Comparative Analysis of E-Business Implementation Critical Success Factors

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The implementation projects of e-business systems are strategic and complex projects. They require substantial resources, and yet, the success is not guaranteed. Organizations must try to minimize risks by focusing on critical success factors (CSF-s) of e-business implementation. We have researched different viewpoints of e-business implementation CSFs. The paper presents an overview of some of existing e-business implementation business models and analyses research about e-business implementation CSFs. Identified CSFs are discussed and linked to the e-business implementation process.

Key words: E-business, CSFs, e- business implementation, e-transformation

Komparativna analiza kritičnih dejavnikov pri uvajanju elektronskega poslovanja

Projekti uvajanja sistemov e-poslovanja so strateški in kompleksi projekti. Tovrstni projekti zahtevajo precejšnje resurse, pa vendar njihova uspešnost ni zagotovljena. Organizacije morajo minimizirati tveganja s tem, da se osredotočijo na kritične dejavnike uspeha uvajanja e-poslovanja. V prispevku smo raziskali različne vidike kritičnih dejavnikov uspeha uvajanja e-poslovanja. Predstavljamo pregled nekaterih modelov uvajanja e-poslovanja in raziskav s področja kritičnih dejavnikov uspeha uvajanja e-poslovanja. Prepoznani kritični dejavniki uspeha so predstavljeni, opisane pa so tudi povezave dejavnikov s procesom uvajanja e-poslovanja.

Ključne besede: E-poslovanje, kritični dejavniki uspeha, uvajanje e-poslovanja, e-preoblikovanje

1 Introduction

Rapid development of information technology has enabled e-business to become a global phenomenon. As the internet became more commercialized and users began to participate in the World Wide Web in the early 1990s, the term e-business was coined and e-business applications expanded rapidly (Turban *et al.,* 2000). Organizations adopt e-business for several reasons and perceived benefits. Authors mention better management of information, better integration of suppliers and vendors, better channel partnership, lower transaction costs, improved market understanding, expanded geographical coverage (Damanpour, 2001), trading time expanded to 24x7x365 (Tsao *et al.,* 2004). But the problem is not in finding reasons and benefits of e-business, it is in implementation. Because e-business can be done in so many different ways, organizations are facing a serious challenge, when implementing e-business applications.

Implementation of e-business is a project, which influences all levels of an organization. For an organization to successfully implement and benefit from e-business, management has to consider several CSFs.

We have researched different viewpoints of e-business implementation CSFs. The paper presents an overview of some of existing e-business implementation business models and analyses research about e-business implementation CSFs. Identified CSFs are discussed and linked to the e-business implementation process. Findings will be the basis for hypothesis building for a field study of e-business implementations of different systems and later for in-depth case research in selected organizations.

2 Introduction to methodological issues of e-business implementations

E-business implementation, if not taken seriously enough, can have very negative consequences on organizations. Some companies have made impressive studies, but many have suffered from lack of reliable guides along the road

to e-business transformation (Barua *et al.*, 2001). An e-business implementation is from the outset aimed at integrating business processes with external business partners (Ash and Burn, 2003). Main focus is on the integration of cross-company value chains using e-business tools (Kalakota and Robinson, 2001). E-business implementation is not a one time event. Activities continue on an ongoing basis to accommodate changing relationships with business partners and enhanced functional and technical scope of existing relationships (Norris *et al.*, 2000).

One major problem in transforming organizations is found to be lack of business models. Several models have been developed so far, some of them are (Arunatileka and Ginige, 2003):

- Seven steps to Nirvana by Prof. Mohan Sawhney,
- Seven Co-business Strategy Formulation by Pricewaterhouse Coopers,
- 7S Model for Change Management by McKinsey Consultants.

On the basis of above models and using the experience gained from various eTransformation projects, an additional model was created, that is "Seven Es in eTransformation" (Arunatileka and Ginige, 2003).

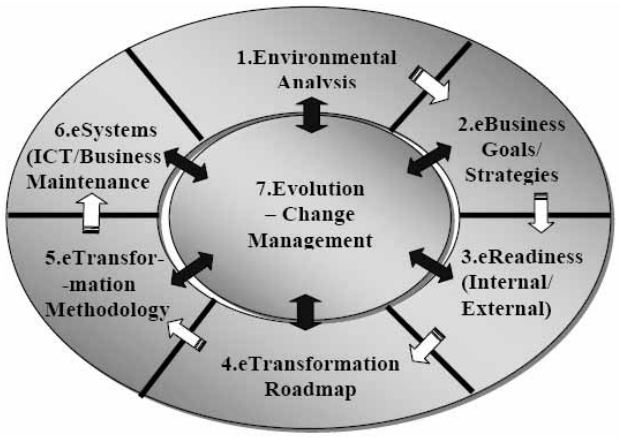

Figure 1: The Seven E's in eTransformation (Arunatileka and Ginige, 2003).

The model (see figure 1) consists of seven very important aspects of e-business transformation process. Each stage is important on its own and as a part of the whole process. Six stages are to be achieved one after another; additionally all are linked to the Evolution stage, which deals with issues related to change management. After each stage, the organization goes through the changes to the evolution stage and through that to the next stage, after the required evolutionary changes have been made (Arunatileka and Ginige, 2003).

3 CSFs in e-business implementations

In order for organizations to realize the full advantages of e-business solutions, they need to identify the CSFs of implementation. It has been suggested that management needs to pay attention to those areas, and make performance measures integral to the definition of CSFs in order to preclude poor enterprise performance (Khandelwal, 2001). With this in mind, organizations should also be aware, that the key to e-business success is to complement an organization's specific business knowledge with the necessary awareness of the new opportunities created by e-business (Norton, 2000). Central and axiomatic to this viewpoint is that adoption of e-business should be appropriate, relevant, value adding, and operationally as well as strategically viable for an organization instead of being a result of apprehensive compliance (Dubelaar *et al*, 2005).

We have scanned computer databases and published books on the subject of e-business implementation CSFs. Through the review of these sources, we were able to identify ten papers that were focused on e-business implementation success factors. In table 1 we have summarized major CSFs mentioned by authors. CSFs are sorted by number of authors, who mentioned them; authors are sorted in alphabetical order. Most important CSFs are further discussed bellow.

3.1 Top management support and involvement

Table 1 shows that most important success factor is top management support and involvement. Sustained management support, cited as the most relevant factor in implementation projects, is needed throughout the implementation project (Lertwongsatien and Wongpinunwatana, 2003; Phan, 2001; Grandon and Pearson, 2003; Molla and Licker, 2005). Top management needs to constantly monitor the progress of the project, provide directions to the implementation teams and establish clear priorities. Adopting and implementing e-business requires substantial resources that are forthcoming only with the active support from top management (Lertwongsatien and Wongpinunwatana, 2003). As Kalakota and Robinson (2001) putted, senior executives who rely on IT managers to relate technology to overall business strategy do so at their own peril. Executives must take responsibility for understanding the implications of up-and-coming technologies and anticipating when they'll affect business strategy (Kalakota and Robinson, 2001).

3.2 Clear goals, objectives and planning

Before making action plans, we have to be aware of organization's perception, comprehension, and projection of the benefits and risks of e-business (Molla and Liker, 2005; Lertwongsatien and Wongpinunwatana, 2003). Clear goals and objectives, should be specific and operational and indicate the general directions of the project (Somers and Nelson, 2004). Feasible budget and schedule predictions are also very important (Chuang and Shaw, 2005; Butler, 2000). Well-defined objectives help to keep the project constantly focused, and are essential for analyzing and measuring success. After that, extensive planning and an understanding of the concepts of e-business sys-

Table 1: Published articles about e-business implementation CSFs.

Critical success factor	Author									
	1	2	3	4	5	6	7	8	9	10
Top management	X		X	X	X	X	X	X	X	
Clear goals, objectives and planning	X	X	X	X	X	X		X		
Compatibility (infrastructure)	X		X	X		X	X	X		X
Market forces			X	X	X	X	X		X	X
Competencies of internal users			X	X	X	X		X		X
Government support			X		X		X	X		X
Strategy	X							X	X	X
BPR		X						X	X	
Change management		X				X				X
Consultants		X							X	
Excellent project management	X				X					
Firm size				X			X			
Project champion	X	X								
Effective communication	X									
Minimal customization		X								

[1] Butler (2000)
[2] Chuang and Shaw (2005)
[3] Grandon and Pearson (2003)
[4] Lertwongsatien and Wongpinunwatana (2003)
[5] Molla and Licker (2005)
[6] Phan (2001)
[7] Thatcher, Foster and Zhu (2005)
[8] Tsao, Lin and Lin (2004)
[9] Viehland (2000)
[10] Zhu, Kraemer, Xu, Korte and Selhofer (2005)

tem will result in the company saving much more time in the implementation process.

3.3 Compatibility (infrastructure)

Compatibility of new technology with the firm's existing technology influences e-business adoption (Zhu *et al.*, 2005). If e-business implementation requires the same or similar technological infrastructure that is already in use, the success is more likely. If organizations had already implemented some form of enterprise resource planning (ERP), inter-organizational integration involved in e-business has the potential to pay significant dividends because this leverages the internal integration within the firm (Thatcher *et al.*, 2005). Adopting e-business entails with the selection and implementation of a suite of technologies (i.e., hardware, software), therefore if the innovation is compatible with existing work practices, environments and firms' objectives, firms will be more likely to adopt them (Lertwongsatien and Wongpinunwatana, 2003).

3.4 Market forces

Market forces CSF refers to the application and use of e-business by a firm's competitors, customers, suppliers, and business partners (Molla and Licker, 2005). Pressure from business's market forces has been identified as one of the key drivers for the adoption and subsequent level of utilization of e-business (Dos-Santos and Peffers, 1998). There are two possible implications of this CSF. First, an organization can start the e-business initiative (because of perceived benefits or fear of competitive disadvantage) and customers, suppliers and business partners will follow. Second, an organization is forced into e-business adoption by the same market forces. E-business can be used as a strategic tool to implement an organization's chosen strategy and respond to competitors (Lertwongsatien and Wongpinunwatana, 2003). Some authors argue that the most important key to success is to focus on the customer (Phan, 2001). E-business system has to be customer-centric.

3.5 Competencies of internal users

This success factor is very important because human resources are crucial in the implementation process. One distinct problem was recognised in that the knowledge and skill base is ever changing because the technology in not yet mature (Zhu *et al.*, 2005). As a result it is very important that employees who work on e-business project are constantly improving their knowledge. Organizations with IT departments are in a better position to acquire new knowledge for adopting e-business, since IT departments can be viewed as a source of IT related skills and

knowledge (Lertwongsatien and Wongpinunwatana, 2003). Since e-business implementation is a project, we have to consider rules of team building. So, selecting the right employees to participate in implementation process and motivating them is critical for the implementation's success (Khan, 2002).

3.6 Government support

Government can encourage e-business diffusion by providing supportive infrastructure, legislation, public policies and regulatory frameworks (Molla and Liker, 2005). Governmental support varies between developing countries and developed countries. As the state of supporting infrastructure in developing countries is not at the level of those in developed countries, this actually has a negative effect on the uptake of e-business. One of major areas, where government can help is security. A related study of e-business and globalization indicates that e-business adoption is slow in countries without strong privacy legislation and security protection (Zhu and Kraemer, 2002).

3.7 Strategy

If an organization wants to benefit from an e-business system, it has to prepare a clear strategy or a plan. If it is a commercial organization, one way of doing this is to incorporate new internet-based functionalities into their existing marketing strategy (Tsao *et al.*, 2004). Plans have to be prepared prior to start of implementation process. Another angle of this CSF is that firms are more likely to adopt open, standard internet-based e-business system, than proprietary, closed technologies such as EDI (Zhu *et al.*, 2005).

Businesses must develop information-centric business strategies to participate in the Information Age economy. Value will be found in information-based products such as branding, customer relationship, supplier integration and the use of key information assets (Viehland, 2000).

3.8 Business process reengineering

The software my not necessarily fit our business processes, so implementing an e-business system also involves reengineering business processes to the best business standard. The adoption of e-business is not just technological gimmickry; it is in fact a whole new way of doing business that replaces traditional models (Tsao *et al.*, 2004). Implementation of e-business system also brings increases in operational efficiency and effectiveness and a chance to reengineer the business process (Tsao *et al.*, 2004). Some organizations hire consultants to reengineer their business processes to fit the software system they intend to implement (Chuang and Shaw, 2005). In these cases it is important for consultants to have very good system process knowledge (Chuang and Shaw, 2005).

3.9 Change management

E-business implementation may significantly affect organizational structures, policies, processes and employees, and can cause resistance, confusion, redundancies, and errors if not managed effectively. Many implementations fail to achieve expected benefits possibly because companies underestimate the efforts involved in change management (Somers and Nelson, 2004). Given that e-business can also involve major changes in business process, it is important that managers also develop human resources skilled in change management. These technical and managerial capabilities are essential to a firm's ability to capitalize on the relative advantage of e-business and mitigate the negative influence of adoption costs and organizational change (Zhu *et al.*, 2005). Employees not only have to change how they work but also how they behave. Somers and Nelson (2004) said that such activities appear to be important from the early stages of a project and continue throughout the adaptation and acceptance stages. If people are not properly prepared for the imminent changes, then denial, resistance and chaos will be predictable consequences of the changes created by the implementation.

3.10 Consultants

The success of a project depends strongly on the capabilities of the consultants because the consultant is the only one with in-depth knowledge of the software. On the other hand if consultants lack business process knowledge, this can dramatically increase implementation difficulties (Chuang and Shaw, 2005). Somers and Nelson (2004) added that an organization frequently uses outside consultants for setup, installation, and customization of their software. They provide a very valuable service by filling gaps, providing expertise, and thinking outside the box (Khan, 2002). They are specialized and can usually work faster and more efficiently. Organizations have to establish a knowledge transfer mechanism by which consultants' role is defined clearly and their skills and expertise are acquired and transferred adequately.

3.11 Project management

Since the combination of hardware and software and the organizational, human and political issues make many e-business projects huge, complex and risky, effective project management is crucial from initiation to acceptance (Somers and Nelson, 2004). Because e-business systems implementation is a set of complex activities, involving all business functions, companies should have an effective project management strategy to control the implementation process, avoiding overrun of budget and ensuring the implementation within schedule (Butler, 2000). To fulfil this task efficiently and effectively, the management needs broad authority over all aspects of the project. Im-

plementation must be managed by an effective project leader who is responsible for overall management of the implementation effort and coordinates the use of the organization's resources with those of contractors and consultants.

3.12 Firm size

Firm size has been constantly recognized as a factor influencing technology adoption in the existing literature (Damanpour, 1992). For example, the proportion of EDI adoption is about 95% Fortune 1000 firms, and only 2% in small companies (Densmore, 1998). With regard to e-business adoption, larger firms have several advantages over small firms (Zhu *et al.*, 2003):

- They tend to have more slack resources to facilitate adoption.
- They are likely to achieve economies of scale, an important concern due to the substantial investment required for e-business projects.
- They are more capable of bearing the high risk associated with early stage investment in e-business.
- They possess more power to urge trading partners to adopt technology with network externalities.

Although there are bound to be exceptions. Since we know, that e-business comes in a diversity of forms, not all of them are out of reach for small and medium-sized enterprises.

3.13 Project champion

A project champion is person who performs the crucial functions of transformational leadership, facilitation and marketing the project to the users. Championship should also be considered as a critical enabling factor (Somers and Nelson; 2004). Project champions play a critical role in acceptance of the technology and he is usually somebody at senior management level, so that this person has the authority to make substantial organisational changes happen. The project champion should ensure that (Khan, 2002): management stake in the project is conveyed to all levels, top management support is maintained throughout the project, necessary resources are provided at critical junctures, parties at loggerheads are brought together and, decisions and compromises are enforced.

3.14 Effective communication

The importance of communication across different business functions and departments is well known in the IT implementation literature, because communication has a high impact from initiation phase until system acceptance, as it helps to minimize possible user resistance. We need effective communication in project team and within the organization. Khan (2002) explained that good communication in project team can be ensured by: weekly team meetings where team and project status updates are provided; postings on the company intranet; formal and informal information sessions etc.

3.15 Minimal customization

Somers and Nelson (2004) say that successful e-business implementations are often the result of minimal customization as customization is usually associated with increased implementation cost, longer implementation time, the inability to benefit from vendor software maintenance and upgrades etc. Keeping e-business system as standard as possible tends to have a positive effect on implementation process (Chuang and Shaw, 2005). Every modification request should be carefully evaluated.

4 E-business implementation CSFs and e-business implementation process

According to our preliminary research some e-business implementation CSFs are more important in some phases of e-business implementation process than in other phases. In other words it seems that not all e-business implementation CSFs have the same importance during all phases of the implementation process. We speculate that the margin of importance or relevance of factors is not the same through all the stages of the implementation process. We tried linking the e-business implementation CSFs with Seven E's in eTransformation model (see section 2) and our assumptions for this phenomenon are discussed bellow.

Environmental analysis phase gives an insight into the external environment the organization is working in (Arunatileka and Ginige, 2003). Usually in this stage SWOT analysis, industry analysis and global trends analysis are conducted. According to previous research on CSFs we think that in the first stage very important factors are: Top management support, Market forces, Government support, Change management, Consultants, Firm size, Effective communication.

E-business goals/strategies phase defines corporate strategy and goals for e-business. A prerequisite for this are identified organization's competitive advantages (Arunatileka and Ginige, 2003). Important CSFs in this stage would be: Top management support, Clear goals, objectives and planning, Market forces, Strategy, BPR, Change Management, Excellent project management, Project champion,

In third phase e-business readiness has to be assessed. According to Porter (1996), seven aspects of e-readiness have to be analysed: business process, applications & infrastructure, web presence, skills, executive management, external connectivity and future directions. The following CSFs are in our opinion crucial in this stage: Top management support, Clear goals, objectives and planning, Com-

patibility (infrastructure), Competencies of internal users, Strategy.

The fourth phase – eTransformation roadmap assesses the current status of the company and shows the direction to proceed. We assume that in this phase very important factors are: Top management support, Clear goals, objectives and planning, Compatibility (infrastructure), Competencies of internal users, Strategy, Change management, Consultants, Project champion, Effective communication.

E-transformation methodology phase has an iterative nature, ensuring the changes are not difficult to cope with. Modifications and changes to systems are to be expected. According to the matter of this stage as important factors can be defined: Top management support, Compatibility (infrastructure), Competencies of internal users, Strategy, BPR, Change management, Excellent project management, Effective communication.

In the eSystems phase management controls have to incorporate standards, guidelines to users, procedures and manuals for the new system. Security issues are being taken care of at this point. In this phase it seems that the important CSFs are: Top management support, Clear goals, objectives and planning, Compatibility (infrastructure), Competencies of internal users, Change management, Effective communication, Minimal customization.

Change management phase ensures the transition is smooth and that it achieves the expected broader and narrower goals and objectives of the entire transformation process. Since the entire phase is the same as one of identified CSFs, that is change management, this is clearly the most important factor. This last stage is supposed to have a connecting role to all other stages, so it is different in its definition. As a result, we won't assign additional factors to this stage.

5 Conclusion

The implementation projects of e-business systems are strategic and complex projects. They require substantial resources, and yet, the success is not guaranteed. Organizations must try to minimize risks by focusing on CSFs of e-business implementation. We are persuaded that linking of e-business implementation CSFs to an e-business implementation process is crucial to improve success of e-business projects and to enhance the knowledge about management issues of e-business implementations.

A variety of different research methods were used by cited authors which are not completely comparable. To achieve comparability and scientific relevance we are planning to test the importance of CSFs from table 1 in a complex field research focused on 200 successful implementations of Navision based e-business modules in companies in Slovenia and on 90 successful implementations of SAP based e-business modules in companies also in Slovenia. This research will be followed by several case research attempts of selected number of successful and less-successful e-business implementations. Case research will be conducted in (1) second biggest local newspaper company using Navision based e-business, (2) very large multinational electronics company based in Slovenia which is using SAP based e-business and in (3) very big port also using SAP based e-business. In case research special attention will be focused in project management specific factors.

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