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ADOPTION AND IMPLEMENTATION OF INFORMATION TECHNOLOGY IN SMALL AND MEDIUM ENTERPRISES

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Abstract. *Small and medium enterprises (SMEs) have great impact on economy of every country and small business sector is one of the fastest growing sectors of the economy. SMEs are becoming more dependent on information technologies (IT) for their operations. IT is a form of organizational resources that can be transformed into a valuable, rare and not easily imitable asset. The asset then makes the base of competitive advantage and high business performance. Researches in IT implementation have primarily focused on large corporations, but results of the researches may not be fully applicable in small and medium enterprises and there is need to investigate specificity of IT adoption and implementation in SMEs. Therefore, this paper researches the most important issues and challenges in adoption and implementation of information technologies in small and medium enterprises. Also, the paper treats problems of adoption, implementation and use of groupware technology.*

Key Words: *Information Technologies, IT adoption, IT implementation, Small and Medium Enterprises, Groupware.*

INTRODUCTION

Small and medium enterprises (SMEs) make great part of economy in every country. For example, in the United States, SMEs make 99.7 percent of all firms and employ 60-80 percent of new employees annually, over the last decade. Also, in USA about 600,000 new SMEs are established each year, although more than 500,000 existing SMEs are closed. Crucial question for SMEs is how to survive in today turbulent environment and competition. (Jie et al. 2009, 46-53)

In comparison with large companies, SMEs have limited resources and little influence on the market. Their survival depends on their ability to take full potential of the resources and quickly adapt to market changes. IT is a driver of operational flexibility and competitive

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advantage, and may help SMEs to be more flexible, to survive and succeed. Also, information and communication technology (ICT) infrastructure is deemed as important in supporting operational, tactical and strategic goals of enterprises. (Wasko et al. 2011, 645-652)

However, many studies showing the positive effect of IT resources engagement on enterprise performance were conducted in large US-based firms. Small number of researches has focused on use of information and communication technologies in SMEs and the issues related to IT adoption and implementation in SMEs. IS (Information Systems) theories and practices developed for large organizations may not be fully applicable in small and medium enterprises. Challenges, opportunities, and management issues of IT implementation in SMEs are unique and deserve special attention of research community. (She-I et al. 2008, 275-294)

Considering need for new researches in that specific field of IS, the paper has focus on adoption and implementation of IT in SMEs with brief view to groupware technology. The paper is organized in five sections. In next section, prior researches on IT implementation in SMEs are briefly presented. In third section, a model of IT adoption and implementation in SMEs with factors influencing on the adoption and implementation are described. In fourth section, main issues in implementation and use of groupware technology in SMEs are analysed. Final section is dedicated to concluding remarks.

1. Prior Researches on IT Implementation in SMEs – a Brief Review

Information technologies can improve enterprise business performance and competitive advantage. This is particularly fact if enterprises use IT on innovative way to compete with their rivals. However, adoption and application of the new technologies is very complex and difficult task. As we previously mentioned, great number of studies and researches is dedicated to IT adoption and implementation in large enterprises, but studies of IT implementation in small and medium enterprises are very rare. In addition, small and medium enterprises have specific attributes influencing process of IT implementation that require special attention and investigation.

SMEs differ from large enterprises in many aspects. For example, large firms have greater scope of operation and compete in diverse markets, have a better ability to allocate IS development costs on larger units of production, and have internal IS development technical staff. All the aspects and attributes typically are not related to SMEs.

On the other hand, SMEs have their own specific attributes. For example, in small enterprises, decision making is centralized in one or two persons, bureaucratic procedures are minimal, standard operation procedures are not well established, long-term planning is limited, and there is greater dependence on external services for IS operations. Therefore, the problems and opportunities in SMEs considering IS implementation are unique and require special focus.

Traditionally, SMEs have been the slowest in adopting modern information technologies. Large enterprises make high level of investment in hardware, software, hiring and training IT professionals. SMEs usually lag behind large firms considering adoption and implementation of advanced IT products. However, the decreasing cost of storage and processing hardware and the increasing number of software applications designed for SMEs eliminate barriers that prevent SMEs from adoption of new IT. In recent years, SMEs invested a significant amount of resources in IT implementation.

A recent survey (Zhang et al. 2008, 357-380) shows that IT environments of SMEs are no longer based only on desktop PCs. Over 75% of SMEs have more than one server and the majority of SMEs have distributed IT infrastructures. Also, the literature (Nambisan 2013, 215-226) on SMEs suggests that the enterprises can make benefit from using IT. For example, IT enables SMEs to better manage their customer bases, keep information about customers in a more organized manner and also share knowledge within the organization more efficiently. Other benefits of IT that SMEs can achieve include: cost reduction, improved profitability, better customer service, enlarged market scope, and tighter interorganizational relationships with trading partners. Information communication has become important factor of success in the Internet age. Communication technologies such as e-mail, the Web, interorganizational systems (IOS), and electronic data interchange have dramatically changed business processes.

A common theme in many studies about IT implementation in SMEs is the importance of contextual and organizational factors in achievement of business success. The studies (Khazanchi 2005, 88-95) (Davison et al. 2013, 89-109) try to find answers to following questions: What kinds of organizational, contextual, and other factors influence IT success in SMEs? What makes one enterprise more innovative compared with other enterprises? For example, there is some evidence that organizational size is just one important factor in making a firm innovate and adopt new IT.

There are several investigations that explore the factors influencing the adoption of communication technologies in SMEs. One investigation (Premkumar 2003, 91–121) evaluates the impact of six factors (perceived usefulness, cost, compatibility, top management support, competitive advantage, and size) on the adoption of communication technologies. Data is collected from 207 firms and the results of data analysis reveal that competitive advantage, top management support, and size are important determinants of adoption of communication technologies.

A study (Lee, Runge 2001, 44-57) of drivers of IT adoption in 188 small retail businesses reveals that owner's perceived relative advantage and firm's willingness to innovate have an impact on potential IT adoption in SMEs. In another study (Magal, Lewis 1995, 75-83), authors investigated factors that affect IT success in SMEs. Examination of 150 SMEs have showed that respondent's awareness of IT and attitude toward IT are critical factors in their use of new IT.

Mentioned research (Khazanchi 2005, 88-95) analyses factors that determine conditions for Electronic Data Interchange (EDI) implementation. Research question in the research is: Under what conditions SMEs are likely candidates for the information technology implementation? The four distinct factors influencing on the conditions are: internal/external business and technological environment, organizational readiness and trading partner support, financial impact, workflow productivity. Although the research is related to the specific IT, the four factors are clearly robust and could potentially be applicable to any information technology implementation in the small firm context.

In the next section, we try to define a comprehensive and integral model of IT adoption and implementation in SMEs. Model shows four major domains or layers with all important factors influencing IT adoption and implementation.

2. A MODEL OF IT ADOPTION AND IMPLEMENTATION IN SMES

The four major domains or different layers influencing adoption, design and use of information technology are: individual domain, technology domain, organizational domain and environmental domain (Thong 1999, 187-214). The main goal of information technology adoption and implementation in an organization is to enable employees to complete various work tasks. Primary elements in the domain are the individuals and the tasks that needs to be completed. The technology domain at the next layer provides the tools and information for the individuals in order to do theirs work tasks. The information technology is implemented in the specific organizational context. Thus, various characteristics of the organization influence IT adoption and implementation. The organizational context is deemed a domain separate from individual domain. Organizations are described as a collection of individuals working to accomplish a business objective with a common set of rules, procedures, and value systems. Collective vision and belief regarding information systems of organization may not be the same as that of the individuals within the organization. Because of that, there is need to differentiate the organization domain from the individual domain influencing adoption and implementation of IT. Final domain in IT adoption and implementation model is external environment. Organizations react to the environment by innovations in data processing and analysing in order to compete in the marketplace. Model of IT adoption and implementation with four domain and all factors influencing the adoption and implementation in SMEs is shown on figure 1.

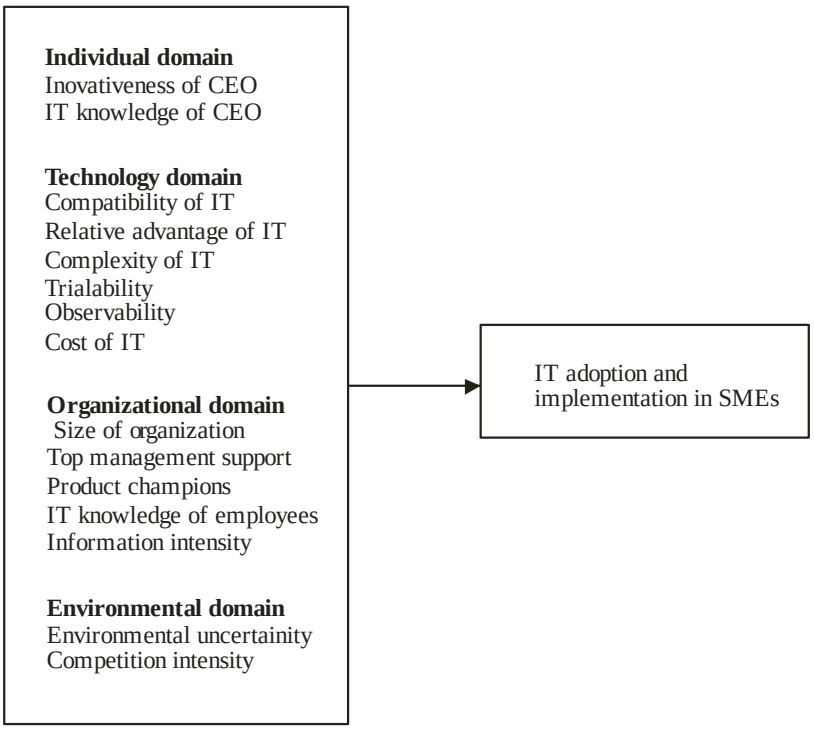

Fig. 1 Model of IT adoption and implementation in SMEs
Source: (Thong 1999, 187-214)

Individual Domain. It is difficult to clearly describe the effect of individual characteristics on IT implementation because the technology is implemented across multiple individuals. Individual factors such as demographics are useful in studying individual-level IT implementation. There are many various demographic factors such as education, job tenure, cognitive style, and IS expertise and experience that influence IT adoption and implementation. Also many studies have researched user involvement and user training as factors of IT implementation success. Some studies considered these factors as an individual variables while others considered the factors at the organizational level. The context of the study determines which approach (individual or organizational) will be accepted (Igbaria 1990, 637–652).

In a small and medium organization, CEO (Chief Executive Officer) is usually the owner of the organization and main decision maker. Therefore, characteristics of CEO are essential in decision making on adoption and implementation of IT. Technological innovations and changes (Andriole 2012, 61-72) depend not only on factors such as business size or market forces, but also on the abilities and preferences of CEO. CEO can belong to two group of managers: adaptors and innovators. Adaptor searches for solutions that have been already tried and understood, while innovator seeks solutions that have not been tried and that are risky. CEO willingness to innovate in IT domain impacts on the other members of organization to easily adopt new technological innovation (for example, new software application, new hardware device, new procedure in data processing etc.)

Second characteristic of SME's CEO influencing IT adoption is his or her technical knowledge. Lack of necessary skills and technical knowledge can be serious obstacle to IT adoption and implementation. Overcoming of the obstacles will lead to greater likelihood of the innovation adoption. CEOs in SMEs often lack basic knowledge of IT and consequently they are not aware of IT potentials. Education of these CEOs about the benefits of IT will lead to greater readiness for IT adoption. (Enns, McDonagh 2012, 1-10).

Technology Domain. Innovation/technology characteristics are very important factors influencing IT adoption/diffusion in an organization. An individual forms an opinion toward the innovation on basis of the characteristics. The opinion leads to adoption and rejection of innovation and, if the decision is to adopt, to implementation of innovation. The perception of the potential adopter toward an IT is main determinant of the IT adoption.

Tornatzky and Klein (1982, 28–45) identified three variables that are related to IT adoption: compatibility, complexity, and relative advantage. Other studies (Moore, Benbasat 1991, 192–222) have also included other variables such as cost, trialability, and observability *Compatibility is* positively related to adoption of an innovation. Compatibility is the degree to which an innovation is consistent with the existing values, past experiences, and needs of the receivers. Compatibility has organizational and technical aspect. Organizational compatibility means that the innovation should be compatible with the organization's values and beliefs, while technical compatibility is related to work practices and system interfaces. If the IT is compatible with existing work practices and existing software/hardware products, the SME is more likely to adopt it. *Complexity* is the degree to which an innovation is perceived as relatively difficult to understand and use. Ease of use of computer systems is positively related to adoption of innovation, while the perceived complexity of the IT has negative effect on decision to adopt the IT. Technology acceptance model (TAM) is often used in studies of the impact of ease of use (or complexity) and perceived usefulness (or relative advantage) on IT adoption and usage. *Relative advantage* is

the degree to which an innovation is perceived as better than previous solution. This factor from technology domain is positively related to IT adoption. The positive perceptions of the benefits of IT make an incentive for a SME to adopt the innovation. *Trialability* is the degree to which an innovation may be experimented, while *observability* is the degree to which the results of an innovation are visible to others. However, trialability and observability are factors that are hard to measure. Finally, the *cost* effectiveness of the innovation is significant variable in analysing IT adoption and implementation.

Organizational Domain. Impact of various organizational factors on IS implementation is obvious because most of information systems are implemented in an organizational context. The organizational factors that are important to study are: degree of top management support, existence of a product champion, organizational size, IT knowledge of employees, information intensity and communication channels. We have already mentioned user training and user involvement which can be individual factors and organizational factors as well.

Top management support and commitment sends strong signals within the organization, reduces or eliminates political barriers in IT adoption and provides resources for IT implementation. *Product champions* play a critical role in propagation of the innovation to the decision makers, developing an implementation plan, facilitating resource allocation, and removing barriers to implementation. Considering the impact of *organizational size* on IT implementation there is a threshold level beyond which size is not an important factor. Larger organizations have more resources and technical expertise to facilitate IT implementation. However, they have more bureaucratic practices and resistance to change that smaller organizations may not have. Small businesses have scarce of resources because they operate in following conditions: a highly competitive environment, financial constrains, lack of professional expertise and high pressure of external forces. This unique conditions cause constrains on financial resources, a lack of internal technical expertise and a short-range management perspective. Consequently, SMEs face more obstacles to adoption of IT than large organizations. Even among SMEs, if an enterprise is larger, it is more able to hire people with specialized skills, such as knowledge of IT. In addition, larger enterprises have more potential to use IT than smaller enterprises, because of their larger scale of operations

IT knowledge of employees in a SME has positive effect on IT adoption and implementation, but SMEs usually have lack of specialized IT knowledge and technical skills. Problems with developing the necessary skills and technical knowledge may cause that SMEs postpone adoption of the innovation until they provide sufficient internal expertise. Thus, if employees of SMEs have IT knowledge and skills, the enterprises are more willing to adopt IT. The degree to which information is present in the product or service of enterprise reflects the level of *information intensity* of that product or service. Similarly, we can measure information intensity of business processes by determination of degree to which information is present in business processes of an enterprise. SMEs in more information-intensive sectors are more likely to adopt IT than those in less information-intensive sectors. For example, financial organizations like banks and insurance companies are more information-intensive, because their main functions are related to processing of financial information. Greater information intensity can make CEO of a small enterprise to think of IT as main competitive weapon and that increases probability of IT adoption. Finally, use of various *communication channels* to get information for adoption is significant factor that impacts on IT adoption/diffusion.

Environmental Domain. Environmental factors have emphasized the use of IT to gain competitive advantage. Growth of interorganisation information systems (IOS) extending organizational boundaries draw attention on the impact of environmental factors on IT implementation. Users of IS are not only internal staff audience, but also organization's customers, suppliers, and other trading partners. Hence, many studies have examined the impact of competitive advantage in initiating the implementation of IOS, the role of interorganizational dependence and power on adoption of these systems. In most cases, the powerful trading partner influences IT implementation. Researchers have also examined the role of incentives and the transaction climate between the trading partners in facilitating the implementation of IOS (Choudhury 1997, 1–24).

Generally speaking, competition increases probability of innovation adoption, because strong rivalry between enterprises pushes the enterprises to be innovative. Intense competition leads to environmental uncertainty and increases need for innovation and rate of innovation adoption. By adopting IT, enterprises will be able to compete in three ways. *First*, IT can change industry structure and thus change the rules of competition. *Second*, IT can give enterprises new ways to outperform their rivals and thus create competitive advantage. *Finally*, enterprise can create new business from existing IT operations. Small or medium enterprise in more competitive environment have greater need to adopt and use IT in gaining of competitive advantage. On the other hand, small enterprise in less competitive environment is not pushed to be innovative.

3. Implementation and Use of Groupware in SMEs

Groupware technology supports group of users working on common tasks, processes and projects. Groupware have some specific attributes which make it different from traditional IT. *First*, groupware technology is not so expensive. There are low cost solutions and even free technologies (e-mail, repositories, etc.). *Second*, groupware technology is complementary and has a supportive role because groupware adoption is parallel to the normal work flows. These two attributes make groupware affordable for SMEs. *Third*, groupware technology is versatile, because implementation and use of the technology depend on the meaning that users give to it and the its characteristics which they emphasize and use.

Groupware is collaborative technology that plays a key role in knowledge management. Table 1 shows a classification of groupware technologies that categorizes the technologies in two types: systems supporting information exchange (ECS - electronic communication systems) and systems that support group of users constituting team (teamwork systems). The aim of the first category of systems is to make the relationship between individuals or organizations easier. The aim of the second category of systems is to integrate information in work processes that have been previously defined. The systems make automation of defined work flows (Mrenoño-Cerdán 2008, 87-96).

The main characteristic of ECSs is the versatility since they affect the communication processes. In the process, there are various levels of interest of users in sharing their information or knowledge and the levels of exploitation of the possibilities offered by these systems. The flexibility of groupware (especially of ECS) means that the group finally defines its use. For example, ECS can be used exclusively in information exchange, but also can be used to support group working in processes and joint decision-making. (Milovanovic 2011, 469-480)

Table 1 Classification of groupware

Category of groupware	Electronic Communications Systems	Teamwork Systems
Concept	It allows the exchange of information, documents and opinions	Work is done through the system
Aim	Relation	Integration
Applications	Email, discussion forums, repositories, yellow pages	Workflow, project management, shared databases, group decision systems

Potential benefits of groupware can be viewed through the perceived usefulness and the relative advantage of the technology. However, the so-called productivity paradox of IT can be connected to groupware technology. The real problem related to productivity paradox of groupware technology is the lack of understanding of tacit knowledge and its relationship with the technology. Investments in traditional IT have limited consequences on competitiveness, but investments in knowledge management technologies like groupware have great impact on gaining competitive advantage. In addition, if groupware supports management of tacit knowledge, enterprise can expect more benefits. Tacit knowledge represents the most valuable resource for knowledge management, especially in innovation processes However, if groupware is used in the coding of existing knowledge in explicit forms and sharing this knowledge through the whole organization, benefits are low. Tacit knowledge is not easily formulated or modified into explicit forms due to personal and contextual nature of the knowledge. Process of modification and conversion of tacit knowledge into explicit form is known as externalization. The communication of tacit knowledge needs a shared system of meaning for its understanding and application. Groupware should support the communication in order to gain greater benefits and competitiveness.

The benefits derived from groupware (particularly Electronic Communication Systems) depend on its use. Technology is socially built. Users give the different meanings to it and emphasize its various characteristics and uses. Therefore, organizational context that encourages employees' participation and creativity must be created. In the context, groupware is the ideal tool to channel the potential of participants, allowing them to share and develop their individual knowledge. Autonomy is a significant dimension of learning and knowledge exchange that facilitate learning among individuals or groups of individuals. The employees' autonomy allows employees to experiment with their knowledge thus improving organizational knowledge assets.

Consequently, the organizational context influences adoption and implementation of groupware technology. The organizational variables that should be considered are: CEO's innovativeness, knowledge externalization and employees' autonomy. However, the simple adoption of groupware does not lead always to better business performance. This is case particularly in adoption of Electronic Communication Systems, due to versatility of the systems. The reason for that is in the fact that SMEs often adopt low-cost and low sophisticated technologies with no intention to change business processes and practices. For example, they can adopt document management systems which are just document warehouses without associated search technologies.

CONCLUSION

IT is significant driver of every enterprise effectiveness and competitiveness. However, there are conflicting opinions about the role of IT on a SME performance. Many owners of SMEs view IT as a cost, as opposed to having the potential for enabling them to grow. In addition, adoption and implementation of IT in a SME mainly depends on individual characteristics, technical knowledge, and innovativeness of the SME owner which often plays role of CEO. Except individual domain, technological, organizational and environmental domains impact adoption and implementation of IT in SMEs. Considering groupware, we can conclude that the technology is affordable for SMEs, but certain adoption and implementation guidelines are needed. Groupware should allow the exchange and creation of tacit knowledge in an environment featured by innovation and autonomy.

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USVAJANJE I IMPLEMENTACIJA INFORMACIONE TEHNOLOGIJE U MALIM I SREDNJIM PREDUZEĆIMA

Mala i srednja preduzeća (MSP) imaju veliki uticaj na ekonomiju svake zemlje i sektor malog biznisa je jedan od najbrže rastućih u takvim ekonomijama. Funkcionisanje MSP sve više zavisi od informacionih tehnologija (IT). IT je forma organizationih resursa koji se mogu transformisati u vredna, retka sredstva koja se teško mogu imitirati. Ova sredstva onda čine osnovu konkurentske prednosti i boljih poslovnih performansi. Istraživanja implementacije IT su primarno bila fokusirana na velika preduzeća i korporacije, ali rezultati tih istraživanja možda nisu u potpunosti primenljiva na mala i srednja preduzeća i postoji potreba za istraživanjem specifičnosti usvajanja i implementacije IT u MSP. Stoga, ovaj rad istražuje najvađnija pitanja i izazove u usvajanju i implementaciji IT u MSP. Takodje, ovaj rad tretira probleme usvajanja, implementacije i korišćenja tehnologije za podršku grupnom radu korisnika.

Ključne reči: *Informacione tehnologije, usvajanje IT, implementacija IT, mala i srednja preduzeća, groupware tehnologija*.