

Impact of information and communication technologies on business process management on small and medium enterprises in the emerging countries

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Abstract. In order to deepen the knowledge and further advance theory on business process management (BPM) on small- to medium sized enterprises (SMEs), the analysis of the impact of information and communication technologies (ICT) on SMEs in emerging countries was conducted. The paper seeks to develop the conception of adaptive business process management on SMEs in the developing countries.

Keywords: information and communication technologies, mobile technologies, business-process, small and medium business.

1 Introduction.

According to European Commission [9], small- to medium sized enterprises (SMEs) are those companies which have the number of employees up to 250 people and a maximum annual turnover of 50 million euro. The importance of SMEs today is undeniable both for developed and developing countries [1], [2], [3]. By providing millions of work places, the institute of SMEs serves as the primary mean of sustainable industrial and social diversification of the society, thus addressing one of the main drivers of economic development in the majority of the countries [3], [4]. However, such phenomena as globalization, the internationalization of domestic markets, the global economic crisis, the volatility of financial markets, declining investment, rapidly changing consumer demand - have increased pressure on SMEs and encourage them to seek the ways for survival and development in the modern business environment. How do then SMEs find these ways, struggle with the above mentioned problems?

The undoubted factor which indicates the improvement of the competitiveness of most enterprises is the usage of the result of scientific and technological progress in business, namely information and communication technologies (ICT). The access of SMEs to ICT increases the efficiency of business and of the world economy in general, being a factor within the value chain of the product. The usage of ICT on the

enterprise is determined by different management approaches and the methodology of its implementation and usage. That is the main reason why ICT should be investigated in conjunction with all the business processes implemented on the enterprise.

The global market for ICT-enabled business process management (BPM) which incorporate all sorts of communications, software, web applications and services, ERP-systems, etc. was estimated in 2008 at 1.8 billion dollars and is expected to grow up to 6.2 billion dollars in 2015 [5]. At the same time, nowadays the usage of ICT in business process management for SMEs in developing countries is quite low [6], [7]. Consequently, additional studies have to be conducted on the usage and impact of ICT on SMEs and on the development of the concept of customized BPM which takes into account the specificity of small-and medium-sized businesses in developing countries. Herewith, among the developing countries with the greatest potential for ICT development one can distinguish the BRICS countries: Brazil, Russia, India, China and South Africa [8]. The development of small and medium businesses is one of the main tasks both of these states and the other countries in the world.

The above arguments and the facts became the prerequisites for the analysis of existing practices of ICT usage and its impact on business process management in SMEs.

2 Business process management on small- to medium sized enterprises.

According to [10], BPM (business process management) is a concept of process enterprise management when business processes are treated as the special enterprise resources which are continuously adapting to the constant changes. Herewith, the basic principles of management are the clarity and visibility of business processes which is reached by modeling with the usage of appropriate formal notations, software, simulation, monitoring and analysis, as well as the ability of dynamically restructuring of business process models by participants and by means of software systems.

The key reason of the limited usage of most BPM concepts by small and medium-sized businesses is the lack of confidence of entrepreneurs in receiving the benefits of BPM-making, adherence to obsolete management principles, which together with the incompleteness of information due to the limited resources and high risks during the implementation of software supporting business process management, prevents the development of business [6].

For understanding the trends of BPM at small and medium-sized enterprises one needs to identify the distinctive features of SMEs related to their organizational structure, common strategies and to examine the sociological context. According to [11], SMEs could be characterized by the following characteristics, which distinguish them from large enterprises:

Specialization and individuality. SMEs act on business markets that are not covered by large enterprises. Characterized by a high specialization and individuality

many SMEs pursue a segmentation or niche strategy that leads to a certain strength in competition.

Proximity to markets. Compared with large enterprises, SMEs are strongly focused on their end-users allowing a high proximity to markets. Instead of focusing on exchangeable products or services for anonymous markets like large enterprises SMEs provide services oriented at the customer's needs.

Flexibility. Quickness to react and reorient themselves on business changes is a major characteristic of SMEs. This flexibility in decision making and implementing organizational changes is archived by preferring simplicity and flexibility regarding their processes and organizational structures.

Limited resources. SMEs are limited like all companies by tight resources, especially missing IT literacy and financial resources. Missing know-how can be compensated with basis knowledge of many areas due to the fact that employees at SMEs are generally "all-rounders" and are good at multi-tasking.

Technical heterogeneity. Smaller firms often lack coherent Information and Communication Technology (ICT) strategy or the related skills. For instance, IT landscapes consist of heterogeneous systems, reaching from Enterprise Resource Planning Systems (ERP) to spreadsheet-based island applications for conducting their every-day business transaction.

At the current moment, a certain amount of BPM practices and approaches are described in the literature. Developed in [12] BPM scheme is universal and can be used as a base and for SMEs as well. An essential prerequisite for the implementation of projects on the introduction or improvement of business process management on any enterprise is process modelling. According to [12], the procedure of the project which is aimed at the reorganization process is shown in Figure 1:

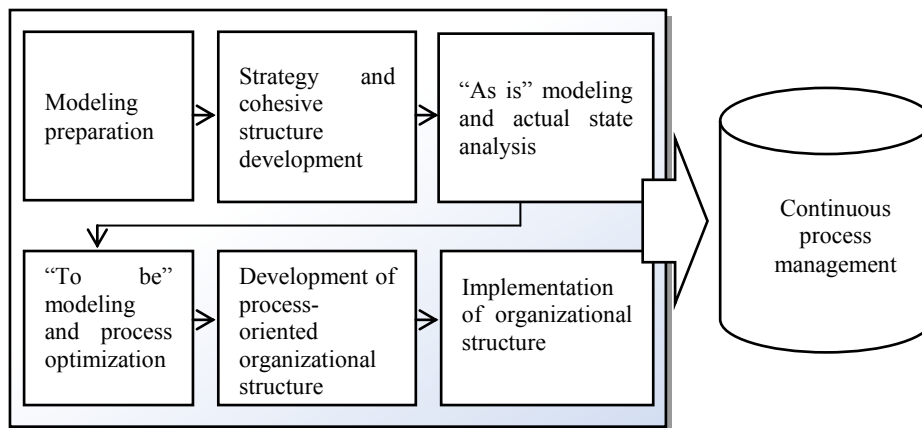


Figure 1. The procedure of a project aimed at the restructuring of business processes.

Thus, for the development of an adapted model of business process management on SMEs this scheme can be used but with the attention to the given characteristics of small and medium-sized businesses described above. Clearly, for different companies

this scheme will vary by context, depending on conditions at a particular enterprise. For implementation of BPM-solutions on each SME it is necessary to analyze the cause-effect relationships between the factors influencing the adoption of ICT, however, one needs to find out the correct methodology for such analysis.

In the literature dedicated to the modeling of business processes on small and medium-sized enterprises the following methods can be found:

- conducting surveys of SMEs' representative on the business structure and processes of their companies with the subsequent modeling using supporting software such as GRAI, ARIS, HDP, etc. [13];
- development of the SMEs business platform using a Balanced Scorecard (the concept of transfer and decomposition of the strategic objectives for the operational planning and control) [11];
- method of structural equation modeling (selection of groups of factors influencing the adoption of ICT in SMEs and the elimination of the causal link between them) [14];
- analysis of enterprise information data flows [15], etc.

However, in literature there is a substantial gap such as the lack of analysis of the ICT usage in BPM on enterprises nor considering the peculiarities of SMEs in developing countries.

3 Usage of ICT by small- to medium enterprises in the emerging countries.

The evolution of technology influences significantly the business by changing the industry infrastructure and business operations and by creating the premises for the emergence of competitive advantages for those organizations that are adopting ICT in their business processes. The adoption of ICT by SMEs provides the ability of rapid access to data, assessment, processing and dissemination of large data volumes. Consequently, only those SMEs which use the state-of-the-art technologies have the opportunity to enter the international market and remain competitive despite the challenges of globalization, liberalization and scientific and technical progress [3].

ICT-solutions help SMEs to increase their productivity and achieve higher business performance. However, the percentage of ICT adoption by SMEs in the BRICS countries is very low [16]. Thus, nowadays a very moderate usage of ICT by SMEs in the emerging economies can be observed. This can be explained due to the fact that in the developing countries the SMEs are faced with additional challenges - high cost of telecommunications, the lack of legislative support from the state, the use of obsolete technologies, the overall technological illiteracy, lack of qualified staff, poor communication infrastructure [3].

Another obstacle for ICT usage by developing countries is inapplicability of the standard software used in developed countries due to their high cost, lack of developed supporting infrastructure and a number of other reasons. Therefore for development of the solutions taking into account the peculiarities of developing countries, additional research is to be made in order to examine the existing problems, the peculiarities of micro and macro environment. Other strategies which will help to

overcome the above mentioned barriers are creation of the appropriate infrastructure, creation of financial and legal foundations.

3.1 Usage of ERP-systems by small- to medium sized enterprises in the countries with the emerging economy.

The usage of ERP systems (Enterprise resource planning, ERP) is considered today as one of the ways of SMEs survival [17]. ERP-system is a single standard information system that provides integrated support for all business processes of an enterprise [18]. Due to the integration of business processes implemented by ERP, it becomes possible to eliminate the boundaries between functional departments, increase the access to information and its seamless movement between the various departments. Among the benefits caused by ERP implementation, one can note such improvements in the operating activity of the company as reduced time of the product development and product withdrawal to the market, as well as the emergence of the ability of quick response to the competitive pressures and changing market conditions [12].

Until recently ERP systems have been setting up exclusively for large corporations with substantial budgets for ICT and which needed to standardize their business processes in accordance with "international best practices." However, at present ERP-vendors are committed to a new conquest of the SME market [19] and in the market of ERP-systems a steady trend of development solutions for small and medium businesses can be observed. According to the studies and predictions of SAP company, the dynamics of the costs for ERP-system for SMEs in the BRICS countries reflects an increase in their use, see figure 2:

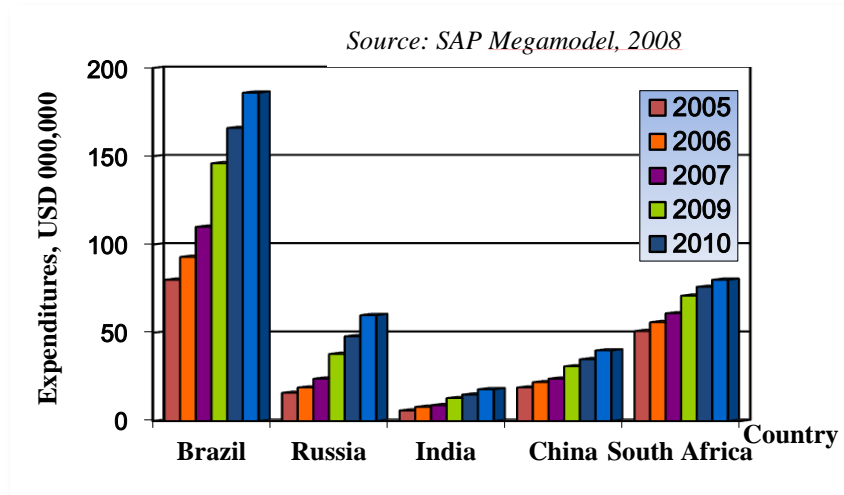


Figure 2. Dynamics of expenditures on ERP-systems in small and medium enterprises in the BRICS.

With the help of ERP-systems and process-oriented approach, the SMEs in developing countries can improve their competitive position, reduce costs and improve efficiency and control of its activities [12]. However, the implementation of ERP-systems on SMEs does not always yield positive results. The monolithic structure of ERP together with the complex process of parameters setting is not always acceptable for SMEs which are characterized by the limited resources such as money, staff and IT-skills. Thus, a special need arises to create specialized solutions for SMEs, different from those used in large companies.

3.2 Usage of the principle “software-as-a-service” on SMEs in the emerging countries.

The ICT budgets of SMEs are usually very limited and it is becoming increasingly important to obtain the software via the Internet. This decision is also justified due to the limited number of ICT professionals working in the enterprise. For a small company it is often more advantageous not to have your own ICT department and to hire external specialists when it is necessary [12]. The basic principle of SaaS (Software as a Service, «software as a service”) implies that the program is not installed on your computer but is operating on the facilities of the serving company. Figure 3 shows the implementation of the SaaS principle implemented by SAP company in application to the interaction of small, medium and large enterprises. Herewith, the clients are working with the program via web interface. The main advantage of SaaS is a direct saving of money – one needs only computer and Internet connection.

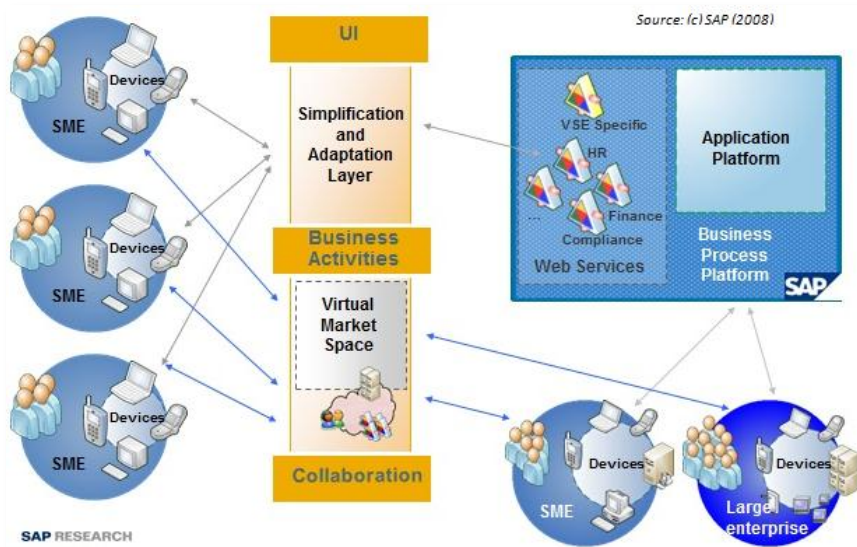


Figure 3. The implementation of SaaS principle by SAP company.

As a result of the development of open technologies, software developers for small and niche companies are able now to compete with large ERP producers, providing its solutions to SMEs at lower prices or even free.

3.3 Usage of mobile technologies by small- to medium sized enterprises in the countries with the emerging economy.

Due to the increase of the mobility, SMEs are interested in integration of the new technologies with existing business processes and are waiting for appropriate proposals from the respective suppliers. According to the analysis [20], almost 80% of small and medium-sized enterprises in BRICS have access to mobile phones, while only 48% currently use it for business purposes. According to the forecast of eMarketer "Mobile BRIC: Extreme Growth Ahead", in BRICS there will be more than 1.7 billion mobile subscribers among SMEs in 2012 with more than 680 million users who have access to the Internet.

In the development and implementation of new innovative technologies one should take into account the competence of employees of organizations. For example, the authors [20] conducted a survey of managers of SMEs in BRICS, in which the respondents were asked to self-assess their knowledge of various assistive devices for business on a scale of 1 to 4 (1 – the respondent has never used the device, 2 - the respondent wants learn how to use the device, 3 - the respondent has experience in using the device, 4 - the respondent is an advanced user). The survey results are reflected in Figure 4:

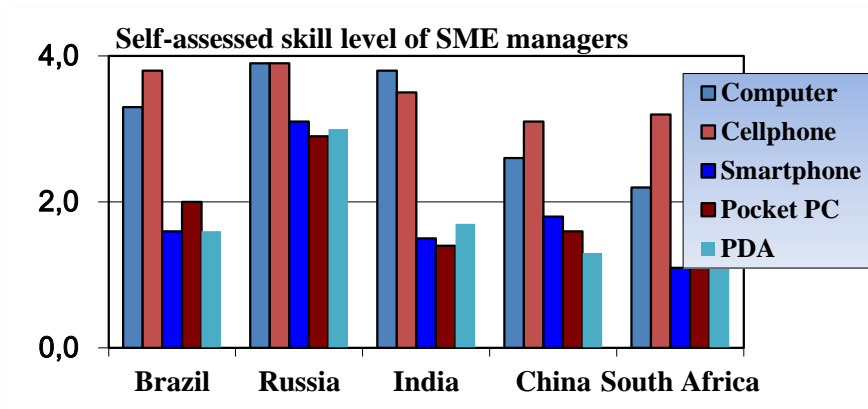


Figure 4. Self-assessed skill level of SME managers in the emerging countries.

The greatest experience the SME managers in BRICS have when dealing with computers and mobile phones. This means that the solutions developed for small and medium-sized enterprises must address at least to these devices.

Thus, a growing number of the representatives of small and micro enterprises in developing countries express readiness to invest in mobile software integrated business applications and services for the growth and maintenance of their business. However, they face problems due to which the current proposed products

and services on the market services are not acceptable. This thesis is demonstrated by the research of a scientific group from Italy which is dedicated to the analysis of the usage of mobile Internet applications "business-to-employee" (B2E) on Italian SMEs [7]. B2E are those mobile Internet applications that can bring substantial benefits to the implementation of business processes without significant modifications and large investments. Because of these reasons, B2E applications are particularly suitable for SMEs which usually do not have large capacities and resources to use ICT. By questioning more than 600 manufacturing SMEs in Italy and with the usage of regionalized sampling method (taking into account the size of the enterprise), the diffusion coefficient of mobile B2E applications in small and medium business was determined, see Figure 5.

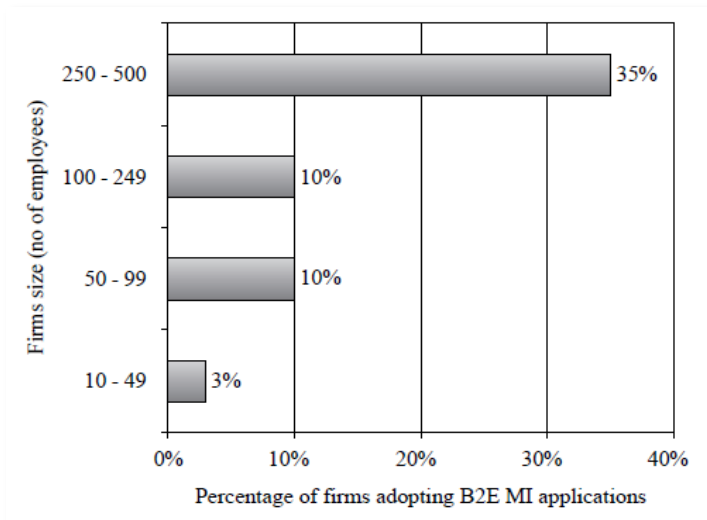


Figure 5. Percentage of SMEs in the survey [7] which using the mobile Internet applications B2E.

The figure reflects the fact that the percentage of SMEs using B2E applications is very low and there is a clear dependence of the growth of its usage with the increasing size of companies. Among the reasons for the unpopularity of the usage of mobile technology, the source [7] indicates a lack of knowledge of the SME managers about them and the difficulties in assessing the effectiveness and benefits of these technologies before their implementation.

Thus, the role of innovative mobile technologies, such as mobile solutions of ERP-systems, for SMEs in emerging markets is an important factor in the development of small and medium businesses. However, there is a need to adapt the existing solutions to the real needs and possibilities of small and medium businesses.

4 Summary.

In the presented work the analysis of existing practices of ICT usage in business process management was conducted which showed that the different approaches to BPM implementation on the enterprise do exist, but most of them are suitable for large enterprises. In the literature dedicated to SMEs one can find the identification of specific properties that must be considered during the BPM development, but the specific design of such models are found only in singular cases in the pilot projects. Thus, additional studies have to be conducted to develop a generalized BPM model for small and medium-sized businesses, which could be used by the variety of SMEs and by manufacturers of appropriate software.

Also the analysis of the impact of ICT on business in SMEs is presented in the paper – amongst the overviewed technologies were considered ERP-systems, SAAS and mobile technologies. The existing researches indicate a strong positive correlation between ICT and economic efficiency and competitiveness of SMEs. However, for the BRICS countries the usage of ICT for small and medium-sized businesses is difficult because of a number of peculiarities such as insufficient funding, lack of resources and qualified personnel, which determines the non-applicability for them of standard ERP-solutions for the developed countries. Herewith, the solutions on mobile ERP-systems were indicated as the most promising innovative technologies used in the management of SMEs in the developing countries.

Additional investigations on the topic are required for development of the concept of BPM adapted to the needs of SMEs which operate in a developing country, taking into account the peculiarities of business process management in small and medium businesses. In addition, since SMEs does not exist in the business vacuum, but they are part of a global business ecosystem, it seems reasonable to consider small and medium-sized companies as the customers and suppliers of the large companies. In the perspective of development the methodology of BPM on the enterprise, this approach involves the inclusion into the consideration of not only internal but also external business processes.

These factors appear as the premises for the further research aimed at developing of an expanded model of business process management for small and micro enterprises, taking into account the impact of ICT in a developing market and research opportunities and benefits of its application for small business and society in general.

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