

Drivers, Benefits and Challenges of ICT Adoption by Small and Medium Sized Enterprises (SMEs): A Literature Review

Virginia Barba-Sánchez*, María del Pilar Martínez-Ruiz*, Ana Isabel Jiménez-Zarco**

Abstract

In the knowledge society, firms need to develop competitive advantages based on an adequate and intensive use of information and communication technologies (ICTs), which is an essential element of success in today's market. This fact is especially relevant for small and medium sized enterprises (SMEs), whose survival depends, among other factors, on the use they make of ICTs to develop new organizational models, compete in new markets or enhance their internal and external communication relationships.

Given the relevance of this topic, the present work studies the impact of the adoption of ICT among SMEs. To do this, we first analyze the current situation of the use of ICT among SMEs in order to show their increasing penetration into the business environment. Then, we study the objectives as well as the main challenges behind the adoption of ICT among SMEs. Later, we analyse the entrepreneur as well as the innovation orientation as key factors in the ICT adoption process. Finally, we conclude by reviewing the main benefits that ICT can bring to certain areas of SMEs.

Key words: Information and Communication Technologies (ICTs); innovation orientation; small and medium sized companies (SMEs).

JEL Classification: L21.

1. Introduction

To be successful in the 21st century, any country in the world needs to develop an ideas-based can do economy and society. This implies an economy and society that are proficient at both creating ideas and translating a considerable proportion of them into new business opportunities. The pay-offs are jobs, wealth and a better quality of life. In this scenario, many developed countries have already concluded that their future relies on increasing investment in the underlying capability of the knowledge economy and creating an environment favourable to the rapid translation of new ideas into new business opportunities (Archrol and Kotler, 1999; Vilaseca, 2003).

In particular, small and medium sized companies (SMEs) will be able to seize this opportunity in a wide variety of ways and small entrepreneurs have a critical role to play. Therefore, it is important that small entrepreneurs take into account that the world in which organizations exist and operate is continuously changing. Changes in interdependencies, relationships, values, and norms among business that have made organizational, cultural, and strategic innovations as well as creative adaptation from being a mere issue of casual interest to a key research topic with major importance (Ahuja, 2000).

In this context, anyone in a leadership position knows that technology drives change, and change demands technology. Certainly, Information and Communication Technology (ICT) has favoured a multiplicity of changes in several industries. Thus, a major challenge for SMEs has been the exploding advancement and the ever-growing ICT developed within the past few decades (Cela, 2005).

* University of Castilla-La Mancha, Spain.

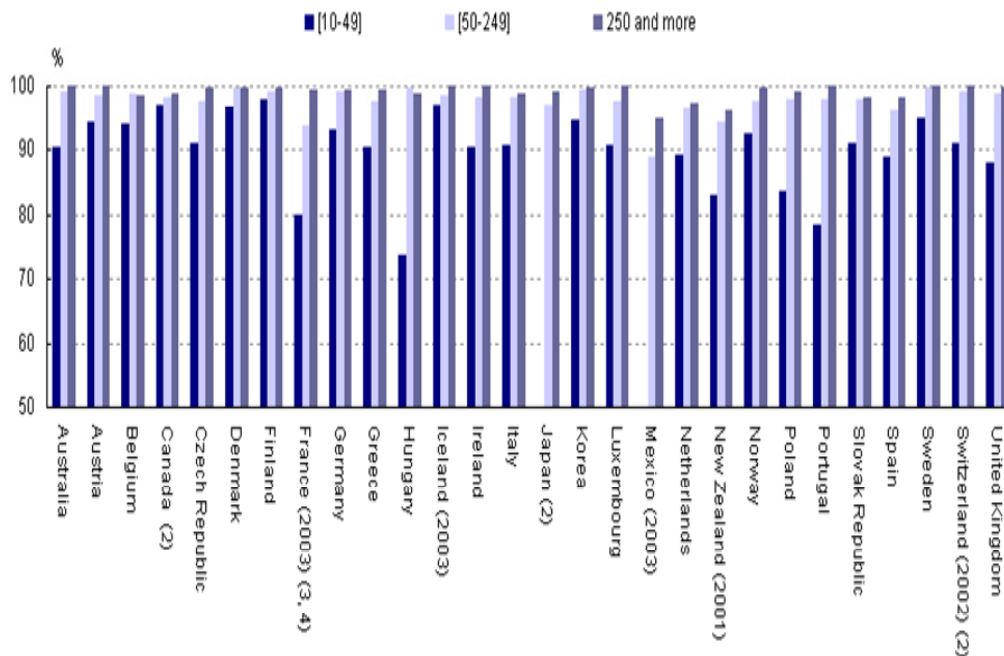
** University of Castilla-La Mancha, Spain.

*** Open University of Catalonia, Spain.

Given the interest of this topic, the present work is a literature review about the impact of the adoption of ICT by SMEs. To do this, we first analyze the current situation of the use of ICT among SMEs in order to show their increasing penetration into the business environment. Then, we study the reasons or drivers for ICT adoption by SMEs. Later, we analyse the entrepreneur as well as the innovation orientation as key factors in the ICT adoption process. Finally, we conclude by reviewing the main benefits that ICT can bring to certain areas of SMEs and identify areas that need further research.

2. The Use of ICT and Internet Among SMEs: Current Situation

Nowadays, the use of ICT by SMEs is increasingly common according to survey for OECD countries. Internet access is also frequent among SMEs (see Figure 2). While Internet penetration is normally higher in larger enterprises, it is detected that the gap between larger firms and SMEs is narrowing. In most OECD countries, Internet penetration rates for medium-sized companies (50-249 employees) are approximately the same¹ than for larger enterprises (more than 250 employees), with penetration rates of over 90%². As shown in Figure 2, small firms (10-49 employees) have a slightly lower penetration rate, generally between 80% and 98%, and in Hungary and Portugal, more than 70% have Internet access.



Source: OECD (2006).

Fig. 1. Internet penetration by size class, 2005 (percentage of businesses with 10 or more employees)

Notes:

1. For most European countries, the following industries are included: Manufacturing, Construction, Wholesale and retail, Hotels and restaurants (part), Transport, storage &

¹ This rate is even higher for certain European countries such as Belgium, Denmark and Hungary.

² There are exceptions (e.g., Mexico).

communication, Real estate, renting and business activities and Other community, social and personal service activities (part). For Australia, data relates to 2004-2005 financial year and Agriculture, forestry and fishing, Education and Religious organisations are excluded. For Canada, Agriculture, fishing, hunting and trapping, and Construction – specialist contractors are excluded. For Japan, data refer to enterprises with 100 or more employees and exclude: Agriculture, forestry, fisheries and Mining. Korea includes: Agriculture & Fisheries, Light Industry, Heavy Industry, Petrochemicals, Construction, Distribution, Finance and Insurance, and Other services. For Mexico, data refer to enterprises with 50 or more employees and include: Manufacturing, Services and Construction.

2. For New Zealand, data exclude electricity, gas and water, Government administration and defence, and personal and other services; the NZ survey also excludes businesses with five or fewer employees (FTEs) and those with turnover of less than NZD 30 000. For Switzerland, data refer to enterprises with 5 or more employees, and include the Manufacturing, construction, electricity, gas, and water and service industries.
3. For Canada, 49-299 employees instead of 50-249 and 300 and more instead of 250 and more. For Japan, 100-299 instead of 50-249 and 300 and more instead of 250 and more. For Switzerland, 5-49 instead of 10-49 employees.
4. Includes all of NACE 92.
5. Also includes Mining and quarrying, electricity, and gas and water.

3. The Adoption of ICTs by SMEs: Reasons for the Change

The relevant literature has traditionally suggested different perspectives or aspects of ICTs that must be considered in their study (Brady et al., 2002). From an economic and management viewpoint, ICTs have been regarded as: (1) a social construction; (2) an information provider; (3) an infrastructure – hardware and software; and (4) a business process and system. From a marketing point of view, ICTs have also been viewed as: (1) a variety of separate applications (Internet, databases, PowerPoint); (2) a marketing channel; (3) a communication/promotional medium; (4) a marketing technique; and (5) a tool for relationship marketing.

Obviously, ICTs are more than just computers or the Internet. Although there has been a tendency to focus on Internet technology, the study of technology effects in economy and business fields must also be closely considered. Today, ICTs must be conceived broadly to encompass the information that businesses create and use, as well as the wide spectrum of increasingly convergent and linked technologies that process that information. Therefore, ICTs can be viewed as a collective term for a wide range of software, hardware, telecommunications and information management techniques, applications and devices, and are used to create, produce, analyse, process, package, distribute, receive, retrieve, store and transform information (Porter and Millar, 1985; Brady et al., 2002).

Nowadays, the widespread uses of ICTs are changing the way people or companies work. It is a feature of the technological advancements of this period in history where there has been immense innovation in information management and communication so that in many countries, information and knowledge are easily conveyed, accessed and used. Thus, the pace of technological change and what is available for use by firms has revolutionized how they interact and do business.

In particular, ICTs have a valuable potential for developing SMEs through more effective use and better integration of ICTs in business processes while assisting them to make more efficient decisions relevant to their performance. ICTs have the potential to generate a step change among SMEs and make them more competitive, innovative and generate growth.

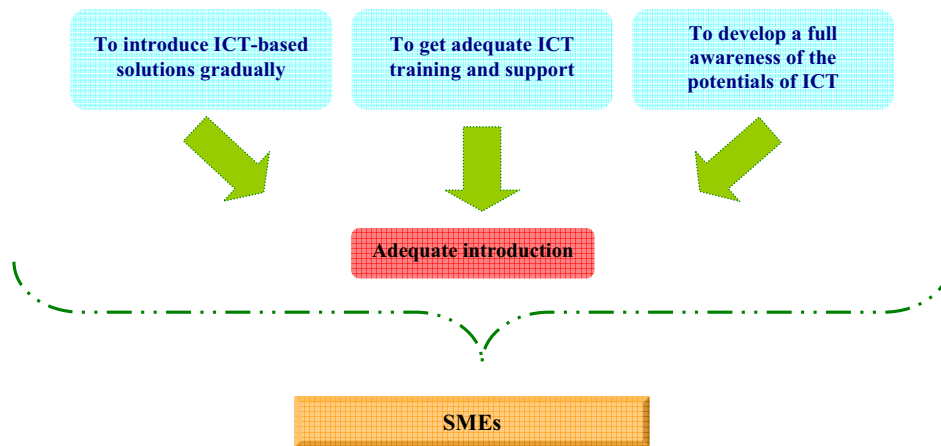
Since SMEs play a role of increasing importance in the economy (especially when we consider their contribution to the generation of jobs as well as the social-economic development of the community where they are located) (Hartigan, 2005), it is then desirable that SMEs are stimulated into adopting new technologies more rapidly, and creating innovative products more competitively. It requires that SMEs have the right environment to prosper, form a skilled workforce and drive economic growth.

In recent years, large numbered SMEs have acquired direct access to computers or other types of digital technologies, primarily for individual task development. Yet now these computers are beginning to be connected to each other, and for the first time there is an opportunity for very large numbers of small companies to use computing and communication capabilities to help coordinate their work. Specialized products have been successfully developed and commercialized, and to some observers these applications herald a paradigm shift in technology usage and implications. On the other hand, the improvements in the costs and capabilities of ICTs are changing the ways in which certain kinds of communications and coordination can occur (Summut-Bonnii and McGee, 2002). Lowering the costs of coordination between firms may encourage more market transactions, and at the same time, closer coordination across firm boundaries. Moreover, new capabilities for communicating information faster, less expensively, and more selectively, may help to create a rapidly changing organization with highly decentralized networks of shifting projects teams (Roberts, 2000). In addition, the sum of these changes is creating a pervasive feeling in business today that global interdependencies are becoming more critical. Thus, companies realize that they need to take advantage of ICT capabilities for improving their competitiveness and productivity (Ragaswamy and Lilien, 1997).

However, it is important to take into account that to adopt ICT systems and elements and strategies, the benefits must outweigh investment and maintenance costs. Consequently, commercial issues and potential returns must drive adoption. Beyond a certain level of ICT adoption and diffusion, not all SMEs will necessarily *catch up* with large firms simply because ICT may not bring large benefits, and SMEs will stay with traditional business processes. Other aspects that should also be considered are the availability of ICT competencies within the firm as well as the availability and cost of appropriate interoperable small-firm systems, network infrastructure and ICT-related support services (Leenders and Wierenga, 2002; Prasad et al., 2001; Roberts, 2000).

Guided by these considerations, some key elements can be mentioned to foster an adequate introduction of ICT-based solutions in SMEs (see Figure 1). First, it is highly recommended that ICT-based solutions be introduced gradually in SMEs since sudden transformations risk failing against unaware and unready business organizations (Argyres, 1999). Second, adequate training and support are required (Wei and Morgan, 2004). It is useful to outline that one of the main difficulties for SMEs in exploiting ICTs potentials is the lack of awareness of the benefits to be derived coupled with little or no specific training on ICTs (both at application and methodological levels). The smaller the enterprise, the greater this problem gets, since most small companies are not using information technology for their activities (apart from specific accounting services, and little more). Consequently, several problems must be solved to make ICTs simpler to use, reliable and well integrated in the SMEs activities.

The adoption of continuous training solutions can play an important role in increasing the awareness of the huge potentialities of ICTs for concrete situations; in this way employees, managers, and entrepreneurs can acquire a learning culture, integrating the training in their work activities and understanding in depth the potentialities of communication and information tools (Brady et al., 2002; Magretta, 1998; Smith and Blanck, 2002). Finally, a further fundamental element concerns developing a full awareness of the huge potentials of ICT (Dogson, 1993; Holmqvist, 2003). Forcing the introduction of technology is one of the main reasons behind the failure of several attempts of the SMEs to simply use ICTs effectively. The path to full awareness should move from introducing concrete and short-term benefits for the companies, followed by the presentation of more general and long-term advantages. Furthermore, by bearing in mind that the introduction of ICTs in SMEs can bring a real modification in the way of working, the introduction of ICT-based processes should take into account the specific culture of the company: the background of the entrepreneur and/or the managers is important as well as their openness to innovation orientation (Argyres, 1999; Tzokas and Saren, 1997; Wei and Morgan, 2004).



Source: Own elaboration.

Fig. 2. Key elements that can foster an adequate introduction of ICTs in SMEs

4. The Small Entrepreneur and the Innovation Orientation: Key Factors in the ICT Adoption Process

4.1. The small entrepreneur

As previously mentioned, the entrepreneur constitutes one of the key factors in the adoption of ICT by SMEs. In regard of this, the innovation and entrepreneurship literatures have long been interested in the following question: What are the differential entrepreneur's features that most people do not have? Apart from financial and an opportunity cost-based rationale, the literature analyzing this issue has examined three different categories of explanations: (1) basic demographic factors such as age, ethnicity and gender, (2) training and experience effects, and (3) psychological differences between individuals. Our purpose here is to briefly review these explanations to provide context for understanding the importance of the entrepreneur in the ICT adoption process by SMEs.

The first class of explanations for entering into entrepreneurship emphasizes *demographic factors*, and spans areas such as religious background (McClelland, 1968) and the presence of self-employed parents (Sorensen, 2006). A number of studies have suggested that age may play a role in the decision to start a new venture as well, with an *aging out* phenomenon affecting those in their upper 40s and later years if they had not earlier started a company (Levesque and Minniti, 2006). Empirical evidence appears to support this assertion (Roberts, 1991). More generally, the overall rate of entry into self-employment among members of immigrant communities depends on the size of the ethnic market, as well as on human capital characteristics such as language skills (Evans, 1989). Also, the literature on gender and entrepreneurship, while limited, emphasizes two areas: whereas one group of studies suggests that women entrepreneurs tend to concentrate in certain industries (e.g., Bates, 2002), a second group of studies examines differential motivations for entering entrepreneurship according to gender (DeMartino and Barbato, 2003).

A second class of explanations for transitioning into entrepreneurship has emphasized *training, career histories, and other experience*. Exposure to entrepreneurial experience through household or personal experience increases the likelihood of entrepreneurship (Carroll and Mosakowski, 1987; Roberts, 1991; Sorensen, 2006). The recent spin-off literature has emphasized both the characteristics of the parent firms (e.g., Gompers et al., 2005) as well as characteristics of the individuals (e.g., Shane and Khurana, 2003) as important determinants of the likelihood to spin off new ventures. While Dahlstrand (1997) shows that a minority of spin-offs come from universities, even for start-up firms that do not spin-off from academia, there is a likely role that university training

plays for entrepreneurs from private firms. Universities are an important source of knowledge spillovers (Zucker et al., 1998). These spillovers are not limited to university technology, but also include knowledge, norms, and attitudes about technology-based entrepreneurship.

Finally, the third class of explanations has highlighted *cognitive differences between individuals*, especially due to *psychological and sociological factors* (Segarra, 2002; De Pablo and Bueno, 2004). The relevant literature on this field has suggested that certain psychological and sociological factors determine the entrepreneurial potential of a certain geographical area (Entrialgo, 1998; Gartner, Starr and Bhat, 1998; Stewart *et al.*, 1999). Thus, the review of the literature proves that having an entrepreneurial psychological profile makes a strong difference (see Table 1).

Table 1

Psychological entrepreneurs' factors

CHARACTERISTIC	AUTHOR
INDEPENDENCE DESIRE	Díez de Castro et al. (1995); Anna, Chandler, Jansen and Mero (2000); De Pablo and Bueno (2004); García and Wandoseel (2004); Koh (1996); Martínez, Sánchez and Urbina (1998); McClelland (1968); Rusque (2002)
TENDENCY TO RISK	Díez de Castro et al. (1995); De Pablo and Bueno (2004)
HIGH NEED FOR ACHIEVEMENT	Díez de Castro et al. (1995); Anna, Chandler, Jansen and Mero (2000); De Pablo and Bueno (2004); Rusque (2002)
LOCUS OF INTERNAL CONTROL	De Pablo and Bueno (2004); Duchene and Orham (1998)
PREFERENCE FOR INNOVATION	Anna, Chandler, Jansen and Mero (2000); De Pablo and Bueno (2004); García and Wandoseel (2004)

Source: Own elaboration.

Although the referred studies can not be directly compared to each other since they differ in the variables considered, all of them suggest the following as entrepreneurs' features: independence desire, higher tendency to risk, higher need for achievement, locus of internal control, and higher preference for innovation (Begley, 1995; Stewart et al., 1999).

Summarizing, some differential features have been identified in small entrepreneurs that induce them to start a company. The presence of these differential features (demographic, training, experience and psychological) can lead to ICTs introduction among SMEs. Therefore, it is not surprising that several works have identified the entrepreneurial spirit along with managerial innovation – among others – as key factors to enhance ICT adoption (e.g., Lucchetti and Steriacchini, 2004; Ács and Varga, 2005).

4.2. The innovation orientation

Another key element in the adoption of ICTs among SMEs is the innovation orientation. Despite its importance, few works have devoted to the study of this concept – although there are several definitions of the term.

Some works consider that innovation orientation “encompasses the total innovation programs of companies and is strategic in nature because it provides direction in dealing with markets” (Manu, 1992). In the same vein, Manu and Sriram (1996) conceptualize innovation orientation as a multi-component construct consisting of new product introduction, R&D expenditures and order of market entry, whereby “single variable categorizations of innovativeness do not fully capture the complexities of innovativeness”. However, this latter work considers variables that determine the impact of the market strategy on benefits exclusively, which constitutes a limitation.

Other works have conceptualized the innovation orientation as the firm ability to introduce new ideas or concepts. Thus, Hurley and Hult (1988) define this concept as the “notion of openness to

new ideas as an aspect of firm's culture", and Hult et al. (2004) view innovation orientation as the capacity to introduce new processes, products or ideas in the organization". Finally, Homburg et al. (2002) view innovation orientation as a function of "the number of innovations a company offers, how many customers the innovations are offered to, and how strongly these innovations are emphasized".

As previously mentioned, there is no consensus on this concept, which has made it difficult to develop a consistent theoretical research body (Siguaw et al., 2006). However, the revision of the existing definitions enables the identification of some common elements that constitute the differential aspects of innovation orientation: learning philosophy, strategic direction and transfunctional acclimation.

Most definitions concur first and foremost that innovation orientation is a *learning philosophy* in which firms have common standards and beliefs about learning and knowledge that pervade and guide all functional areas toward innovation. In other words, a pervasive set of organization-wide understandings about learning, thinking, acquiring, transferring, and using knowledge in the firm to innovate.

Works as Worren et al. (2002) promote the idea of "common" mission" and innovation climate of new ideas, Hurley and Hult (1998) discuss the open-to-new ideas corporate culture of innovation orientation and Atuahene-Gima and Ko's (2001) definition requires an environment that allows "employees to keep up with changing technologies". As we can see, all these conceptualizations strongly imply that a learning philosophy must be an inherent component of innovation orientation.

Besides, a high number of definitions consider innovation orientation as a strategic variable (Worren et al., 2002). Thus, innovation orientation is generally considered an intentional and calculated plan or strategic intent that provides direction toward an organization-wide commitment to more and faster innovation.

As Siguaw et al. (2006) suggest, innovation-oriented firms possess the inclusion of a *future-oriented concept* of the business, captured in the strategic beliefs and understandings that define who the firm is and how the activities of the organization are assembled to ensure that innovation happens in a timely fashion – the strategic direction. The strategic component of an innovation oriented reflects the strategic directions implemented by a firm to create the proper behaviors for a continuous superior performance of the business (Gatignon and Xuereb, 1997). In essence, this component is the way of thinking and leading that drives the firm over the long run, keeping it innovative. Strategic direction involves clarity of thought and purpose and is generally articulated through vision and mission statements and objectives.

As the final component of innovation orientation, the proceeding definitions and conceptualizations argue for a specific work force interaction or *transfunctional acclimation* arising from the learning philosophy and strategic direction components that cross all functional areas. The innovation orientation transfunctional acclimation is generally seen as a set of common understandings and beliefs, pervading the innovation orientated firm that creates a unifying comradeship, enthusiasm, and devotion among employees (Worren et al., 2002). The common beliefs, values and understandings are disseminated so that the organization thinks as one collective body that aspires to see the organization succeed through innovation rather than an assortment of separate functional units, each with its own sometimes disparate goals (Siguaw et al., 2006).

Synthesizing the broader issues surfaced in the literature, innovation orientation can be defined as: "A multidimensional knowledge structure composed of a learning philosophy, strategic direction, and transfunctional beliefs that in turn, guide and direct all organizational strategies and actions, including those embedded in the formal and informal systems, behaviors, competencies, and processes of the firm to promote innovative thinking and facilitate successful development, evolution, and execution of innovations" (Siguaw et al., 2006).

Finally, note that innovation orientation directly determines the technologies choices a firm makes and how that technology is leveraged to ultimately produce high-quality innovations leading to firm performance as modeled. Although the components of the innovation orientation knowledge structure are best viewed together, the learning philosophy element of innovation orientation will determinate which technologies are acquired and developed to facilitate organization-wide learning, the strategic direction component will likely foster technologies that facilitate innovation processes and structures, and the transfuctional component will focus on technologies that facilitate interorganizational communications (Han et al., 2001; Siguaw et al., 2006).

5. Benefits of the Use of ICT in SMEs

On the whole, ICT applications can provide several benefits across a wide range of intra- and inter-firm business operations and transactions. Certainly, ICT applications can contribute to improve information and knowledge management inside the firm, can reduce transaction costs and can increase the speed and reliability of transactions for both business-to-business (B2B) and business-to-consumer (B2C) transactions. In addition, they are effective tools for improving external communications and quality of services for established and new customers. More specifically, SMEs can obtain a wide range of benefits from the use of ICT (Cela, 2005). Among these benefits, it is possible to mention:

1. Enhance the productivity and effectiveness of certain activities or functions (Brady et al., 2002).
2. Favour the adoption of new organizational, strategic and managerial models (Johnston and Lawrence, 1998; Kahn, 1996, 2001).
3. Enable the access to new environments as well as the generation of new markets and business models (Corbitt, 2000; Javalgi and Ramsey, 2001).
4. Improve the qualification and specialization of human resources, which increases the efficiency and efficacy (Vilaseca, 2003).

ICTs play an important role in enhancing the productivity and effectiveness of certain activities or functions made by SMEs (Brady et al., 2002; Webster, 1992). For instance, ICTs facilitate the selective automation of processes related to supporting the field sales force and integrating sales activity into the company's information structure. On the other hand, they provide ready access to a vast array of global information resources and facilitate the gathering of valuable competitive knowledge and consumer-related information that simplifies marketing decision processes. Finally, ICTs provide the marketer with extraordinary capability to target specific groups of individuals precisely and enable them to practice mass-customization and one-to-one marketing strategies, by adapting communications and other elements of the marketing mix to consumer segments (Pine et al., 1995; Prasad et al., 2001).

Yet ICTs not only affect how individual activities are performed, but through new information flows, greatly enhance a company's ability to exploit linkages between activities, both within and outside the company (Porter and Millar, 1985). Thus, ICTs can create new, strong linkages between internal activities, and even coordinate these actions more closely with their consumers and suppliers to facilitate integration within the company (Leenders, and Wierenga, 2002; Rothwell, 1994).

Relationships are sometimes established among businesses or company units that are physically separate. In this case, ICTs enhance the company's ability to coordinate activities regionally, nationally and globally, creating many new interrelationships among them (Prasad et al., 2001), and expanding the scope of industries in which the company must compete to achieve competitive advantage (Porter and Millar, 1985).

Nevertheless, the more important relationships are usually found among different agents within the company, and for these types of relationships, ICTs play an important role. Swan et al. (1999) formulated two distinct perspectives on knowledge management, namely the cognitive and community models. The cognitive model details a perspective where valuable knowledge is

captured and codified from individuals, packaged, transmitted and processed through the use of ICTs, and then disseminated and used by other individuals. Conversely, the community model focuses on the effects of knowledge use on the social interaction and negotiation among members. Based on this work, Sorensen and Lundh-Snis (2001), conclude that ICTs play an important role in internal relationships, enhancing communication and collaboration processes. Thus within the cognitive model, ICTs are viewed as tools that allow one to store, codify, analyse, share and use knowledge, while in the communicative model, ICTs support interaction and collaboration, using knowledge as a socialization factor.

As previously noted, a greater degree of integration is a key factor for internal relationships, through involving consumers and other functional agents in teamwork to develop new products (Kanh, 1996, 2001). ICTs increase integration in different ways. On the one hand they provide universal connectivity in synchronous and asynchronous modes that facilitate and enhance the process of collaboration and information and knowledge exchange (Magretta, 1998; Prasad et al., 2001). Further, authors including Leeders and Wierenga (2002) suggest that ICTs not only help to transfer knowledge among team members, but also support the creation of new knowledge within a particular area. On the other, ICTs may facilitate the development of cooperative behaviours among agents that share the same cultural and common goals. Prasad et al. (2001) suggest that ICTs are important tools to increase levels of consumer loyalty and trust in the company.

Even if partners do not have a common location, culture, history or future, ICTs can enhance collaboration and knowledge transfer and use (Smith and Blanck, 2002). With the widespread use of ICTs global or virtual teams have become a reality. Robers (2000), analysing the ability and willingness to cooperate, suggests that ICTs increase teamwork integration in two ways, firstly facilitating and speeding knowledge transfer, both tacit and explicit, and second, reinforcing the levels of trust and confidence that normally develop in face-to-face meetings.

6. Conclusions, Limitations and Further Research Lines

Nowadays economy must be understood as a global process. In this scenario, ICT can provide a wide variety of benefits to different firms. More specifically, ICT can reduce business costs, improve productivity and strengthen growth possibilities. Besides, the adoption and implementation of ICT by firms can improve business cooperation, business relationships, quality and diffusion of knowledge. Hence, SMEs with an innovation philosophy are a powerful strategic tool.

Despite ICT is not a strategic resource itself, it is free available in the market and is valuable, difficult to imitate and non-sustainable (Barney, 1991). For this reason, ICT must be complementarily exploited along with other business resources in order to get a source of competitive advantage.

The analysis of the strategic value of ICT must include not only the own technological features but also the individual adjustments of the particular firm to the organizational structure, capabilities, resources, incentive structure, facilitating interaction mechanisms to all elements performance conditioners and the possible contribution to a competitive advantage.

In this context, the present theoretical article constitutes a preliminary work, being necessary to contrast the observed findings empirically in order to define with a higher level of accuracy the role of ICT in the formulation and practical implementation of ICT. Furthermore, it is desirable that the incidence of the observed findings is contrasted against the business performance as well as the generation of competitive advantages.

References

1. Ács, Z. and Varga, A. (2005). "Entrepreneurship, Agglomeration and Technological Change". *Small Business Economics*, 24: 323-334.
2. Achrol, R.S. and Kotler, P (1999). "Marketing in the Network Economy". *Journal of Marketing*, 63 (special Issue): 146-163.

3. Ahuja, G. (2000). "Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study". *Administrative Science Quarterly*, 45: 425-455.
4. Anna, A.L.; Chandler, G.N.; Jansen, E.; and Mero, N.P. (2000). "Women business owners in traditional and non-traditional industries". *Journal of Business Venturing*, 15 (3): 279-303.
5. Athuahene-Gima, K. and Ko, A (2001). "An empirical investigation of the effect of marketing orientation and entrepreneurship orientation, alignment on product innovation". *Organization Science*, 12(1):54-74.
6. Barney, J. (1991). "Firm resources and sustained competitive advantage". *Journal of Management*, 1 (17): 99-120.
7. Bates, T. (2002). "Restricted access to markets characterizes women-owned businesses". *Journal of Business Venturing*, 17 (4), 313-324.
8. Begley, T.M. (1995). "Using founder status, age of firm, and company growth rate as the basis for distinguishing entrepreneurs from managers of smaller business". *Journal of Business Venturing*, 10 (3): 249-263.
9. Benjamin, R.J., Rockart, M.S., Scott-Morton, M., and Wyman, J. (1984). "I.T.: A Strategic Opportunity". *Sloan Management Review*, Spring: 3-9.
10. Brady, M.; Saren, M. and Tzokas, N. (2002). "Integrating Information Technology into Marketing Practice – The IT Realize of Contemporary Marketing Practice". *Journal of Marketing Management*, 18: 555-577.
11. Carroll, G.R., and Mosakowski, E., (1987). "The career dynamics of self-employment". *Administrative Science Quarterly*, 32 (4), 570-589.
12. Cela, J. (2005). "Sociedad del conocimiento y sociedad global de la información: implantación y desarrollo en España". *Documentos de las Ciencias de la Información*, 28: 147-158.
13. Corbitt, B.J. (2000). 'Developing intraorganizational electronic commerce strategy: an ethnographic study', *Journal of Information Technology*, 15 (2), pp. 119-130.
14. Dahlstrand, A.L., (1997). "Growth and inventiveness in technology-based spin-off firms". *Research Policy*, 26 (3), 331-344.
15. De Pablo, I., and Bueno, Y. (2004). "Rasgos personales que caracterizan a un emprendedor de éxito". *Iniciativa Emprendedora Y Empresa Familiar*, 44: 113-125.
16. DeMartino, R., and Barbato, R., (2003). "Differences between women and men MBA entrepreneurs: exploring family flexibility and wealth creation as career motivators". *Journal of Business Venturing*, 18 (6), 815-832.
17. Díez de Castro, E. Et Al (1995). *La Empresa en Andalucía*. Madrid: Civitas.
18. Duchene, B.; Orphan, M. (1998). "Woman entrepreneurs in France: motivations for creating a business". *Research in Entrepreneurship and Small Business* (Rent XII), Lyon (France), November 26-27.
19. Entrialgo, M. (1998). *El perfil empresarial como factor determinante de la estrategia y competitividad de la Pyme*. Doctoral Thesis, University of Oviedo (Spain).
20. Evans, M.D.R., (1989). "Immigrant entrepreneurship: Effects of ethnic market size and isolated labour pool", *American Sociological Review*, 54 (6), 950-962.
21. García-Sánchez, A.; Wandosell, G. (2004). "Motivaciones y obstáculos en la creación de empresas: efectos de la experiencia empresarial", *Boletín Económico Del Ice*, 2819: 19-36.
22. Gartner, W.B. (2002). "Are entrepreneurs different than others?", in Christensen, P.R.; Freytag, P.V.; Toftild, L.F.: *Arsrapport 2001/2002-Center For Smavirksomheds-Forskning*. Kolding: Syddansk Universitys Trykkeri, 11-15.
23. Gartner, W.B.; Starr, J.A.; Bhat, S. (1998). "Predicting new venture survival: an analysis of 'anatomy of a start-up, cases from Inc. Magazine". *Journal Of Business Venturing*, 14: 215-232.
24. Gatignon, H. and Xuereb, J.M. (1997). "Strategic orientation of the firm and new product performance". *Journal of Marketing Research*, 34 (1): 77-90.
25. Gompers, P., Lerner, J., Scharfstein, D. (2005). "Entrepreneurial spawning: Public corporations and the genesis of new ventures, 1986-1999". *The Journal of Finance*, 60 (2), 577-614.

26. Han, J.K.; Kim, N. And Kim, H-B. (2001). "Entry barriers: A Dull- one, or two-edged sword for incumbents?. Unraveling the paradox form a contingency perspective". *Journal of Marketing*, 65 (1): 1-14.
27. Hartigan, P. (2005). "El emprendedor social como modelo para el futuro". *Iniciativa Emprendedora Y Empresa Familiar*, 46: 19-25.
28. Holmqvist. M. (2003). "Dynamic Model of Intra-and Interorganizational Learning". *Organization Studies*, 1,24 (1): 95-123
29. Homburg, C.; Hoyer, W.D. and Fassnacht, S.M. (2002). "Service orientation of retailer's business strategy: Dimensions, antecedents and performance outcomes". *Journal of Marketing*, 66 (4): 86-101.
30. Hult, G.T.M.; Hurley, R.F.; and Knight, G.A. (2004). "Innovativeness: Its antecedents and impact on business performance". *Industrial Marketing Management*, 33 (5): 429-438.
31. Hurley, R.F. and Hult, G. T.M. (1998). "Innovation, market orientation, and organizational learning: An integration and empirical examination". *Journal of Marketing*, 62 (3): 42-54.
32. Javalgi, R. and Ramsey, R. (2001). 'Strategic issues of e-commerce as an alternative global distributions system'. *International Marketing Review*, 18 (4), pp. 376-391.
33. Koh, H.C. (1996). "Testing hypotheses of entrepreneurial characteristics". *Journal Of Managerial Psychology*, 11: 12-25.
34. Levesque, M. and Minniti, M. (2006). "The effect of aging on entrepreneurial behaviour". *Journal of Business Venturing*, 21 (2), 177-194.
35. Leenders, M.A.A.M. and Wierenga, B. (2002). "The Effectiveness of Different Mechanisms for Integrating Marketing and R&D. *Journal of Product Innovation Management*, 19 (4): 305-317.
36. Lucchetti, R.. and Steriacchini, A. (2004). "The adoption of ICT among SMEs: evidence from an Italian survey". *Small Business Economics*, 23: 151-168.
37. Magretta, J. (1998). "The Power of virtual Integration: An Interview with Dell Computer's Michael Dell. *Harvard Business Review*, (March-April), 73-84.
38. Manu, F. (1992). "Innovation orientation, environment and performance: A comparison of US and European markets". *Journal of International Business Studies*, 23 (2): 333-359.
39. Manu, F. And Sriram, V. (1996). "Innovation marketing strategy, environment and performance". *Journal of Business Research*, 35 (1): 79-91.
40. Martinez Sánchez, A.; Urbina, O. (1998). "Emprendedores y empresas de alta tecnología: El caso de Aragón", *Revista Europea De Dirección Y Economía De La Empresa*, 7 (3): 135-146.
41. McClelland, D.C. (1968): *La Sociedad ambiciosa*. Madrid: Guadarrama.
42. OECD (2006): *ICT database and Eurostat, Community Survey on ICT usage in enterprises*, September 2006, available at: <http://www.oecd.org/dataoecd/20/23/37442795.xls>.
43. Pine, B.J.; Pippers, D. and Rogers, M. (1995). "Do you Want to Keep your Customers for Ever?". *Harvard Business Review*, 73 (2): 103-119.
44. Porter, M.E. and Millar, V.E. (1985). "How Information Gives You Competitive Advantage". *Harvard Business Review* (July-August), 63 (4),149-174.
45. Prasad, V.K.; Ramamurthy, K. and Naidu, G. (2001). "The Influence of Internet-Marketing Integration on Marketing Competencies and Export Performance". *Journal of International Marketing*, 9 (4): 82-110.
46. Proyecto Sicman (2005). *Cuatro acciones para el impulso de las tecnologías de la información en las empresas de Castilla-La Mancha*, Albacete: Fundación Campollano.
47. Rangaswamy, A. and Lilien, G.L. (1997). "Software Tools for New Product Development". *Journal of Marketing Research* , 34 (February), 177-184.
48. Roberts, E.B., (1991). *Entrepreneurs in high technology: Lessons from MIT and beyond*, New York: Oxford University Press.
49. Roberts, J. (2000). "From Know-how to Show-how? Questioning the Role of Information and Communication Technologies in Knowledge Transfer". *Technology Analysis & Strategic Management*, 12 (4), 429-443.
50. Rothwell, R. (1994) Towards the Fifth-Generation Innovation Process. *International Marketing Review*, 11 (1): 7-31.

51. Rusque, A.M. (2002). "De la capacidad emprendedora basada en rasgos individuales a la capacidad emprendedora como responsabilidad social", *V Encuentro De Red Motiva Para La Formación De Formadores En Creación De Empresas*, San José (Costa Rica), 21th-22th November.
52. Sammut-Bonnici, T. and McGee, J. (2002). "Network Strategies for New Economy". *European Business Journal*, 14, 174-185.
53. Segarra, A. (2002). "Creación y supervivencia de empresas", *XVII Jornadas De Alicante Sobre Economía Española*, 24th-26th October, Alicante (Spain).
54. Shane, S., Khurana, R., (2003). "Bringing individuals back in: The effects of career experience on new firm founding". *Industrial and Corporate Change*, 12 (3), 519-543.
55. Singuaw, J.; Simpson, P.M. and Enz, C.A. (2006). "Conceptualizing Innovation Orientation: A framework for study and integration of innovation research". *Journal of Product Innovation Management*, 23: 556-574.
56. Smith, P.G. and Blanck, E.L. (2002). "Leading Dispersed Teams". *Journal of Product Innovation Management*, 19: 294-304.
57. Sorensen, J.B. (2006). "Closure vs. Exposure: Assessing alternative mechanisms in the inter-generational inheritance of self-employment". *Research in the sociology of organizations* (forthcoming).
58. Sorensen, C. and Lundh-Snis; U. (2001). "Innovation through Knowledge Codification. *Journal of Information Technology*, 16, 83-97.
59. Stewart, W.H. Jr. et Al. (1999). "A Proclivity for entrepreneurship: A comparison of entrepreneurs, small business owners, and corporate managers". *Journal Of Business Venturing*, 14 (2): 189-214.
60. Swan, J.; Scarbrough, H. and Hislop, D. (1999). Knowledge Management and Innovation: Networks and Networking. *Journal of Knowledge Management*, 3 (3): 262-275.
61. Vilaseca, J. (drtor.) (2003). *Las TIC y las transformaciones de la empresa catalana*, Barcelona: FUOC.
62. Webster, F.E. Jr. (1992). "The Changing Role of Marketing in the Corporation". *Journal of Marketing*, 56 (October): 1-17.
63. Worren, N., Morre, K. and Carmona, P. (2002). "Modularity, strategy flexibility, and firm performance: A study of the home appliance industry". *Strategic Management Journal*, 23 (12): 1123-1140.
64. Zucker, L.G., Darby, M.R., Brewer, M.B. (1998). "Intellectual human capital and the birth of U.S. biotechnology enterprises", *American Economic Review*, 88 (1), 290-306.