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A model for the assessment and development of Internet-based information and communication services in small and medium enterprises

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Abstract

Young engineers understand technology very well, but they usually have poor skills on business practices. For this reason, they should appreciate tools that help in assessing small companies from a combined viewpoint of business and technology. In this article we present such a tool in the form of a model that helps to understand how an enterprise is using information and communication technologies (ICTs) and "how" and "when" a company should incorporate new technological elements. The model can also be applied to marketing research to understand the small and medium enterprises (SMEs) emergent market related to ICTs and to plan government policies devoted to fostering ICT introduction in SMEs. The model has been applied successfully in the assessment of 500 SMEs, and also as an innovative active learning tool for higher education.

Keywords: Information and communication technologies (ICT); Small and medium enterprises (SME); Entrepreneur; Market research; Innovation; Telecommunications; Information systems

1. Introduction

It is widely accepted that both "innovation in-house" and "innovative small and medium enterprises (SMEs) cooperation" require for SMEs to use information and communication technologies (ICTs). Moreover, ICT expenditures are productivity improvement drivers by themselves (Lapierre and Denier, 2005; Falk, 2005).

That is, the use of ICTs can be considered as key factors for innovation and entrepreneurship. ICTs are a must for SMEs to innovate.

In fact, a look over the fifth edition of the European innovation scoreboard (EIS) reveals that there is a big innovation gap between Europe and the US that is not closing (Trendchart Report, 2006). The EIS includes innovation indicators and trend analyses for all 25 European Union (EU) Member States, as well as for Bulgaria, Romania, Turkey, Iceland, Norway, Switzerland, the United States and Japan. It assesses five key dimensions of innovation: innovation drivers, knowledge creation, innovation and entrepreneurship, applications, and intellectual property.

The innovation and entrepreneurship dimension of innovation is supported by six indicators, which are mainly related to the innovation performance of SMEs.

Let us pay attention to three of the six indicators from the innovation and entrepreneurship dimension, which are (Trendchart Report, 2006):

- *SMEs innovating in-house*: This indicator measures the degree to which SMEs that have introduced any new or significantly improved products or production processes during the period have innovated in-house.
- *Innovative SMEs cooperating with others*: This indicator measures the degree to which SMEs are involved in

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innovation co-operation. Complex innovations, in particular in ICT, often depend on the ability to draw on diverse sources of information and knowledge, or collaborate on the development of an innovation. This indicator measures the flow of knowledge between public research institutions and firms as well as between firms and other firms.

- *ICT expenditures*: ICT is a fundamental feature of knowledge-based economies and the driver of current and future productivity improvements. An indicator of ICT investment is crucial in capturing innovation in knowledge-based economies, in particular due to the diffusion of new information technology (IT) equipment, services and software.

Besides, there is a need to foster young engineer's abilities and education towards technology-based and market-based innovations, mainly through the development of entrepreneur profiles or through the mentoring of young entrepreneurs. All the same, the entrepreneurship objective should also be extended to small organizations that need some help to foster their innovation abilities.

For this reason a good solution to innovation and entrepreneurship fostering could be to *instill* into the minds of young ICT engineers the idea of being the professionals that assist small enterprises on their way to innovation and competitiveness based on IT. Furthermore, these young professionals should be provided with a valuable tool (tricks, if you prefer) for the rapid assessment of the needs of SMEs. That way, both objectives could be achieved: the entrepreneurial character of young engineers would be developed, and also small enterprises could find in such professionals the support they need to improve their use of ITs for their sustainable and competitive growing.

Why is that consultancy field suitable for young engineers? The information and communication systems for the SME emergent market cannot be easily afforded (at least directly) by large IT providers or telecommunication operators. The reason is that the offer from large operators or providers is quite packetized, so personalization or configuration is only possible at a pure technical level, but not at a business level. There are so many business models, industries, company sizes, company structures or client typologies that off-the-shelf ICT business solutions *need necessarily* be adapted by a consultant. The question to be addressed is which types of ICTs should be used and how to introduce them in each specific SME. The model proposed in this article is an approximation to the answer.

2. Model description

Our model is based on the measurement of the degree of the introduction of ICT in SMEs, but also taking into consideration other enterprise strategies or circumstances (Martin and Matlay, 2001). For example, if an SME is intending to invest in ICT then they should seek out an adviser who can ensure the investment has a clear strategic focus and the business opportunity is enhanced (Morgan et al., 2006).

The model is based on the following hypothesis: Internet is the foundation of SMEs corporate networks and Internet-based services are the cornerstone of their information services. For this reason, ICT in SMEs should be analyzed from an Internet culture standpoint. Internet access, the use of basic Internet services, as well as the use of enterprise management, and trading information systems (e.g. e-commerce, e-procurement), should also be considered.

The above hypothesis also suggests that an SME should be assessed from three different fields: telecommunications, information systems, and corporate culture (human resources). The first two fields seem to be obvious, but some times the third is forgotten and it is extremely important in the case of SMEs (Mullins et al., 2001; Fulantelli and Allegra, 2003; Dagdilelis et al., 2003; Oyelaran-Oyeyinka and Lal, 2006).

Before going through a distinct analysis of these three fields, our model should determine which steps are to be followed by an SME when introducing ICTs. Since the network and services for SMEs are Internet-based, a good conceptual model should consider the evolution of Internet services inside a firm.

At the height of the dot-com bubble, the three Cs (*content*, *community* and *commerce*) were the valued proposition for web portals. Other authors have used an analysis based on up to eight C's (*connectivity, content, community, commerce, capacity, culture, cooperation* and *capital*) to address the success of ICT deployment (Rao, 2003), which is more than a web portal deployment. Our analysis, in fact, is very close to the "8 Cs" paradigm since our model addresses also connectivity (we call it *telecommunications*) and capacity–culture–cooperation (we call it *corporate culture*). Today, capital is not supposed to be an obstacle since information systems for SMEs are quite affordable.

Going back to the "3 Cs" analysis, we should define *content*, *community* and *commerce*—in a similar way to how Rao (2003) does—for the case of ICTs being applied by SMEs.

- *Content:* To provide basic (but complete) information about the firm and its products or services that can be downloaded by employees and also by customers.
- *Community:* To work together; this implies much more than information uploading and retrieving.
- *Commerce:* To get through to make business.

The model is also in accordance with Belussi (2005) who found that SMEs use ICTs for customer relationships (content) in an earlier stage than for providers' relationships (community) and also with Nuissl (2005) in the sense that making business together (commerce) is a consequence of trust (which is achieved by working together).