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Abstract

Institutional involvement has been determinant in the diffusion of technological innovations, however little attention has been given to institutional intervention in the adoption and diffusion of e-commerce in SMEs. This study investigates the role of government in the adoption and diffusion of e-commerce in small and medium size enterprises. King et al. (1994) framework of institutional factors in information technology innovation is used to analyze the wishes expressed by SMEs regarding intervention to foster the adoption and diffusion of e-commerce among small businesses. The findings show that the government could mostly influence adoption and diffusion through knowledge deployment, subsidies and mobilization.

Keywords: Electronic Commerce, Internet, Adoption, Diffusion, Institutional Intervention, Government, SMEs

Introduction

Innovation and technological change has been considered an important factor for economic development. Innovation is characterized by three stages: invention, innovation and diffusion (Dosi, 1988). An invention is a new idea or product, which becomes an innovation when it starts diffusing in the society or move into a usable form. Diffusion is the spread of the capacity to produce and/or use an innovation, and its use in practice. Much attention has been given to influence and regulatory actions of institutions in adoption and diffusion of innovations. King et al.(1994)'s definition of institutions is adopted here according to which "an institution is any standing, social entity that exerts influence and regulation over other social entities as a persistent feature of social life, outlasting the social entities it influences and regulates, and surviving upheaval in the social order". This definition implicitly considers institutions as boundaries between social entities such as organizations and firms on one hand and society and culture on the other. Information technology has been among the fastest growing innovations in both production and use in the second half of the last century. In the last decade, a particular type of information technology, the Internet, has been changing business processes, organizational and industrial structures and given form to new communication and business forms as for example e-commerce. King et al. (1994) identifies

a series of institutions that influence IT adoption among which: government authorities, international agencies such as the United Nations, research oriented higher education institutions, trend-setting corporations, professional, trade and industry associations.

Especially government intervention has been historically important in creating economic growth and in fostering diffusion of technological innovations. For example, Reinert (1999) highlights the role of the state as promoter of economic growth by getting the nation into the "right business", creating a competitive advantage in "the right business", setting standards and creating demand. The role of government has been fundamental in the diffusion of infrastructures such as telecommunication networks. In e-commerce diffusion, many studies are addressing the role of government intervention to avoid a digital division of poor and rich countries. For example, Madon (2000) in an analysis of the relationship between Internet diffusion and socio-economic development in developing countries identifies 3 major areas of government intervention: creating knowledge, disseminating knowledge and human resources development.

Government intervention is especially important at sustaining technological development in SMEs (Rothwell, 1994). Recently, many governments and international organizations are taking initiatives to foster the adoption of electronic commerce in small and medium size enterprises (OECD, 1999). These initiatives are considered important to avoid a digital divide between small and large companies.

E-commerce is here defined as "the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks (Zwass, 1997)". SMEs are defined as companies with up to 500 employees (OECD, 1999). The telecommunication network under consideration is Internet, therefore here e-commerce is equivalent to Internet commerce. This paper focuses on business-to-business e-commerce.

The American government in 1997 has set up a set of guidelines in "The Framework for Global E-commerce" (http://iitf.doc.gov/eleccomm/) to foster the diffusion of electronic commerce. The European Community has approved a series of "Directives" aiming at guaranteeing free availability of products and services for electronic signatures, copyright protection, taxation policy, etc. For example, France, Germany, Great Britain and Italy put great emphasis on technological aspects such as electronic signature and encryption. Germany and Britain invest mainly in information for corporations, for example through "competence centers" (Timmers and Van Der Veer, 2002). Italy has been the first European country to endorse electronic signature, but not much has been done regarding human resources development and knowledge building.

Despite these government and international organization initiatives, the literature addressing the role of government in the adoption and diffusion of e-commerce in small and medium size enterprises is very limited, which is the motivation for this study. The basic research question addressed in this article is "How are SMEs wishing that government intervene in fostering the adoption and diffusion of e-commerce in small and medium size enterprises?"

The article is structured as follows. The next section is a literature review of frameworks addressing institutional roles in adoption and diffusion of IT. The following section presents the research method and data collection. The section "Expected Government Intervention" analyzes the data and discusses the findings. Finally the last section gives some concluding remarks and suggestions for further research.

Literature Review

A fundamental approach to study the adoption and diffusion of new technologies is the diffusion of innovations (Rogers, 1995). The literature on adoption and diffusion of innovations (including information technology) has mostly focused on the factors affecting adoption and diffusion. These factors have been classified into three main groups or other categories that can be reconnected to these three groups: technological context, organizational context and environmental context (e.g. Tornatzky and Fleischer, 1990; Chau and Tam, 1997; Iacovou et al., 1995; Scupola, 2003). The technological context includes technologies that are internal or external to the firm. The organizational context includes factors internal to the organization that constrain or facilitate adoption such as top-management behavior and organizational size (Tornatzky and Fleischer, 1990). The environmental context includes the external actors and factors that affect a corporation's decision to adopt a technology, either directly or indirectly. These include the competitors, industry associations and the government.

Within the environmental context, the institutional research has focused on the influence of institutions on adoption and diffusion of technological innovations. Especially contemporary institutionalism in sociology has argued that social action is powerfully shaped by the social context and in turn it shapes that context (e.g. March and Olsen, 1989; Giddens 1979). In particular the work started by DiMaggio and Powell (1983) has taken the environment into serious consideration.

The research on the role of institutions on the adoption and diffusion of information technology is summarized here in two main frameworks: Andersen et al. (2003) model of environmental drivers and King et al. (1994) model of institutional actions. The model by King et al. (1994) focuses specifically on institutions, while the model by Andersen et al. (2003) takes more broadly into consideration the environmental factors affecting adoption and diffusion of IT, among which the institutions' role.

Andersen et al. (2003) model for analyzing environmental factors mainly focuses on the demand drivers. Such drivers include industry structure (e.g. concentration, sectoral distribution, vertical integration, size of firms, etc.), information infrastructure (telecommunication, wireless and Internet infrastructure, technology acceptance, etc.), financial and human resources (e.g. venture capital, population, IT skills, education) and social and cultural factors (consumption patterns, consumer preferences, language, business culture, etc.). The second group of factors of the model includes initiatives taken by the government and private sector institutions to promote e-commerce. The model identifies 4 main initiatives: knowledge diffusion, economic incentives, regulation and legislation and electronic government.

King et al. (1994) classifies the nature of institutional intervention in IT innovation on whether the desired changes are in production or use. Production concerns the actors that make innovative products, while use concerns the actors and ways in which innovations are used in the society. In the process of being used, innovations are often altered to fit the needs and characteristics of different users. King et al. (1994) claims that institutional intervention in IT adoption can be constructed at the intersection of the influence and regulatory powers of institutions and the ideologies of supply-push and demand-pull models of innovations. Institutions can affect IT adoption in several ways, for example by using legal forces or by stimulating demand through the creation of a need for innovative products and processes (Montealegre, 1999).

King et al. (1994) classifies the forms of institutional actions into influence and regulation. Influential initiatives have the purpose of changing behavior of those under the institution's way. This is achieved without direct use of force or exercise of command. Regulatory actions instead have the purpose of affecting the behavior of entities under formal institutional jurisdiction. These can be directives or actions that limit the choice of options (Damsgaard and Lyytinen, 2001). Furthermore, influence and regulation can play different roles depending on whether the innovation is driven by demand-pull or by supply-push. Supply-push forces for innovation come from the production of the innovative product or process. Demand-pull forces arise from the willingness of potential users to use the innovation. Whether the supply-push or demand pull forces dominate in the innovation process shapes institutional actions regarding innovations (King et al., 1994). Based on the categories of influence, regulation, demand-pull and supply-push, King et al. (1994) identify six types of institutional actions that can stimulate or retard IT adoption, summarized in Table 1 below. These six categories are knowledge building, knowledge deployment, subsidy, mobilization, standard setting and innovation directives.

	SUPPLY-PUSH	**DEMAND-PULL**
I N F L U E N C E	(I) KNOWLEDGE BUILDING Funding of research projects KNOWLEDGE DEPLOYMENT Provision of Educational Services SUBSIDY Funding Development of Prototypes Encouragement of capital markets to support R&D activity Provision of tax benefits for investment in R&D (e.g. investment tax credits, rapid depreciation) INNOVATION DIRECTIVE Direct institutional operation of production facilities for innovation	(II) KNOWLEDGE DEPLOYMENT Training programs for individuals and organizations to provide base of skilled talent for use SUBSIDY Procurement of innovative products and services Direct or indirect provision of complementarities required for use Direct or indirect suppression of substitute products or services MOBILIZATION Programs for Awareness and promotion
R E G U L A T I O N	(III) KNOWLEDGE DEPLOYMENT Require education and training to the citizens SUBSIDY Reduction in general liabilities for organizations engaging in innovative activity Modification of legal, administrative or competitive barriers to innovation and trade STANDARDS Establishment of standards under which innovative activity might be encouraged INNOVATION DIRECTIVE Establishment of requirements for investment in R&D by organizations	(IV) SUBSIDY Procurement Support for products and processes that facilitate adoption and use STANDARDS Require particular products or processes to be used in any work for the institution Require conformance with other standards that essentially mandate use of particular products or processes INNOVATION DIRECTIVE Require that specific innovative products or Processes be used at all times

Table 1: Dimensions of Institutional Intervention (King et al. 1994).

Knowledge Building. Knowledge building consists of the institutional actions undertaken with the purpose of providing the base of scientific and technical knowledge necessary to produce and exploit innovations. The most obvious form of knowledge building is sponsored research that can be either basic or applied. The government is the most common supporter of

research, but it is not unusual that also private foundations and corporations sponsor research as well. The ESPRIT project of the European Commission is an example of a multinational cooperation for knowledge building.

Knowledge deployment. Knowledge deployment involves institutional actions aimed at disseminating new knowledge, either in form of knowledgeable individuals and organizations, or in the form of repositories of knowledge as archives and libraries of scientific and technical facts. The most important form of knowledge deployment is the general provision of education to the population. Another form of knowledge deployment is the encouragement of highly skilled labor force to come into a region or country. Finally knowledge deployment can also be achieved by stimulating the use of innovations through the training of a group of potential users. This is usually done by government agencies, but can be also performed by trade and professional associations.

Subsidy. Subsidies have the purpose of defraying the otherwise unavoidable costs or risks to innovators and users in the process of innovation adoption and diffusion. They take different forms: funding of prototyping, institutional procurement of innovations and of locally produced goods and services containing those innovations, support for provision of necessary complements to be used with innovative products or processes.

Mobilization. Mobilization refers to institutional actions aimed at encouraging decentralized actors to think in a positive or negative way about an innovation as for example through promotional and awareness campaigns. Higher education institutions and professional associations can mobilize their members (or significant members) interest to see innovation as necessary to organizational welfare.

Standard setting. Standard setting comprises actions that regulate the operation of decentralized actors and institutions to bring them into line with larger social or institutional objectives. Examples of standards are ISO open system standard.

Innovation Directives. Innovation directives are institutional actions aiming at producing innovations, using them, or engaging in some activities facilitating their production or use (King et al., 1994). One form is for institutions to produce their own innovations and/or use them as for example a government or industry is required to develop or use a particular technology.

King et al.'s (1994) model is here used to categorize the desired government intervention by small and medium size enterprises in Southern Italy in e-commerce adoption.

Methodology

The data used in this article are part of a larger research project on adoption and diffusion of electronic commerce in Southern Italian SMEs. The research was designed as a case study (Yin, 1994) to understand issues in adoption and diffusion of e-commerce in small and medium size enterprises, including government intervention.

The sample and the sample selection process

Six interviews in six different companies were conducted. The companies have been chosen on the basis of representativeness and accessibility according to the following criteria:

- They should be a registered company and could be classified as SME according to the number of employees that should not exceed 500.

- They should have been early adopters of Internet. Having had an Internet connection for at least 3 years was chosen as criterion of early adoption. This is based on the consideration that these companies with their experience are in a better position to identify and evaluate issues related to e-commerce adoption.
- The companies should be located in the same geographical region. This criteria should ensure that external factors such as government influence, average level of education of the population, availability of qualified labor force, etc. are the same for all the sample companies.

As Table 2 shows, the sample includes two IT consulting companies, two distributors, one producer of textiles, and an intermediary in the textile business. They are all located in the Southern Italian region called Puglia according to the last selection criterion above.

The local yellow page directory and a directory of companies distributed by the Chamber of Commerce of the city of Lecce were the primary sources in the selection of the cases. One consulting company and the local chamber of commerce were very helpful to narrow down the sample to those companies that satisfied the criteria mentioned above. Many more companies were contacted telephonically but only those in Table 2 were willing to participate to the study. The interviews were conducted in spring 2001.

Company	**Type of Business**	**No. Of Employees**	**Year of E-commerce Adoption**
F1	IT Consultants	80	1996
F2	IT Consultants	1 (family driven)	1996
F3	Distributor of Watches	15	1996
F4	Intermediary in the Textile Business	2 (Family Driven)	1998
F5	Production and Commercialization of Textiles	300	1996
F6	Distributor of Car Parts	19 (family driven)	1998

Table 2: Companies Description

Company/ Desired Intervention	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**
Knowledge Building						
Knowledge Deployment	X	X	X	X	X	X
Subsidy	X	X	X	X		X
Innovation Directive						

Directive						
Mobilization	X		X			
Standards						

Table 3: Desired Intervention by Different Companies

Research Process and Data Analysis

One person was interviewed in each company. The company has suggested the person to be interviewed on the basis of the author's requirement to talk with the employee responsible for and most knowledgeable about e-commerce. In all the cases this person has been the owner, often functioning as CIO. Semi-structured interviews were the main data collection method. The interview questions were formulated with the intention of understanding issues of adoption and diffusion of e-commerce in SMEs in this region, including government intervention. Interviews also covered demographic data on each firm and informant. The interviews have been conducted by the author at the company's site and have lasted between 1.5 and 3 hours each. Each interview was tape-recorded and transcribed within 24 hours in a sequential order to ensure reliability of the data (Perakyla, 1997). Notes were also taken during the interview. The interview protocol was first tested with one of the two consulting companies and successively adjusted to make it more clear and comprehensive. The total data collected in the six different cases were analyzed intuitively by the author according to the theme of government intervention. The parts of the text relevant to this theme were then contextualized according to the categories of King et al. (1994) framework (Creswell, 1998; Wolcott, 1994). The transcripts and the results were sent to the companies interviewed to ensure validity (Creswell, 1998), but there was no reaction.

Expected Government Intervention

Being the focus of this article government intervention in SMEs adoption and diffusion of e-commerce, it is natural to position the analysis in a demand-pull rather then a supply-push perspective in King et al. (1994)'s framework. The demand-pull perspective deals, in fact, with influence and intervention regarding the use of technological innovations, while the supply-push perspective deals mainly with influence and intervention regarding their production. In Italy influence and regulation have been used to stimulate the production of Internet related products such as development of encryption guidelines and digital signature. The OECD (2002) report also shows that in other OECD countries some initiatives have been taken to increase awareness of e-commerce in SMEs, but not much had been done in Italy at the time of the study yet. This study shows the wish by small and medium size enterprises for more government intervention.

SMEs Desired Intervention in Adoption of E-commerce

This study has found that the following government actions could foster e-commerce adoption in SMEs (see Table 3):

- **Knowledge Deployment**. Italian SMEs believed that State intervention to deploy knowledge is very essential for their uptake of e-commerce. This could take the form of e-

commerce training programs (F1, F2, F3) and more widespread knowledge of English (F4, F5, F6). For example F1 said that

"*The education to the good use of e-commerce is lacking…Government financial intervention for training could function…Leader companies are motivated by the novelty (of e-commerce..) to try it..The others need to be trained…"*

These programs could mainly be used to spread knowledge and first hand-on experience of the potential benefits and uses of e-commerce (Poon and Swatman, 1999; Scupola, 2003). Italian SMEs also expressed the wish to increase the English language skills among the local population and SMEs employees in particular (especially those companies dealing with foreign countries). For example F5 said that

"*Internet is not enough...it is important to know the foreign languages, especially English…especially for those companies conducting international business…We need more government intervention regarding this…"*

Madon (2000) also states that in Latin America the language is becoming a problem for the diffusion of e-commerce. All the indigenous information on Internet is in Spanish, but most of the foreign sources are in English. It seems therefore that intervention aimed at increasing the knowledge of English among the non English speaking population would contribute to adoption and diffusion of e-commerce in the region as well.

- **Subsidies.** All the sample companies considered direct or indirect subsidies important both as influence and regulation mechanisms. Small businesses wished governmental subsidies in two main areas: procurement of e-commerce technologies and services by governmental institutions and procurement support to small companies for products and processes that facilitate adoption and use. Small businesses (F1, F2, and F6) expressed especially the wish for government institutions and the public administration to procure and use Internet technologies and services both to the public and to the single citizen. In this case, government institutions would contribute to decrease uncertainty about a new idea and serve as role model for corporations (Rogers, 1995). Some local municipalities already do this, but small companies in this area believe that it should be much more spread. For example F1 states that

"*Right now many SMEs are reluctant to adopt e-commerce…the situation could change if the public institutions, for example the local municipalities, start using e-commerce and e-commerce services…There are some doing it, but they are too few..."*

F6 also says

"the use of e-commerce by the public administration could foster adoption among Smes..It could create the need for using it…"

Another type of subsidy mentioned by SMEs in this study is direct or indirect procurement support for e-commerce systems to small businesses (F1, F3, and F4). The types mentioned are financial aid for the acquisition of the system and relative training, tax deduction for companies buying electronic commerce systems. For example F3 says that

"the customers are requiring now a customization of the watches, which means I also need to change the system..I am applying for state subsidies for this…"

Many government initiatives already exist in this field, but small and medium size enterprises are not aware of these opportunities. For example F4 states that

"*government subsidies could help….but I do not know of any*".

- **Mobilization**. Companies (F1, F3) expressed the wish for more programs aiming at increasing awareness of Internet technologies and e-commerce. This can be achieved through educational and informational campaigns aimed both to the larger population and to small businesses (Poon and Swatman, 1999). For example F1 said that

"*small companies do not use e-commerce…. Intervention from the government to inform them could improve the situation…*"

F3 also said that

"*The main barrier..(for him to conduct e-commerce with his customers) is that many clients do not know what the Web is..We could need an informational campaign…possibly from the government..*"

However, these campaigns should also have the objective of informing small and medium size enterprises of the existence of government subsidies and other forms of intervention as often they are not aware of them. For example, F4 and F6 were not aware of state financial subsidies to SMEs buying an e-commerce system at the time of the interview, even though these programs did exist. As a matter of fact, the consulting company F1 said that some funds (allocated from the state to IT) had to be given back by the local authorities to the state because not used by local small and medium size companies.

Discussion

From the analysis it can be concluded that the data have mostly supported King et al. (1994) framework of institutional intervention in a demand-pull perspective. The analysis has showed that small businesses wish government intervention, both in term of influence and regulation to foster adoption and diffusion of electronic commerce in SMEs. Such intervention should concentrate on three different areas: knowledge deployment, subsidies and mobilization. The companies interviewed have not referred to standards or innovation directives. This might be explained by the fact that the people interviewed are not IT or policy experts, but they only know those aspects of e-commerce that directly concerns their businesses.

Mobilization should aim at awareness creation of the technology, related benefits, and ways of use (Poon and Swatman, 1999). The analysis has also shown that even when intervention initiatives exist, small and medium size companies might not be aware of them. Therefore mobilization initiatives should also aim at informing the companies of state and other institutions' e-commerce support programs and initiatives.

Knowledge deployment should aim at increasing knowledge of e-commerce and e-commerce systems (e.g. through targeted training programs), but also and especially at increasing knowledge of English among the population in general and small businesses employees in particular. It seems therefore that being knowledgeable in English is very important to successfully enter the information society.

Subsidies have emerged important both as influence and regulation mechanisms. The most important desired form of subsidy is indirect subsidies aiming at improving e-government, as SMEs believe that e-government is fundamental to their adoption of e-commerce. Direct subsidies such as financial support, tax deductions and e-commerce pilot programs are also considered important and desirable.

Furthermore the study has found significant evidence for conjuncture 2 and 4 in King et al. framework stating:

Conjecture 2: "Significant (production or) use of IT innovation requires serious and sustained institutional interventions for knowledge deployment",

Conjecture 4. "Mobilization efforts are important but not essential in stimulating (production and) use of IT innovation, and are useful mainly in conjunction with other institutional interventions".

The analysis in fact has showed that knowledge deployment is considered by SMEs a very important type of intervention to increase adoption of e-commerce and that mobilization is also important, but not really essential and it would lead to some results mainly in conjunction with knowledge deployment and subsidy.

However the study has found only partial support for conjecture 3 stating:

Conjecture 3: "Subsidies are often crucial but not always essential instruments of institutional intervention in both the production and use of IT innovation".

In fact, if it is true that financial subsidies such as tax breaks etc. are crucial, but not essential, SMEs believe that indirect subsidies in the form of government procurement of e-commerce and e-services are very essential to the adoption and diffusion of e-commerce among SMEs. This is also confirmed by Andersen et al. (2003) study that states that one of the governance initiatives responsible for the uptake of electronic commerce in Denmark has been electronic government. The Danish state, in fact, has considered electronic government as a major driver both to create a big e-commerce market and to stimulate the private e-commerce sector. It is expected that by the end of year 2002 all major public procurement in Denmark will take place electronically.

Conclusions and Suggestions for Further Research

Most government directives believe that the diffusion of e-commerce should be driven by the private sector as for example stated in the ABAC Roundtable on e-commerce (ABAC E-Commerce Report, 1998) or by the European Community (Timmers and Van Der Veer, 2002). This study has showed that SMEs desire institutional intervention, both in term of influence and regulation. Such intervention should concentrate on three different areas: knowledge deployment, subsidies and mobilization.

The study presents a number of limitations. The main limitations have to be found in the small sample of companies interviewed and the limited geographical area where they are located. Thus, it is difficult to generalize from these results to other SMEs in the same region or other regions of the world. Also the analysis shows the desired intervention by SMEs, but more research is necessary to understand to what extent this kind of intervention works as intended.

The area where the study has been conducted has been in the last two-three years target of intervention regarding e-commerce and ICTs both from the Italian State and the European Union; a big project to bring e-government services in most municipalities has also started recently. Further research could therefore investigate whether and how these programs have changed the opinions of the small and medium size enterprises in this area.

Further research could also extend this study to a larger sample of companies in the same region or to a larger geographical region. Finally a survey could be conducted to test whether the results obtained by the case studies are shared by a larger sample of companies in the same area.

To conclude, more attention should be given to understand what interventions are undertaken at national and local government levels in different geographical regions and what SMEs believe that their needs for intervention are. An analysis of the convergence and divergence of such results could also be done to highlight the successes and failures of current government intervention initiatives.

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