

CRITICAL SUCCESS FACTORS FOR SUCCESS OF B2B ELECTRONIC COMMERCE IN SMES

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ABSTRACT

The objective of this paper is a comprehensive study of effective factors on success of B2B electronic commerce that are under control of SMEs themselves. These factors include individual features of companies and environment have no influence on them. In this paper critical factors are divided into four main groups; business infrastructure, human resources, client interface and technical infrastructure. Also in our approach, factors were viewed from SMEs viewpoints.

KEYWORD

B2B, electronic commerce, critical success factors, SME.

1. INTRODUCTION

The Internet is transforming and reshaping the nature of inter-organizational commerce by providing new types of electronic exchanges. The term electronic commerce involves sharing business information, maintaining business relationships and conducting business transactions by means of telecommunication networks [1]. This involves the use of information technology to link the functions provided by participants in this kind of commerce, rather than physical exchanges or direct physical contacts. It also refers to the procedures, policies and strategies required to support the incorporation of electronic interaction to the business environment. B2B (Business to Business) is a kind of e-commerce that defined as a new organizational form residing in digital space and established by two or more business (in most cases between business and its providers). B2B enables firms to conduct and engage in online relations bypassing the intermediaries needed to effectively doing business transactions in the traditional off-line way. The growth of B2B e-commerce has been (and will continue to be) a much more significant business activity of far higher value and will impact nearly all SMEs (small and medium enterprise) in the long run. The most experienced and successful e-commerce companies are beginning to realize that key determinants of success or failure are not merely web presence or low price, but there are many factors that impact on it. Some of them are environmental factors, which change the conditions equally for all companies in business space, and SMEs have no effect on them; and the others are influenced by business strategy, organizational infrastructure, technical skills, and resources and so on. Since environmental factors are not under control of businesses and they are the same for all, our focus is on the individual features of SMEs which lead to success.

2. SUBJECT DESCRIPTION

The evaluation of a B2B model is a complicated work that is related to many factors. This is because success of e-commerce can be viewed from several viewpoints, such as managers, competitors, business partners, stakeholders and government, and from each point of view effective factors are different. Several studies have been undertaken looking at success factors, issues, and requirements for e-commerce, but most of them have had no perfect viewpoint on success of e-commerce and each of them focused on part of success. For example, some scholars pointed out the importance of content currency for website success [10] and the other researches investigated the evaluation to the financial aspects in the e-commerce model B2B [2]. The second shortage is in addressing the nature of factors. Some factors are resulting from individual features of companies and the others are environmental, which companies can not change. So there is no proper classification on the factors that are presented in these models. The third problem is that the factors in the mentioned models are very general. For accurate evaluation, the factors should be explained in more detailed by using sub factors. Finally, the last deficiency is in addressing what is needed for B2B e-commerce success. Most of papers have investigated the factors that impact all kinds of e-commerce such as B2C, B2B, etc. Although these issues are important, some of which are hardly critical for SMEs. While the previously listed issues are effective to success of e-commerce, they should be classified properly.

3. RESEARCH OBJECTIVE

This paper will address important aspects of e-commerce success in the B2B sector. Its purpose is to gain a better understanding of the dimensions that affect the success of B2B e-commerce and influenced by SMEs themselves. It provides an overview of different success criteria and presents a model which can be used to evaluate e-commerce success. The primary research question this paper seeks to answer is: What are the important internal factors that affect success of a **B2B** e-commerce?

4. LITERATURE REVIEW

In the e-commerce area, there is a general lack of models and frameworks for evaluating the degree of success. But our process has uncovered multiple sources which try to design criteria for evaluating success. Here, briefly some of the literature that is interesting as a foundation for our evaluation criteria is presented.

Some scholars have researched the evaluation of economic benefits of e-commerce. Shao Peiji et al [2] have investigated the evaluation of financial aspects in the B2B e-commerce model. Their proposed index system consists of the index of B2B strategy evaluation, the index of market evaluation, and the index of application evaluation. This system can directly reflect different attributes, such as the evaluation target, content, and then compose ordinal masses in terms of subject connection and level principle. This model divides the index system of the B2B e-commerce model into three aspects by analyzing and researching some factors interrelated with the sale model B2B. Electronic Commerce 2004, written by Turban et al [3] lists the following factors as critical for success when it comes to e-commerce:

- Specific products or services traded
- Top management support
- Project team reflecting various functional areas
- Technical infrastructure
- Customer acceptance
- User-friendly Web interface
- Integration with corporate legacy systems
- Security and control of the EC systems
- Competition and market situation
- Pilot project and corporate knowledge
- Promotion and internal communication
- Cost of the EC project
- Level of trust between buyers and sellers

Armand St-Pierre [4] offers a conceptual framework to evaluate whether an e-commerce application should be implemented. The framework is centered along three major domains: Management, Technology, and Human Interface. The owners of the e-commerce applications have to justify them based on a cost-benefit analysis in the long run. An organization faces continuous challenges, such as new media and technology and managers have to plan, coordinate, and manage these changes adequately. The technology domain includes quality factors that can be broadly categorized into three classes. The first class contains those criteria (reliability, efficiency, usability) that pertain to the use of the e-commerce application after it has become operational. The second class pertains to the maintainability of the e-commerce system that integrates all business applications. The third class includes factors that reflect the ease with which a transition to a new environment can be made. Human interaction domain is for the assessment of key elements in user interface design with respect to the presentation of information and usability.

Molla and Licker have proposed a partial extension and specification of the DeLone and McLean model of IS success to e-commerce success [5]. This article has emphasized the need for a dependent variable to e-commerce success, customer e-commerce satisfaction, and its relationships with e-commerce system quality, content quality, use, trust and support. They have stated that success is a multidimensional construct and underlying the e-commerce systems are the business models that determine the nature of the product or service offering, the actors and role players and the revenue stream.

The United Nations Conference on Trade and Development (UNCTAD)'s E-Commerce and Development Report 2002 [6] provides a great deal of information on e-commerce from a variety of countries. The purpose of the report is to influence the expansion of e-commerce in small to medium sized companies in developing countries. Most of the emphasis of the report is on the issues relating to the regulatory interface, intellectual property protection, and the telecommunications infrastructure.

Jennex [7] mapped the UNCTAD report to the B2B Infrastructure Success Factor model attributes and generated a B2B e-commerce infrastructure success model for SMEs in developing economies. The Model has five factors: People Factors, Technical Infrastructure, Client Interface, Business Infrastructure, and Regulatory Interface. Each of these factors has many attributes among which 26 found to be critical.

5. PROPOSED MODEL

There are some factors that should be considered by any model that intends to assess the success of e-commerce. In this paper, we first have studied some of the relevant researches and extracted all of the factors that are mentioned in the previous models. Then, we found that although most of these issues are important, some of them are hardly critical for SMEs. In this section, we present a model for the evaluation of B2B e-commerce model based on the critical success factors that include individual features of companies and they are different from one SME to another. The proposed model is depicted in Figure 1.

At the first level of the model, factors are divided into four main groups. Each of them is detailed into sub-factors at the second level. However, as our approach is based on SMEs and their business partners, the emphasis has put on factors that can be controlled and influenced by businesses.

5.1 Business Infrastructure

Five issues that are known as important Business infrastructures are: structure, knowledge, strategy, flexibility and stakeholder satisfaction [8]. To further understand these five elements, it is necessary to look at their inner relations. Three of these factors have direct impact on the success of the company: knowledge, flexibility and stakeholder satisfaction. The other two; organization and strategy, are harder to understand. Since strategy is derived from the knowledge base of the company and needs flexibility for implementation.

Strategy is important for every e-commerce company to fulfill their goals and vision of doing transactions online. Strategy of a company must be consistent with the value proposition and must fit into its value chain. Furthermore, the strategy of a company should reflect its unique capabilities to gain advantage in e-commerce arena. Good strategy directs the company towards stakeholder satisfaction. Strategy is built on knowledge. Good knowledge base increases the likelihood of a successful strategy. Organization on the other hand has different influences over future success. Through company culture, or structure, it can influence the knowledge and the flexibility of the company. Flexibility is defines as company's ability or response to

change or the dimensions resulted from that change. A flexible company is more likely to be able to implement an e-commerce strategy successfully.

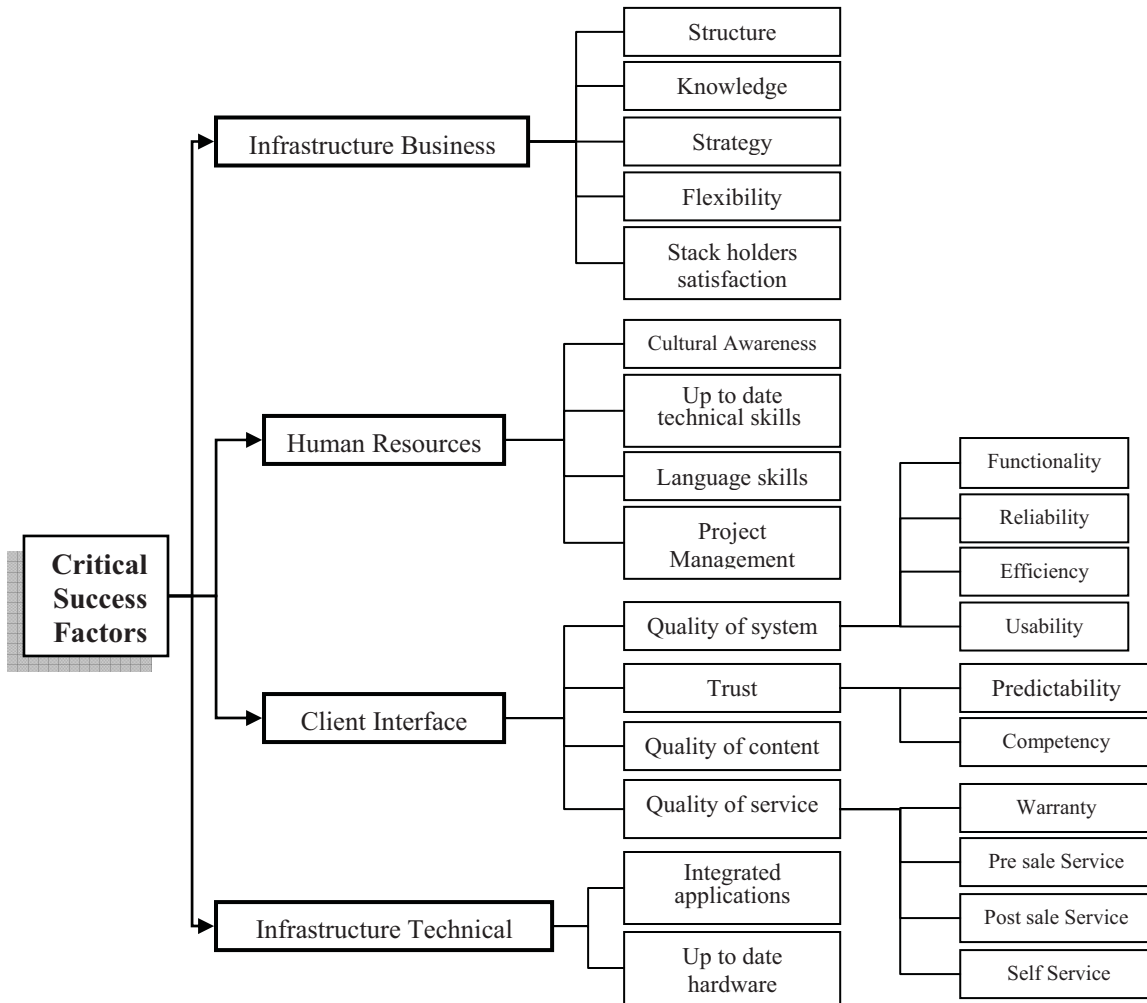


Figure1. Proposed model for comprehensive evaluation of B2B e-commerce for SMEs

5.2 Human Resource

Human resource management and creating a learning and flexible organization is one of the core concepts for e-commerce companies. These two ensures the fact that the more the organizations are aligned to learn quickly, the more they will gain the capability of adapting to the fast changing technology and e-commerce environment. To measure quality of the human resources and the flexibility of the organization, Turban et al [3] suggest the following criteria:

- There must be web based training opportunities in the company,
- The number of hours spent per worker for educational and training purposes.

5.3 Client Interface

For companies wishing to begin a B2B e-commerce venture, ensuring that their business partners can communicate with them and resolve problems is very important. So we investigate it as the most important

internal factors in four main issues: quality of e-commerce system, quality of content, quality of services offered and trust.

5.3.1 Quality of System

Given the fact that all interaction between business partners is accomplished through a human-computer interface, the quality of e-commerce systems can follow the same principles as software quality. According to the ISO 9126 standard [9], software quality consists of six quality factors, which are functionality, reliability, usability, efficiency, maintainability and portability. Since our approach is from company and business partner viewpoint, we emphasized on functionality, usability, reliability and efficiency; because maintainability and portability are important factors from developers point of views.

Functionality refers to a set of functions and specified properties that satisfy stated or implied needs. According to the ISO 9126 standard [9], its sub-characteristics are suitability, accuracy, interoperability and security. Based on the definition, it is obvious that the quality factor of functionality can be related to the basic characteristics of e-commerce systems. Some of these characteristics follow [10]. The name of the e-commerce website and the time needed to interact with the site's web pages create the first impression to the user, given the fact that the user expects direct access to the web site and navigability through the web pages. Navigability, pleasant interface, compatibility with all kinds of browsers, multi-linguality and provision of accurate information also play an important role. Another important facility, for the user, is the ability to find the right information at the right time; the availability of a search engine service and the creation of shopping categories can aid in reducing search time, but in order to search with efficiency, one needs an operable search engine and a functional site map. The other basic functional characteristic of e-commerce is the procedure of payment. There are various methods of payment [11], such as digital currency, electronic credit card and electronic check payment. In all the above methods of payment, a very important parameter is security.

Reliability [12] refers to a set of attributes that bear on the capability of software to maintain its performance level, under stated conditions, for a stated period of time. Sub-characteristics of reliability are maturity, fault tolerance and recoverability. The reliability, as far as e-commerce systems are concerned, is related to the accuracy of the information provided about products, as well as the consistency of the services.

The e-commerce system is reliable when it restores user transactions, even in the case of a system failure. The basic characteristic of e-commerce systems related to reliability is security of electronic financial transactions. Five blocks of security have been identified [12], as far as Internet transactions are concerned. These are confidentiality, authentication, access control, data integrity and user's accountability. For this purpose, means like digital certificates and the SSL (Secure Socket Layer) have been created and their role is to guarantee the security of transactions. The aforementioned means, using cryptographic methods, ensure the reliability of e-commerce systems, even in the case of system failure. Another important characteristic of e-commerce systems is privacy of personal information. Certain users may want to limit the number of detailed personal information that they are required to provide to an e-commerce system, in order to complete a transaction. Others may allow the disclosure of personal information, only if they have access to the collected information, or may want to maintain a personal record and analysis of what personal information has been collected [13]. A reliable e-commerce system should provide the possibility of such actions.

Usability is defined as a set of attributes that bear on the effort needed for the use and on the individual assessment of such use by a stated or implied set of users. According to ISO 9126 [9], usability's sub-characteristics are understandability, learn- ability and operability. Based on the definition, it is obvious that the quality factor of usability is related to characteristics of e-commerce systems, such as provision of accurate informative texts about products and services offered, as well as provision of thumbnails, photographs and videos presenting the services and products available [10]. Additionally, a well- designed interface that attracts user's attention and facilitates navigation, contributes to the usability of e-commerce systems. Another important characteristic, related to usability, is easy and simple access to the web site of the virtual shop. A web site can either be accessed directly (by means of its name), or indirectly (through a web search engine). Finally, a usable e-commerce system should enable the end user to adapt the web pages to his own personal profile and needs. Consequently, applications that process user profile and adjust the interaction based on one's specific needs and preferences are desirable characteristics of e-commerce systems.

The quality factor of efficiency [14] refers to a set of attributes that bear on the relationship between the software's performance and the amount of resources used under stated conditions. According to ISO 9126 standard [9], Sub-characteristics of efficiency are time behavior and resource behavior. Based on the

definition above it is argued that efficiency is also important to the quality of e-commerce systems. A system is efficient, if the user can access the relevant web pages promptly and easily.

Navigation through the web pages should be completed at the minimum time possible, and access to the categories of products and relevant descriptive information should be easy [10]. Therefore, an efficient e-commerce system should rely on user personal profile, user preferences and other user information available.

5.3.2 Quality of Content

To define the information quality on an e-commerce system, following criteria can be used:

Precision:

- ✓ Clear information about products and services
- ✓ Information isn't conflicting
- ✓ Accurate information about products and services
- ✓ Neutral information, regarding other products etc.

Formats:

- ✓ Presentation of the information in a useful manner.
- ✓ Presented material to provide the user with quick understanding

In Time:

- ✓ Updated information
- ✓ Information is in time and genuine

5.3.3 Quality of Service

Recent research shows that price and promotion are no longer the main draws for customers to make a decision on a purchase [15]. More and more sophisticated online customers would rather pay a higher price to companies who provide high quality e-service [16, 17]. Market research has indicated that service quality has a significant impact on customer satisfaction, loyalty, retention and purchase decisions, and even on company's financial performance. Thus, to build customer trust and loyalty, and keep customer retention, companies must shift the focus to service quality before, during and after the transactions. So we investigate it in four issues: warranty, pre sale service, post sale service and self-service.

Navigation in an e-commerce shop is similar to a walk in a real shop, where the shopper (user) interacts with the seller and requires answers to questions. The provision of frequently asked questions (FAQs), or means of direct access to the e-commerce shop should be included in a self-service of e-commerce system.

The user of the e-commerce system, just as every buyer, wishes to receive the best services possible, with all the advantages that a simple shop provides, like offers and special prices. Moreover, an e-commerce system should be updated regularly; new products should be presented, while those that are not for sale any more should be removed from catalogues. It is important that an e-commerce system provides the facility of cross selling complementary or similar products. Finally, it is self-evident that the provision of a detailed help service (avoiding, however, unnecessarily long texts) affects greatly the users' satisfaction of the system.

In addition to aforementioned services, warranty plays critical role as the risk reducing information send by the seller [18]. Warranty is a form of distributing (sharing) the risk (of low quality) among all of the customers. In a single transaction, warranty may be considered as providing information, which shares the risk in either of the parties in seller-buyer relationship. In any business transaction, but especially in indirect communication, as in e-commerce, at least two sources of risk and two types of claims can be observed:

- Risk of malfunctioning: the product sold does not meet the specified (promised by the seller) properties, during the specified period of its life.
- Risk of misinforming (misunderstanding): the product does not meet the expectations of the buyer. Warranty statements as "If you are not fully satisfied - money back" addresses this kind of risk.

5.3.4 Trust

The trust should be even more important in the e-commerce than in the traditional commerce because of the paucity of rules in regulating the e-commerce and because online services and products typically are not immediately verifiable [19]. When making an assessment of the trustworthiness of an individual or organization Dutton argued that trust is impacted by several factors [20]. Within the context of B2B e-commerce at least two of these factors apply. These factors include: predictability and competence.

A sense of predictability must be based on the knowledge that business acts in consistently positive ways. Business partner in an e-commerce transaction may reasonably expect the e-commerce business to behave consistently. It is possible that the actions of business may change which would impact consistency. However, if the business partner understands the reason for and anticipates the change, predictability will not suffer. Predictability is a starting point for the development of trust in inter-organizational relationships. Therefore, the more predictable a business views another to be, the higher the trust in that party. It is expected that this holds in e-commerce relationships. The difficulty in linking competence to trust is that the majority of people are unable to critically evaluate the competence of specialists. Dutton [20] argued that competence contributes to the building of credibility. The greater the credibility the greater the confidence and willingness to trust the other party and value the relationship. Also he identifies that competence is an important dimension of trust in technology intensive business. Due to the technical nature of e-commerce, perceptions of technical competence are particularly important in e-commerce relationships. In e-commerce, if the trusting party is not confident of the other party's competence to carry out a transaction successfully and securely, the trusting party will be less willing to trust and engage in that transaction.

5.4 Technical Infrastructure

Technical infrastructure is one of the main drivers of the e-commerce. Under technological development, following issues can be listed [21]:

- Up to date PCs and other computer hardware,
- Integrated companies front end applications and back end applications,
- Developing an intranet through which collaborative product design across locations and among multiple value systems participates can be enabled,
- Following the technological trends and technology markets to innovate different channels and products to provide new values both to company to provide efficiency and to their business partners (Such as development of mobile applications, instant messaging products etc.)

6. COMPARISON AND EVALUATION

In this session, a quick survey of success factors that are commonly mentioned in the recent literature on B2B e-commerce is presented. The analyzed literature is a condensed extract from books and papers concerning the e-commerce, and addresses the issue of success. Seven sources are briefly described in Table 1. These sources are compared in eight issues that are addressed as critical success factors in our proposed model, and the number of sub factors mentioned in each source is shown.

As it is observed, most of them had no comprehensive viewpoint regarding the success of e-commerce, and each of them only focused on parts of the success. For example, some papers have pointed out the importance of environment and the others have investigated the individual features of companies. Our model tries to embrace all factors that have been mentioned in other models.

Table 1. Comparing electronic commerce success and issues studies

Papers	Total	Business Infrastructure	Human Resources	Client Interface	Technical Infrastructure	Environmental Factors
<i>Pierre 2001[4]</i>	23	3	--	18	--	2
<i>Molla 2001[5]</i>	6	--	--	6	--	--
<i>Stefan 2001[10]</i>	4	--	--	4	--	--
<i>UNCTAD 2002[6]</i>	29	9	5	4	2	9
<i>Peij 2003[2]</i>	16	4	1	7	--	4
<i>Turban 2004 [3]</i>	13	2	2	6	1	2
<i>Proposed Model</i>	22	5	4	11	2	--

7. CONCLUSION AND FUTURE WORK

Electronic commerce is still a rather young area and lack of models and frameworks make the task of evaluating e-commerce success hard. In this paper, using the literature in this field, a new model for evaluating the success of a B2B e-commerce was provided. In the proposed model, the success of the B2B e-commerce depends on factors that affect the capability of creating profit for e-commerce companies, and also satisfaction of their business partners. Further research into developing, validating and empirically testing the model is proposed. A way to improve the model's accuracy is further analyzing sub-factors that correspond to the e-commerce success factors. Future work is weighting factors of the proposed model. Critical factors can be weighted through applying the model in different success SMEs in the same environment and calculating total degree of success in those companies. Also, the success factors of e-commerce in different companies were not studied scientifically, as there is a lack of scientific literature for this area. Moreover, weights of factors are not equal in different countries; so this model can be customized for a country.

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