those reasons are more important when smaller is the company.

So this study proposes the following research questions to see if the effort made by European companies in ICT has been different depending on its size during this period.

RQ2a: Have larger companies invested more in ICT than SMEs in this period?

RQ2b: Have larger companies had greater volume of eCommerce than SMEs in this period?

3 Empirical background

3.1 Sample selection

The data used in this study belongs to EUROSTAT database and is based on the enterprise ICT survey, which has been constructed with the next characteristics. The frame population (or sampling population) is the list of enterprises equivalent to the target population. The sample for the Community Survey has been drawn from the business register in the different Member-States as defined in Council Regulation (EEC) No 2186/93. Part of this register is the activity code at the four-digit (class) level of NACE

Rev.1, the size measured by the number of persons employed and the geographical location code (territorial units) of the enterprises. The choice to comply with the enterprise as the appropriate statistical unit and the business register and its enterprise' characteristics as the framework population, is inspired by the wish to keep a certain level of consistency with the Structural Business Statistics. On a meso-level as well as on micro-level results of the Structural Business Statistics it has been combined with data on the ICT usage of enterprises for analysis and for weighting-purposes.

The survey has been based on a probability sample from which results representative of the population could be derived, considering the agreed breakdowns defined in the questionnaire. The sampling design and the resulting sample size has been the appropriate for obtaining accurate, reliable and representative results on the survey characteristics and breakdowns specified in the Regulation and the model questionnaire.

This objective has been achieved for the overall proportions as well as for the proportions relating to the different subgroups of the population. The estimated coefficient of variation (or relative standard error) has not exceed 2% for the overall proportions and has not exceed 4% for the proportions relating to the different subgroups of the population where these subgroups constitute at least 5% of the total population in the scope of the survey.

3.2 Statistical analysis

The EUROSTAT database was subsequently treated for a statistical analysis firstly, through a regression model to know if there is a causal relationship about ICT variables (dependent variables) and two independent variables, Time and Business size. In order to do comparative research there were selected seven variables; the first five variables, considered key indicators of ICT by the Partnership on Measuring ICT for Development, show the degree of ICT use and the last two variables are indicators of eCommerce. (Table 1). Secondly, with Kendall´s tau to know whether there is a positive trend in temporal series.

Table 1. ICT variables

ICT1	Computer
ICT2	LAN
ICT3	Internet
ICT4	Broadband connection
ICT5	Web
ICT6	Received orders on-line (at least 1%)
ICT7	Purchased on-line (at least 1%)

Source: Own elaboration

Firstly, the descriptive statistics of the sample have been analysed (Table 2). To carry on the regression, the normality of the variables were previously analysed by means of the Kolmogorov-Smirnov test. When the correctness of the normality was achieved, the next step was to make a parametric analysis of the variables by checking whether there is homoscedasticity with Levene´s Test between the seven ICT variables. ICT2, 3 and 4, did not obeyed the criterion of homoscedasticity so it wouldn´t applied the regression model and were analysed through the nonparametric statistic Kruskal-Wallis. The principles of normality and homoscedasticity were complied by the rest of variables so that a regression was carried out to test the research questions posited where Year and Size were the independent variables and ICT were the dependent variables.

Table 2. Descriptive statistics and Correlation Matrix

Variable	Mean	Std. dev.	Correlations						
			ICT1	ICT2	ICT3	ICT4	ICT5	ICT6	ICT7
ICT1	97,52	3,856							
ICT2	80,18	18,869	0,629***						
ICT3	94,83	7,811	0,914***	0,612***					
ICT4	77,88	19,601	0,515***	0,572***	0,587***				
ICT5	72,09	19,352	0,622***	0,675***	0,721***	0,592***			
ICT6	18,26	12,51	0,259***	0,356***	0,306***	0,427***	0,639***		
ICT7	26,71	17,584	0,275***	0,370***	0,312***	0,361***	0,628***	0,840***	

* p < 0,1; ** p < 0,05; *** p < 0,01.

Source: Own elaboration

The Size variable ranks companies by size into three groups: small, medium and large enterprises. In testing RQ1a and 1b, ICT variables were regressed against Year so the coefficient of this variable must be positive to support RQ1a, and 1b. In testing RQ2a and 2b ICT variables were regressed against Size; the coefficient of Size must be positive to support RQ2a and 2b.

4. Findings

The results of the study in the years analysed is shown below in Table 3. The results are statistically significant for the Year and Size indicators in all ICT variables except on the causal relation between Year and ICT6. As expected, the variable Year was estimated as positive (* p < 0,1; ** p < 0,05; *** p < 0,01). This result suggests that European firms have increased their ICT use from 2004 to 2008 despite of the economic crisis and have increased their volume of eCommerce too. With regard to the variable Size, it was estimated positive too (*** p < 0,01). So this result suggests that large companies invest more in ICT and have a greater volume of eCommerce than smaller ones.

Table 31. Results of Regression model and Kruskal-Wallis

	Dependent variables						
Model	ICT1	ICT5	ICT6	ICT7	ICT2	ICT3	ICT4
Independent variables	B	B	B	B	K-W	K-W	K-W
(Constant)	94,342***	52,001***	10,335***	18,949***			
YEAR	0,265**	2,18***	0,58	1,093*	18,498***	17,24***	77,94***
SIZE	2,623***	15,579***	6,713***	5,491***	229,968***	220,365***	151,637***
R^2	0,319	0,459	0,073	0,196			
Adjusted R^2	0,315	0,456	0,192	0,068			
F-statistic	96,053***	176,531***	47,791***	15,351***			

* p < 0,1; ** p < 0,05; *** p < 0,01.

Source: Own elaboration

Finally the tendency was analysed with a nonparametric correlation coefficient the Kendall's tau. This statistic is a measure of correlation, and so measures the strength of the relationship between two variables. This statistic has slightly better statistical properties than others and there is a direct interpretation of Kendall's tau in terms of

probabilities of observing concordant and discordant pairs (Conover, 1980) so it is appropriate using in this case to know if there is a trend or not by ICT variables.

Table 4. Differences between European firms (Kendall´s tau)

	ICT1	ICT2	ICT3	ICT4	ICT5	ICT6	ICT7
Austria	0,856**	1**	0,69	0,867**	0,828**	0,69	0,501
Belgium	0,43	1**	0,645	0,733	0,867**	0,333	-0,505
Bulgaria	0,548	1	0,913	-	0,548	-	-
Croatia	-	-	-	-	-	-	-
Cyprus	0	1	1	-0,707	0,667	0	0,913
Czech Republic	0,775	1**	0,894**	0,552	1**	0,276	-0,2
Denmark	0,258	0,298	0,548	0,733	1**	1**	0,333
Estonia	1	1	1	1	1	0,548	0
Finland	-0,346	1**	0,856**	0,733	1**	0,598	-0,738
France	1	1	1	1	1	-	-
Germany	-0,43	1**	0,365	-0,072	0,828**	0,8	0,738
Greece	-0,072	0,867	0,333	0,828**	0,552	-0,138	-0,43
Hungary	0,667	1	0,913	0,333	1	0,183	-0,236
Ireland	0,645	1**	0,966**	1**	0,931**	0,867**	0,867**
Island	-	-	-	-	-	-	-
Italy	0	0,867**	0,966**	0,867**	0,828**	0,788	-0,43
Latvia	0,913	0,667	1	0,333	1	1	1
Lithuania	0	-0,548	1	1	1	1	1
Luxembourg	0,548	1**	1**	0,966**	0,966**	0,276	-0,298
Malta	0	1	0,816	1	-0,333	-	-
Netherlands	0,775	0,867**	0,966**	0,69	1**	0,828**	0,69
Norway	0,602	0,828**	0,828**	0,467	0,828**	0,6	0,828**
Poland	0,816	1	1	1	0,913	0	0,183
Portugal	0,828**	1**	1**	0,867**	0,867**	0,69	0,828**
Romania	-	1	1	1	1	-	-
Serbia	-	-	-	-	-	-	-
Slovakia	0,548	1	0,667	0,667	0,913	1	-1
Slovenia	0,236	1	0,707	1	1	0,183	-1
Spain	0,856**	1**	1**	0,966**	1**	0,966**	0,931**
Sweden	-0,234	0,548	0,183	0,733	0,788	1**	0,467
United Kingdom	0,645	1**	0,856**	0,867**	0,966**	-0,276	0,69

* p < 0,1; ** p < 0,05; *** p < 0,01.

Source: Own elaboration

The results of the analysis are shown in Table 4. We can see the heterogeneity of the results by countries. Spain is the country who shows the best results in the trend, because it has a constant tendency in all variables. Then Portugal is the second best positioned in the pool. Ireland and then Italy, Luxemburg, Netherlands, Norway and United Kingdom

are too well positioned. It can´t be inferred results from Croatia, Island and Serbia because of the lack of data. With respect to other countries, the results related to the variable ICT1 show that only in a small number of countries, Austria, Portugal and Spain, there is a clear growing trend in the use of computers. Almost half of European countries have increased the number of companies that had used broadband connection during the study period.

The result in the use of the Internet (ICT3) is less homogeneous, focusing the positive results in the Mediterranean area and in the Nordic countries. Related to ICT4, the Mediterranean area is mainly who shows a positive trend in the series. The number of companies who has a website increased more than half of European countries. However, the results of the variables relating to eCommerce are very different. In most countries there is no empirical evidence of a growing trend in electronic commerce. But clearly, there is a positive trend in Spain and Ireland. Also noteworthy that Spain is the only country who shows a growing trend in all the variables in the period. This reveals that Spanish companies have made considerable efforts in incorporating ICT into their business strategy and in the eCommerce too.

5. Discussion findings and conclusions

This research provides evidences of how crisis hasn't affected negatively the ICT implementations and use on EU business. First, results show that economic crisis hasn´t affected negatively to the use of keys information technologies in business, even in this period the use of ICT has increased in almost all European countries; therefore the answer to RQ1a is yes.

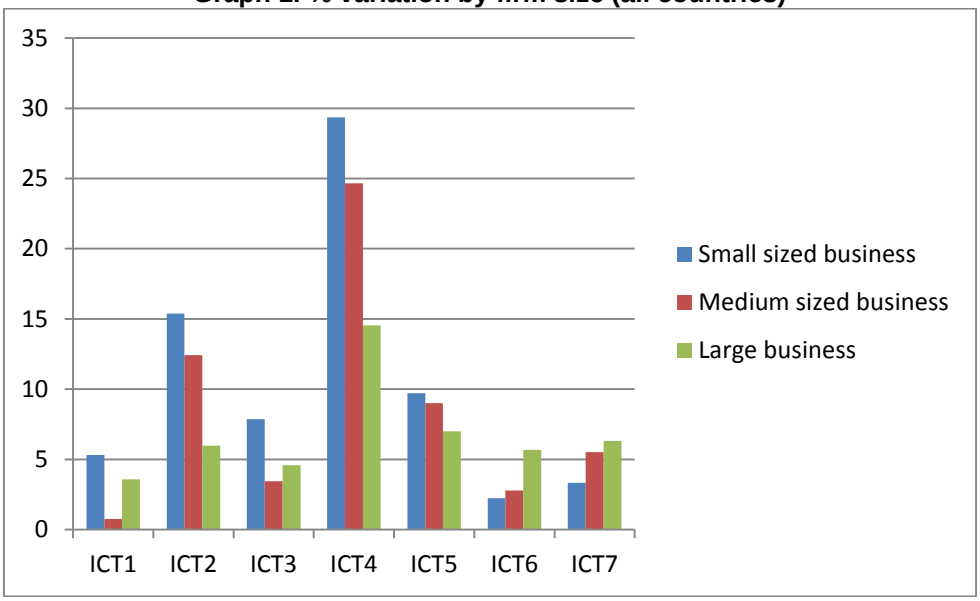
Second, if we analyzed the data from the whole countries, we can see that eCommerce has been increased in the period, but if we analyze country by country the results are quite different; the volume of purchases and sales through the Internet has increased since 2004, so there has been a positive trend until 2008. However, from 2007, electronic purchases begun to decrease, mainly caused of the drop of consumer. The fall in

household consumption and public bodies till 2007 has been a direct impact on trade and business strategies based on the Internet.

Therefore, the response to RQ1b is double, first, in global eCommerce has increased in the period studied but we can see in the graph that from 2007 eCommerce has arisen to decrease in almost all countries. This confirms by one hand that, companies use information technologies in their business and, on the other hand that the global economic crisis has begun to affect electronic commercial transactions as well as has affected traditional trade from 2007.

With regard to the analysis by firm size, relating to ICT1-5 variables, the variation has been positive. We can see on Graph 1 that small firms has get the biggest increase in the five variables of ICT implementation so the answer to RQ2a is no, because small firms had improved their information technologies more than large ones. However, on eCommerce variables ICT6-7, the results are very different. Both, on electronic purchases and sales, large firms have increased more than smaller firms, so the answer to RQ2b is yes.

Graph 1. % variation by firm size (all countries)



Source: Own elaboration

The study's main conclusion is that European companies are well aware of the importance of ICT in their business strategies and have made a great effort to incorporate them into their business organization, despite of the difficulties arising from the awful global economic crisis of the first decade of the XXI century. Moreover, small firms had improved their implementation and use of information technologies more than large ones, but with regard to eCommerce the results are very different because large firms have the most increased on electronic purchases and sales so they have been less affected by the economic crisis.

The findings of this paper present some important implications for both managers and policy-makers. By showing that, despite economic crisis businesses have increased their ICT adoption. Another direct consequence of crisis is that they have begun to decrease their transactions through eCommerce from 2007. This study gives evidence of the importance of ICT in business and else more that they are a key component of their business strategies. Finally, another conclusion of the research is that countries of the Mediterranean area show the best results in the period analyzed.

The main limitations of the study arise from the lack of similar researches that support it. It hasn´t passed enough time to get global perspective of the crisis nor about its impact on firms and country economies and this fact makes that this investigation can contribute to create a body of theory on the subject. In addition, the data period isn't still too long. In the future the period analysed can be more extensive and so the results will be more representative.

6. References

Abernathy, W. & Clark, K., (1985). Innovation: Mapping the winds of creative destruction. *Research Policy*, 14, 3-22.

Arvanitis, S. (2005). Computerization, workplace organization, skilled labour and firm productivity: evidence for the Swiss business sector. *Economics of Innovation and New Technology*, 14 (4), 225-249.

Arvanitis, S. & Loukis, E.N., (2009). Information and communication technologies, human capital, workplace organization and labor productivity: A comparative study based on firm-level data for Greece and Switzerland. *Information Economics and Policy*, 21, 43-61.

Ayed-Mouelhi, R. B. (2009), Impact of the adoption of information and communication technologies on firm efficiency in the Tunisian manufacturing sector. *Economic Modelling*, 26, 961-967.

Azizi, N. & King, M. (2005), Firm performance and AIS alignment in Malaysian SMEs. *International Journal of Accounting Information Systems*, 6 (2), 241-259.

Bartram, S.M. & Bodnar, G.M., (2009). No place to hide: The global crisis in equity markets in 2008/2009, *Journal of International Money and Finance*, 28, 1246-1292.

Bertschek, I. & Kaiser, U., (2001). Productivity Effects of Organizational Change: Microeconomic Evidence, *ZEW* Discussion Paper nº 01-32, Manheim.

Brynjolfsson, E. & Hitt, L., (1996), Paradox lost? Firm level evidence on the returns to information systems spends. *Management Science*, 42 (4), 541-558.

Byrd, T.A., & Turner, D.E. (2001), An explanatory examination of relationship between flexible IT infrastructure and competitive advantage. *Information&Management* 39 (1), 41-52.

Caldeira, M.M., & Ward, J.M. (2004), Using resource-based theory to interpret the successful adoption and use of information systems and technology in manufacturing small and medium sized enterprises, *European Journal of Information Systems*, 12, 127-141.

Carmassi, J., Gros, D. & Micossi, S., (2009). The Global Financial Crisis: Causes and Cures. *Journal of Common Market Studies*, 47(5), 977-996.

Castillo, A. & García Dotor, M.D. (2006), *TIC y PYME: Buenas Prácticas para el desarrollo productivo del país*, E- Deusto, Spain.

Chan, Y., Huff, S., Barclay, D. & Copeland, D. (1997), Business strategic orientation, information systems, strategic orientation and strategic alignment. *Information Systems Research,* 8(2), 125-150.

Clair, J. A. & Dufresne, R. L. (2007). How companies can experience positive transformation from a crisis. *Organizational Dynamics*, 36(1), 63-77.

Coltman, T. R., Devinney, T. M. & Midgley, D. F. (2005). Strategy content and process in the context of e-business performance, *Advances in Strategic Management*, 22, 349-386.

Congleton, R. D., (2009). On the political economy of the financial crisis and bailout of 2008. *Public Choice*, 140, 287-317.

Conover, W.J. (1980). *Practical Non-Parametric Statistics*, 2nd ed. John Wiley and Sons, New York.

Corden, W. M., (2009). The World Credit Crisis: Understanding it and what to do. *The World Economy*, 385-400. Doi: 10.1111/j.1467-9701.2009.01165.x.

Cragg, P.B., King, M. & Hussin, H. (2002), "IT alignment and firm performance in small manufacturing firms", *Journal Strategic Information Systems*, 11, 109-132.

Cramm, S., (2008). Smaller IT Budget? Pursue Value Driven development, *Harvard Business Review*, November 2008.

Crespi, G., Criscuolo, C. & Haskel, J. (2006). Information Technology, Organizational Change and Productivity Growth: Evidence form UK Firms, Queen Mary College. *University of London Working Paper* nº 558, London.

Davis, C.H., & Sun, E. (2006), Business Development in Information Technology SMEs in a regional economy: An explanatory study, *Journal of Technology Transfer*, 31, 145-161.

Dehning, B., & Stratopoulos, T., (2004). Determinant of a sustainable competitive advantage due to an IT-enabled strategy. *Journal of Strategic Information Systems* 12 (1), 1-22.

Dozier, K. & Chang, D., (2006). The effect of company size on the productivity impact of Information Technology Investments. *Journal of Information Technology Theory and Application*, 8 (1), 33-47.

Dubois, D. (1993), *Competency-based performance improvement: A strategy for organizational change*. HRD Press, Inc, Amherst, MA.

Emrouznejad, A., Cabanda, E. & Gholami, R. (2008). An Alternative Measure of the ICT-Opportunity Index. *Information & Management.* 246-254. Doi:10.1016/j.im.2010.04.002.

Galloway, L. & Mochrie, R. (2005), The use of ICT in rural firms: A policy oriented literature review, *The Journal of Policy, Regulation and Strategy for Telecommunications*, 7 (3), 33-46.

García-Canal, E., Rialp-Criado, A. & Rialp-Criado, J. (2007). Tecnologías de la Información y Comunicación (ICT) y crecimiento de la empresa. *Información Comercial Española*, 838, 125-145.

Grossmann, G. M. & Helpman, E. (1994). Endogenous innovation in the theory of growth. *Journal of Economic Perspectives*, 8, 23-44.

Hannan, M. T. & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, 49 (2), 149-164.

Van Hemert, P. & Nijkamp, P. (2010). Knowledge investments, business R&D and innovativeness of countries: A qualitative meta-analytic comparison. *Technological Forecasting & Social Change*, 77, 369-384

Hempell, T. (2004). Do computers call for Training? Firm-level Evidence on Complementarities between ICT and Human Capital Investments. *ZEN* Discussion Papers nº 03-20, Mannheim.

Hendricks, K., Singhal, V. R. & Stratman, J. K., (2007). The impact of enterprise systems on corporate performance: A study of ERP, SCM and CRM system implementation. *Journal of Operations Management*, 25, 65-82.

James, J., (2007). From origins to implications: Key aspects in the debate over the digital divide", *Journal of Information Technology*, 22(3), 284-295.

Joseph, G. & George, A. (2007), A framework to integrate the enterprise domain ontology and organizational change application domain, *International Journal of Accounting and Information Management*, 15(2), 3 – 23.

Lesjak, D. (2001), Are Slovene small firms using Information Technology strategically?, *Journal Computer Information Systems*, 41(3), 74-81.

Levy, M., & Powell, P., (2000). Information systems strategy for small and medium sized enterprises: An organizational perspective. *Journal of Strategic Information Systems*, 9 (1), 63-84.

Nieto, M.J. & Fernandez, Z. (2006), The role of information technology in business strategy of small and medium enterprises, *Journal of International Entrepreneurs,* 3, 251-262.

OECD (2000-1). Perspectives économiques de l´OCDE: Quels sont les facteurs qui sous-tendent la croissance dans les différents pays de l ´OCDE? 67.

Oh, W. & Pinsonneault, A. (2007). On the assessment of the strategic value of Information Technologies: Conceptual and Analytical approaches. *MIS Quarterly*, 31(2), 239-265.

Orviska, M. & Hudson, J. (2009). Dividing or uniting Europe? Internet usage in the EU. *Information Economics and Policy*, 21, 279-290.

Ravichandran, T. & Lertwongsatien C., (2005). Effect of Information Systems, Resources and Capabilities on Firm Performance: A resource based perspective. *Journal of Management Information Systems*, 21, 237-276.

Ross, G. (2008). What do "Europeans" think? Analyses of the European Union's current crisis by European elites. *JCMS*, 46(2), 389-412.

Salmeron, J.L., & Bueno, S. (2006). An information technologies and information systems industry-based classification in small and medium-sized enterprises: an institutional view. *European Journal of Operational Research*, 173, 1012-1025.

Scapens, R.W. & Jazayeri, M. (2004). ERP Systems and Management Accounting change: Opportunities or Impacts? A research note. *European Accounting Review*, 12(1), 201-233.

Scapens, R., Jazayeri, M. & Scapens, J., (1998). SAP: Integrated Information Systems and the implications for Management Accountants. *Management Accounting*, 76(8), 46-48.

Schubert, P., & Leimstoll, U. (2007), Importance and Use of Information Technology in Small and Medium-Sized Companies, *Electronic Markets*, 17(1), 38-55.

Tripsas, M. & Gavetti, G., (2000). Capabilities, cognition and inertia: Evidence from digital imaging. *Strategic Management Journal*, 18, 119-142.

Tushman, M. & Anderson, P. (1996). Technological discontinuities and organizational environments. *Administrative Science Quarterly*, 31, 439-465.

Wolf, E. & Zwick, T., (2002). Reassessing the Impact of High Performance Workplaces, *ZEW* Discussion Paper nº 02-07, Revised Version, Manheim.

World Bank. (2006). Information and Communications for Development 2006: Global Trends and Policies. www.worldbank.org.