

Evaluating e-Business Adoption: Opportunities and Threats

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Abstract. Electronic Business (e-Business) is a challenging practice due to the many aspects it involves. Many organizations have adopted e-Business to respond to several business drivers. The rapid changes in the political, economic and technical fields are creating new business environments, in which e-Business is considered a normal practice. A variety of business threats are facing organizations that do not adopt e-Business early enough. Our emphasis is on the e-Commerce field and we perceive e-Business as the broadest form of e-Commerce. This paper attempts to model the business environment and evaluate its competitive characteristics by measuring technology's necessity and business threats. The paper adopted a qualitative measurement of the position of an organization with respect to its adoption of e-Business.

Introduction

The success of the World Wide Web (WWW) and its applications introduced a mixture of interrelated terms in the business context, e.g. e-Business, e-Commerce, e-Marketplaces, e-Wallets, e-Cash, etc. Many researchers have attempted to define e-Business. e-Business considers the manner in which business transactions and customer services take place via different sets of Information Technology (IT) mechanisms [1, 2]. e-Business intends essentially to leverage the relationship between customers and vendors [3, 4]. In many cases, customers tend to search in one location for their needs, and negotiate different vendors [3]. Vendors need to understand customers' behavior in order to enhance their decision making process [3, 4]. e-Business describes the broadest definition of e-Commerce.

Traditional business vs. e-Business

Kreplin *et al* [5] identified "Reality" and "Virtuality" terms; these terms distinguish traditional business from e-Business. e-Business is based on a virtual (digital) business

process with a virtual agent, and virtual product. Traditional business is a physical business process with respect to the three components. For instance, when a consumer wants to purchase an article, there are a number of alternative scenarios to do this.

He could go to a library in town, search the articles manually using traditional indexes or catalogs, choose the right one, take it to the cashier, and pay cash for it. This is pure traditional business where the agent is the library, the product is the article, and the process starts by going to the library and terminates by conducting payment manually. Notice that each component is a concrete real object.

Alternatively, the consumer, through his computer, may launch a digital library web site, post his search criteria, fetch results, select the right one, fill the payment form, and may download a soft copy of the article. This is pure e-Business where the agent is the digital library, the product is the soft copy of the article, and the process includes searching, paying, and downloading the article. Notice that each component is a virtual digital object.

In between those two forms of businesses lie many different mixed forms, some of which are closer to e-Business and some are closer to traditional business. Notice that this distinction is applied in the commerce field of business. However, customer service and other tasks can be distinguished in the same manner.

Turban, *et al* [7] presented a three dimensional model to illustrate business virtuality by means of working in a digital environment. Figure 1 offers a simplified distinction between traditional business and electronic business.

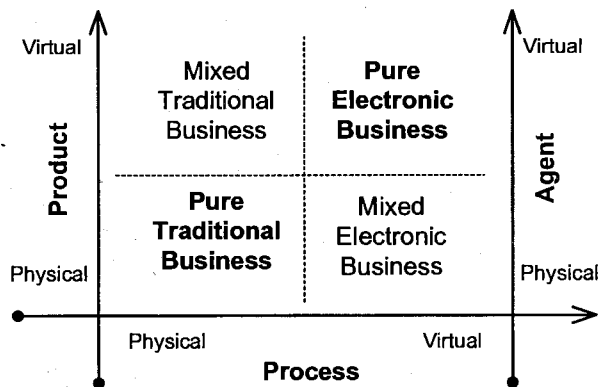


Fig. 1. Traditional business vs. e-business (Adapted from [7]).

Background on Opportunities and Threats

Organizations need to adopt suitable business strategies to get involved in e-Business revolution [8, 9]. e-Business gives a realistic business opportunity due to the accessibility and ubiquity of the technologies it employs, such as the internet [10, 11]. However, it “presents a threat to businesses that do not get involved early on” [10]. Organizations also need to have a managerial process to gain viable fit between its objectives, resources and environment opportunities [9, 22]. The executives of successful e-Business companies seem to be strategic thinkers [7]. There are many choices for any organization that decides to move to e-Business. The right choice depends on the nature of business, business environment, and the internal resources availability [7]. There are internal and external factors that influence the decision process [8]. This may include industry analysis and competitive opportunities assessment [9, 12].

e-Business adoption can be considered from two different perspectives, namely the threat perspective and the opportunity perspective. Business opportunity refers to the situation where adopting new business initiatives, e.g. IT adoption, make it possible to achieve advancement to overall business [13]. Business threat refers to how business competition can be harmed, especially if critical business issues, e.g. business limitations and IT adoption latency, are not taken into account [13]. To model the business environment and evaluate its competitive characteristics, we exploited four measurement components that are devoted to measure opportunities and threats relevance. These will allow evaluating e-Business adoption within an organization. This evaluation measures IT necessity and business threat.

Basic Measurement Components

In this paper, the main measurement components are (pressures, limitations, reality, and innovation). They are mainly classified into threat perspective components, and opportunity perspective components. Threat perspective components are pressures, limitations and innovation. Opportunity perspective components are pressures, reality and innovation.

Business pressures

The term “pressure” refers to something that drives changes, and stresses to yield one [13]. Pressures force many organizations to develop strategic business objectives. As much as these pressures become numerous, business environments become more challenging [7]. There are many drivers that create pressures on the business environment. Within any organization, a business pressure is an internal or external element that affects business environment, e.g. aggressive competitors, global focus, strategic alliances, continuous improvement, globalization, corporate merger, strategic systems, shift in the market demand, and global information technologies [7,14]. Because they all affect business, we call them “business pressures”. An individual

pressure is called “pressure element”. Based on their underpinnings, they could be classified into many classes, such as political, technological, and social pressures [7].

The current business environment is called “the current status”. The one which is targeted is called “the target status” [14]. The target status is e-Business. We classify each pressure element based on its relationship with the target status. A pressure that drives business towards its target status is called a “positive pressure”, while one that drives backward is called a “negative pressure”. When virtuality is fully applied, “Business” is synonymous to “e-Business” [15]. e-Business will become the current status and the target status will be something beyond e-Business.

Pressures have different control mechanisms [7]. Thereby, pressures can be declined. A control mechanism is an organizational response or reaction to a pressure. For instance, globalization [16] is a political pressure, because it is a superior driver of the business change with political underpinnings. Simultaneously, it is a positive pressure, because it presents an aggressive competition that drives business towards its target status. To decline this competition pressure, different organizational responses can be applied [7]. Combining different control mechanisms yields a business strategy.

Business reality

Normally, the main goals of e-Business are to automate or digitalize business, reduce costs, and raise productivity [17]. Business virtuality is the process of moving business activities into electronic or digitalized form using IT [5]. The underlying technologies are mainly used to communicate, to interact, to retrieve and to store business information [18]. Business reality assumes traditional practices of business in physical buildings, transportation means, cash handling and manual procedures [13]. IT provides additional benefits to a real (physical) business [17]. However, this automation or digitalization usually faces many obstacles, such as the various types of limitations [7]

Business limitations

Obstacles of business virtuality are called “business limitations”, such as the diversity of standards, regulations, legislations [7, 17], and poor software systems [1]. The term limitation refers to something that is not available, prohibits achieving the main target, or not well-prepared [13]. Furthermore, it can be a rule or fact or condition that limits achieving that target. These limitations are mainly classified into technical and organizational limitations [7].

Technical limitations encompass a set of technological conditions that limit the progress towards business virtuality, such as the diversity and heterogeneity of software components [1]. Organizational limitations are conditions that limit the progress towards the business virtuality, such as the diversity of regulations, standards, and languages [7].

The presence of business limitations and business negative pressures creates some

sort of confusion. Business limitations as well as business negative pressures drive backward. However, each of the two has its own peculiarities. Business negative pressures affect the tendency towards e-Business and they usually precede a decision to e-Business adoption [8]. Business limitations are hindrances to the actual implementation of e-Business [7].

For instance, the lack of trust [19] is a psychological negative pressure, because it is a pressure that drives business to be real (physical) and concrete environment, especially, with regard to virtual payment systems [7, 17]. It has psychological underpinnings. Usually, humans do not trust paying electronically due to the nature of the human interaction in a virtual environment [17]. Security considerations [20] and past practices control this feeling.

Web security is a technical limitation, because it is related to the real implementation of business virtuality [21]. We will not cover the lack of trust and the security issues in this research, because they include several open questions that are not yet answered.

The key question in organizational and technical limitations is how to overcome them? As we discussed in business pressures, there are different control mechanisms for technical and organizational limitations. However, negative and positive classifications are not applicable here. There are control mechanisms that are devoted to decline these limitations, such as standardization of technical and organizational aspects [22, 23]. Business limitations can be resolved by process and technical innovation. Management Information Systems (MIS) are concerned with bridging the gap between business and technical perspectives, which is an essential requirement to bring out innovative technology-based solutions [24]. Haag, *et al.* [24] presented five strategies for competing with IT. One of these is demanding innovative ideas.

Business innovation

Innovation is the process of solving a business limitation in a creative way. IT creativity gives any organization a competitive advantage over its competitors [24]. Hackney, *et al* [9] covered the context of strategies. They specify a source of innovation by applying "out-of-the-box" thinking to capture information. However, there are many other sources of innovation. They recommend using information sharing in non-competitive situations to gain insight and then create innovative ideas.

The prime idea of innovation is to establish skills-based teams that accommodate different views, e.g. marketing, computer, finance, etc, to exploit collective knowledge [25], and come up with innovative solutions of business problems [24]. Technical solutions are not enough. Many other perspectives must be considered, such as marketing, competitors' business practices, technical trends, and industry opportunities [24].

Technology's Necessity Measurement

The modern information technologies are becoming a competitive necessity, and organizations that do not adopt them early enough will be out of business [8]. Many industries, still consider IT a secondary issue. IT seems to be considered critical across a variety of industries. Industries that used IT competitively very early on, e.g. airlines, may consider IT a business primitive [8]. Hence, any two organizations in the same industry can be evaluated through opportunities and threats in an evaluation period. Evaluation period refers a given interval of time that IT status in a given organization is evaluated in comparison with competitor organizations in the same industry, e.g. October, 2002. Comparing technological presence in two different organizations from different industries, in a different evaluation period seems to be unacceptable.

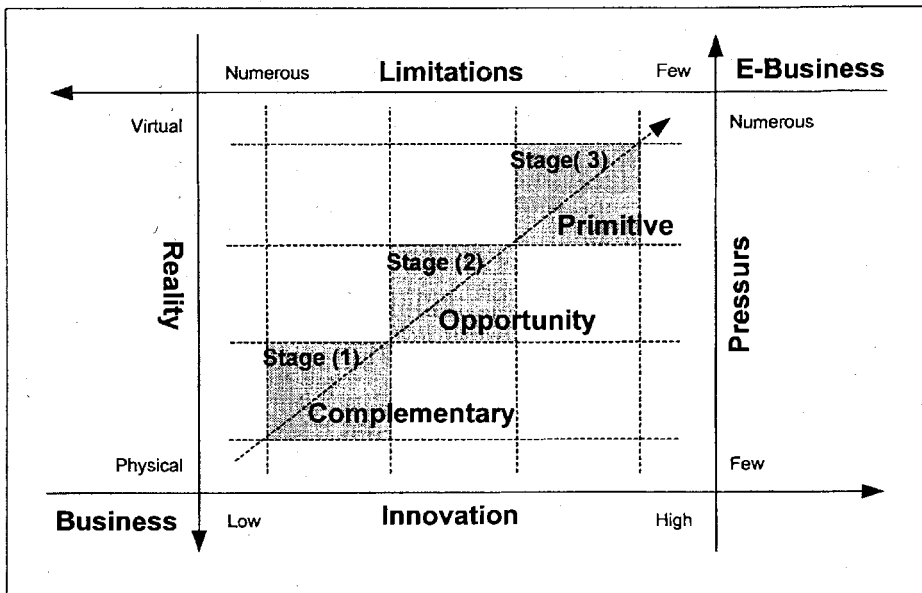


Fig. 2. Measuring technology's necessity.

Specifying evaluation period and industry are essential and critical in this measurement. Generally, this measurement tries to measure the technology's necessity in a business context. Many industries reach e-Business by combining successful business practices and proper technology. The rapid growth of businesses based on technological foundations enables e-Business as illustrated in Fig. 5.1, to grow in three stages. Along with necessity level, these stages are ordered increasingly as business complementary, business opportunity and business primitive, where business primitive indicates more necessity.

A pure real (physical) business is usually applied due to the numerous limitations, traditional solutions, and few pressures in the business environment. This is depicted at Fig. 2 in the first stage. At this stage, the values of our measurement components are as follows.

$(\text{pressures, limitations, reality, innovation}) = (F, N, P, L)$

Pressures are few, limitations are numerous, reality is high (physical business), and innovation is low. In this situation, IT is not a critical competition alternative [8]. It is totally independent from business. But together, they might add more competence and conveniences [8]. IT is “business complementary”.

$\text{Components } (F, N, P, L) \rightarrow \text{IT (not critical to competition)}$
$\text{IT (not critical to competition)} \rightarrow \text{IT (additional to business)}$

The second stage is “business opportunity”. All measurement components are in the middle range. Pressures are middle, limitations are middle, reality is a mixture of physical and virtual practices, and innovation is imitative.

$(\text{pressures, limitations, reality, innovation}) = (M, M, M, I)$

This means that IT is a probable solution to decline the middle degree pressures. IT is capable of augmenting business virtuality. Other industrial practices can be imitated [24]. Limitations are not few as in the first stage and maybe critical. Nevertheless, limitations are not numerous, so the chance of success in adopting a technological solution is high. Thus, IT becomes a “business opportunity”.

$\text{Components } (M, M, M, I) \rightarrow \text{IT (probable solution)}$
$\text{IT (probable solution)} \rightarrow \text{IT (business opportunity)}$

At the last stage, IT is “business primitive”. System is business and business is system [15]. IT belongs to business, because IT is a critical competitive alternative, and organizations that do not adopt IT are out of business [8]. There are IT-based creative solutions, pressures are numerous, limitations are few, and reality is low (virtual business).

$(\text{pressures, limitations, reality, innovation}) = (N, F, V, H)$
$\text{Components } (N, F, V, H) \rightarrow \text{IT (belongs to business)}$
$\text{IT (belongs to business)} \rightarrow \text{IT (business primitive)}$

At this point, the pure e-Business is crystallized, and it becomes a current status. The next target status will be something beyond e-Business.

The components (pressures, limitations, reality, and innovation) could measure technology's necessity as illustrated in Table 1.

Table 1. Measuring technology's necessity in a business context

Governing dimensions				IT	
P	L	R	I	Stage	Position
F	N	P	L	Complementary	Additional to business
M	M	M	I	Opportunity	Combined with business
N	F	V	H	Primitive	Belongs to business

Business Threat Measurement

The huge investment in IT forces competitors to go for e-Business to attract customers and remain in market. However, it presents entry barriers to new market's entrants [24]. The rapid changes in the political and technical fields are creating new business environments in which e-Business are considered normal practices [10]. New market's entrants will ultimately fail if they do not go for e-Business competitively [24]. They will have to invest in e-Business to offer services to customers who have come to expect from them [24].

Specifying evaluation period and industry are also essential in threat measurement. Business threat measurement tries to measure the risk on business through IT adoption effectiveness and latency in an evaluation period. IT adoption effectiveness and latency are related to organization movement to full e-Businesses in comparison with competitor organizations in a given interval of time. Declining business threats in this measurement has three basic levels. Along with threat degree, these levels are ordered decreasingly as business failure, business threat and business success, where business failure is the riskier situation.

The existence of numerous pressures in a business environment that uses pure virtual practices, coupled with numerous limitations, and without creative IT-enabled solutions pushes threats to the maximum. This is depicted at Fig. 6.1 in the first level. In this level, the values of our measurement components are as follows.

$$(pressures, limitations, reality, innovation) = (N, N, V, L)$$

Here, pressures are numerous, in a virtual business, limitations are numerous, and innovation is low. In this situation, business is in a risky status. The full adoption of e-Business technology without innovation and in a growing limitations environment may not absorb increasing pressures. The use of IT is a prime cause of business failure. The

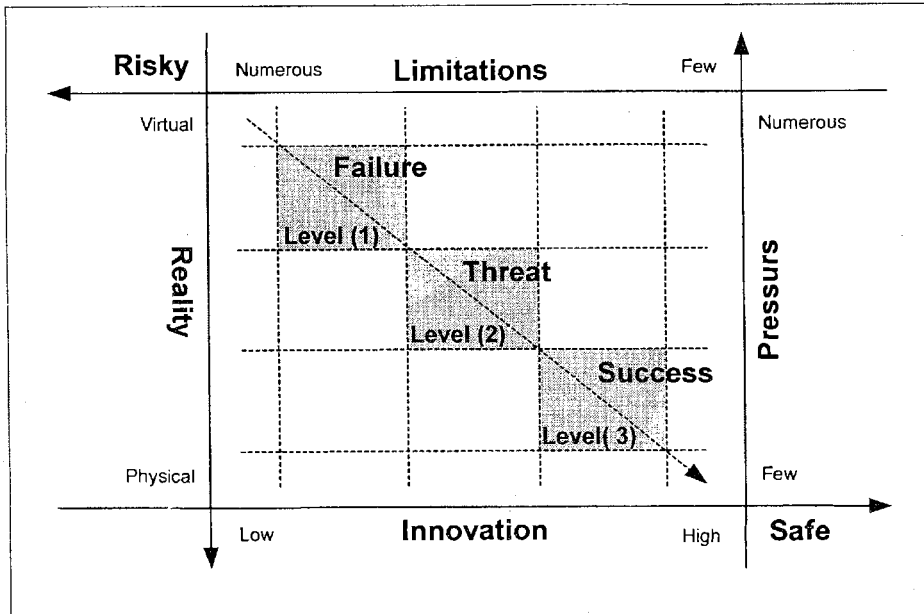


Fig. 3. Measuring business threat.

threat is “Business failure”. This is illustrated in Fig. 3 in the first level.

<i>Components (N,N,V,L) → IT (prime cause of failure)</i>

<i>IT (prime cause of failure) → IT (business failure)</i>
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The second level is “Business threat”. All measurement components are in the middle range. Pressures are middle, limitations are middle, reality is mixture of physical and virtual practices, and innovation is imitative solutions.

<i>(pressures, limitations, reality, innovation) = (M,M,M,I)</i>
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Imitating competitors using mixture of physical and virtual practices may limit the progress towards industry competition. Relying on traditional ideas will never enable an organization to achieve market leadership [24]. The way this organization uses IT is primarily considered as a threat reaction [9, 22]. Other competing organizations may come up with more innovative use of IT, and consequently take market leadership. This level is called “Business threat”.

<i>Components (M,M,M,I) → IT (may limit competition)</i>
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<i>IT (may limit competition) → IT (business threat)</i>
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“Business success” is the lowest level of threat. Here, pressures are few, in a physical business, coupled with few limitations, and relying on creative solutions.

$$(pressures, limitations, reality, innovation) = (F, F, P, H)$$

When business creativity is coupled with these dimensions, business is in the safest status. Creative business proactively declines threats before they become more dangerous. However, IT is a prime source of innovation. Thus, the use of IT is the remaining action to assure business success.

$$\begin{aligned}
 &Components (F, F, P, H) \rightarrow IT (tool for success) \\
 &IT (tool for success) \rightarrow IT (business success)
 \end{aligned}$$

The components (pressures, limitations, reality, and innovation) could measure business threat as illustrated in Table 2

Table 2. Measuring business threat

Governing dimensions				IT	
P	L	R	I	Level	Position
N	N	V	L	failure	Prime cause of business failure
M	M	M	I	Threat	May limit business competition
F	F	P	H	Success	Tool for business success

Conclusion and Future Work

This paper covered the foundations of a model for evaluating opportunities and threats of e-Business adoption. It is possible to apply the rules specified in the paper to achieve a reasonable assessment of the position of an organization in the context of e-Business. Of course, estimating the size of pressures, limitations, reality and innovation has to be done in an honest and objective manner. Though generic and more qualitative, our model is able to sketch a road map for an organization to follow in handling the obstacles and designing strategies towards a successful implementation of e-Business.

Another complementary part of this model is a quantitative analysis model based on an empirical study to apply our model after integrating the previous measurements. We will utilize case studies from different organizations and different industries to set quantitative measures for evaluating e-Business relevance.

Because we live in a dynamic world, time, pressures, limitations, reality, and innovation are changing. Time is a critical factor in measuring opportunities and threats, as it affects each of these components. Pressures take time to be declined, limitations take time to be overcome, virtuality takes time to be crystallized, and innovation takes time to be successful. Our next research will accommodate the time dimension into our model.

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تقييم تبني الأعمال الإلكترونية : الفرص والمخاطر

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ملخص البحث . تبني الأعمال الإلكترونية توجه استراتيجي في أي منشأة، نظرا للآثار الكبيرة التي يتضمنها وقد تبنت كثير من المؤسسات هذا التوجه لحاجة الأعمال، في وقت أصبح فيه هذا التوجه ممارسة طبيعية في ضوء المتغيرات الكبيرة التي يعيشها العالم في كل المجالات. وتعرض كثير من المؤسسات إلى المخاطر نتيجة لتبنيها المتأخر للأعمال الإلكترونية. وفي هذا البحث، ننظر إلى الأعمال الإلكترونية كنموذج أشمل للتجارة الإلكترونية ونطرح نموذجا لبيئة العمل يمكننا من تقييمها إزاء المخاطر والفرص التي تتيحها التقنية عبر محاور الضغوط والمحددات والواقع والابتكار. وبالرغم من أن النموذج المقترح هو نموذج موضوعي غير إحصائي فإنه يساهم بشكل واضح في تحديد حالة المؤسسة ضمن منظومة الأعمال الإلكترونية ويعرف مكانم الخطر ومجالات التحسين الممكنة .