A METHOD FOR EVALUATING E-BUSINESS EFFECTIVENESS
A Study of eBusiness Capability in Mainland China

Jian Chen
Netec, Xi'an Software Park, Xi'an, Shaanxi, PR China

Christine Mingins
Faculty of Information Technology, Wellington Rd, Clayton, Victoria, Australia

Yan Deng
Netec, Xi'an Software park, Xi'an, Shaanxi, PR China

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Abstract: Business of all kinds is increasingly being conducted on-line, potentially dissolving the boundaries between local, national and global entities. Enterprise Information Portals are a vital tool for doing business over the internet. No matter how sophisticated a company's traditional business model is, its eBusiness capability is only as effective as its online presence. It is to be expected that companies of developed companies will perform better than companies in developing countries in this respect. This work establishes a method and process for evaluating the effectiveness of eBusiness capabilities. The method was applied to measure the current status of eBusiness portals of Mainland Chinese IT companies, compared with those of companies based in developed countries. A benchmark was established by analysing the EIPs of leading international companies and developing a method of evaluating eBusiness capability from an external, client viewpoint. The benchmark was then used to determine the degree of difference between Chinese companies on the basis of size, region, and business focus. This is the first systematic study on the effectiveness of e-business applications of Mainland Chinese companies. The method and process described in this work can be used to develop benchmarks and perform comparative evaluations of eBusiness capability for any business sector.

1 INTRODUCTION

In recent years doing business over the web has evolved rapidly from static product advertising and email communication to the operation of full-blown e-Business portals (Kalakota and Robinson 2001; Smith et al. 2003; Eikebrokk et al. 2005; UNCTAD 2004). e-Business is defined as " ..the conduct of business generally, with the assistance of telecommunications and telecommunications-based tools. e-Business therefore encompasses a wide range of activities such as e-commerce, e-publishing and electronic services delivery Its scope extends across the business activities of all categories of organisations and individuals, whether undertaken for profit, or as a service to some community" (Clarke 2001). Indeed, the internet economy is rapidly evolving into a new phase where many modular business services are provided for customers over the web. These e-services can be performed at a web site, on the customer's computer, or even computed over a grid (Casati et al. 2001). A business will typically establish its e-presence and engage in business with customers via an integrated set of services accessible through a single entry-point, an Enterprise Information Portal (EIP) (Shilakes and Tylman 1998). These portals are regarded as key enabling factors for small and medium enterprises, especially in developing countries (Eikebrokk and Olsen 2005; UNCTAD 2004; Georgiou and Steffaneas 2002).

Although there have been many reports and research projects on applications of Internet technology, there has been to date no specific research on the overall level of adoption of eBusiness applications in general, and the effectiveness of e-Business applications in particular, in China. The goal of the research reported in this paper is to develop a methodology and process for studying e-Business applications

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used by industry sectors, and apply it to a representative sector in Mainland China. It is anticipated that an analysis of the differences between best practice international businesses operating in China and Chinese companies would result in recommendations for improving their business models and e-Business capabilities, in order to improve their global competitiveness. The perspective taken in the evaluation is that of the customer. No matter how effective internal business models and supporting technology is, it is the quality of the external customer interaction with the portal that determines the effectiveness of doing eBusiness with the company.

2 RELATED WORK

UNCTAD (2004); Georgiou and Steffaneas (2002), Gregorio and Kassicieh (2005), OECD (2004) and OECD (2004a) highlight the digital divide between developed and developing countries. An important motivation for our research comes from the United Nations Conference on Trade and Development, E-Commerce and Development Report (UNCTAD 2004):

By 2003 the estimated number of internet users globally was 276 million of whom 243 million were from developing countries – and two thirds of those were from Asia.

Data for e-business development in developing countries is not easy to collect, but it is clear that there is a distinct lag in e-Business adoption in developing countries.

In developing countries, SMEs in urban areas have better Internet access for operating eBusiness applications..

Most SMEs need to have a defined eBusiness strategy in order to adopt eBusiness applications and hence increase their competitiveness.

Internet access is increasingly available– the crucial issue for small business is to be able to integrate eBusiness applications into their existing business operations.

Best practice in eBusiness applications and the challenges of e-Business has been discussed extensively – for example in Moore (2001). The current status of e-Business applications in Mainland China is described in CNN (2004); CNNIC (2004a); CNNIC (2004b)

Of the many studies on the evaluation of various aspects of eBusiness, such as the adoption of and the effectiveness of eBusiness applications (Barua et al. 2001; Eikebrokk and Olsen 2005; Yeung et al. 2003; Vaidyanathan and Devaraj 2003; Schonberg et al. 2000; Osterwalder and Pigneur 2003). The most relevant for our research is Pather and Remenyi (2003).

In this work, a conceptual model for measuring the effectiveness of eBusiness systems is proposed, based on a combination of user satisfaction and service quality. Our approach is consistent with the model proposed in Pather and Remenyi (2003) in several ways:

We evaluate the effectiveness of eBusiness applications via EIPs on the web by evaluating the services available in the portal and the level of the services provided.

The level of service provision is defined based on a benchmark of widely accepted, successful e-Business applications.

The level of effectiveness in our approach is defined along the same lines of user satisfaction, as described in Pather and Remenyi. (2003) in the sense that we regard successful eBusiness applications as demonstrating a certain level service quality. Gefan (2002) defines service quality as the subjective comparison that customers make between the quality of the services that they want to receive and what they actually get.

3 RESEARCH METHOD AND PROCESS

Overall we used a three-phase approach to the project: in the first phase we determined a set of representative international companies, operating in China, as a benchmark to determine the commonly used eBusiness applications, and as a basis for developing a set of effectiveness evaluation criteria. In the second phase a representative group of Mainland Chinese companies was selected. In the third phase the chosen domestic companies were evaluated against the international benchmarks from different perspectives.

3.1 The Research Method

The overall goal of the study was to evaluate the effectiveness of an industry sector's eBusiness applications, from a user's perspective. Enterprise Information Portals (EIP) (in the broadest sense) were chosen as the means to perform the evaluation, as they provide a common application scope for small, medium and large companies. The Chinese IT sector was chosen as the target for the evaluation because it is the most mature and pervasive eBusiness sector in China.

The focus of this project was to develop and apply a method that will enable a systematic evaluation of any industry sector. Many similar studies have used survey and interview approaches to collect data on the actual application and effect of these applications; other studies discuss classical usability techniques (inspection, enquiry, automated methods) to evaluate the usability of web sites as an indicator of eBusiness success (Head and Hassanein 2002).

Our approach was to establish an initial set of attributes (eBusiness applications), relevant to the sector under study, against which to perform the evaluation. A set of grading criteria was established for each application, and validated by a panel of eBusiness experts and consultants. The following evaluation process was applied to each EIP:

- Evaluate the EIP on its overall usability, stability, responsiveness, and freedom from errors.
- Compare the EIP with the set of relevant eBusiness applications for the sector. From this, a usage rate was calculated for each application for the sector. This is useful not only for rating of individual companies, but also of a whole sector against international benchmarks.
- The effectiveness of each eBusiness application for each selected company is then evaluated, by actually using the application.

The scaled grading system we developed for evaluating eBusiness effectiveness is consistent with the notion of service quality (Pather et al. 2003). For example, we use a 0 to 5 grading system to mark the evaluation or the perception of using the application. A Grade of 0 marks the absence of the eBusiness application. A grade below 3 indicates the expectation exceeds the perception Grade 3 indicates that the perception matches the expectation and a grade above 3 indicates the perception exceeds the expectation.

Table 1 below shows an example of the grading system. the 6 criteria and associated grades that were applied to the application representing Applications for Online training courses.

Table 1: Evaluation criteria for Online training courses.

Grade	*Criteria*
5	Online application support, online payment when applicable
4	Application form to download, submission by fax or email, prompt and effective reply
3	Slow responding
2	Rarely reply
1	No reply
0	No such option

3.2 The Analysis Method

Based on the evaluation data collected using the method described above, analysis was undertaken in three groupings:

- Evaluation of the overall interface design and website technology of each company in the study
- Evaluation of the usage rate of e-Business applications across different groups of companies in the study.
- Evaluation of the effectiveness of eBusiness applications of each company

The companies were classified according to the following attributes: International/Domestic; Size (small, medium, large); Location (Central, Regional/Leading, Regional). A comparative analysis was then performed on the different groupings. The comparisons were made across the following sample slices: international/domestic, domestic by size, domestic by location, domestic by main business focus within the IT sector.

3.3 The Process

A set of international leading software companies, that also have major operations in Mainland China, were selected for benchmarking against. A set of e-Business applications applicable to all software companies were selected. For each application an effectiveness evaluation framework and set of criteria were established A set of 90 domestic software companies were selected, representing small/medium/large, central / regional-leading / regional, mainland businesses.

The evaluations were carried out on the individual companies and the results analysed and reported on according to the categories described above. The results are therefore useful not only to the individual companies, but also to the region, industry sector and nationally.

4 RESEARCH FINDINGS

90 Software IT companies based in mainland China were evaluated against a set of 40 eBusiness applications that would be expected to be available in a typical eBusiness portal in the software industry. The results were benchmarked against 10 international companies with operations in China. The complete analysis and research findings are presented in the work of Deng et al. (2005).

4.1 Analysis Results

Table 2 below shows a representative set of results, after grouping by size, region or type of company. The highlighted entries represent applications with a usage rate higher than 50% and with an effectiveness rating of 3 or more.

Table 2: Results of the Analysis.

Application	Use	Rating	Satisfaction
Large and public companies			
Organization Introduction	100%	4.3	13
Organization culture	100%	3.6	
News	100%	4.6	
Contact Information	90%	3.3	
Product catalogue and description	100%	4.4	
Services and solutions	80%	3.2	
Introduction of the services and supports	90%	3.6	
Online consultation	60%	2.6	
Online technical communication and support	70%	3.3	
Knowledge and information archives	50%	2.3	
Downloads of drivers, upgrade, patches	80%	3.7	
Frequently asked questions	60%	2.2	
B2C	50%	1.6	
Marketing news	90%	3.8	
Online recruitment	80%	3.7	
Employment policies and organization culture	80%	2.6	
Catalogue and introduction of partners	80%	2.1	
How to be a partner	80%	3.1	
Online application for being a partner	50%	2.1	
Online technical support for partners	50%	2.4	
Business and product information for partners	50%	2.5	
Introduction of training courses	70%	3.1	
Medium and Regional Leading Companies			
Organization Introduction	100%	3.4	4
Organization culture	77%	2.2	
News	100%	3	
Contact Information	90%	2.3	
Product catalogue and description	100%	3.3	
Services and solutions	100%	3.2	
Introduction of the services and support	90%	2.6	
Online consultation	57%	1.7	
Online recruitment	87%	2.6	
Medium and small companies			
Organization Introduction	100%	2.8	0
Organization culture	52%	1.2	
News	92%	2.5	
Contact Information	97%	1.9	
Product catalogue and description	96%	2.8	
Services and solutions	78%	2	
Introduction to services and support	64%	1.5	
Online recruitment	74%	1.9	
All domestic companies			
Organization Introduction	100%	3.1	2
Organization culture	66%	1.8	
News	96%	2.9	
Contact Information	92%	2.1	
Product catalogue and description	98%	3.1	
Services and solutions	86%	2.5	
Introduction of services and support	76%	2.1	
Online recruitment	79%	2.3	
Software companies in central cities			
Organization Introduction	100%	3.2	3
Organization culture	61%	2.2	
News	97%	3	

Contact Information	94%	2.4	
Product catalogue and description	97%	3.2	
Services and solutions	85%	2.6	
Introduction of services and support	64%	1.9	
Online recruitment	76%	2.5	
Companies in the central and west region			
Organization Introduction	100%	3.1	3
Organization culture	65%	1.3	
News	92%	2.7	
Contact Information	88%	1.5	
Product catalogue and description	96%	2.8	
Services and solutions	85%	2.4	
Introduction of services and support	81%	1.9	
Online recruitment	77%	2.3	
Employment policies and organization culture	54%	1.2	
Catalogue and introduction of partners	50%	0.9	
General purpose Software and Services companies in all regions of mainland China			
Organization Introduction	100	4.3	4
Organization culture	75%	2.5	
News	50%	4	
Contact Information	75%	2.8	
Product catalogue and description	100%	4.3	
Services and solutions	50%	1.8	
Technical white paper and archives	50%	1.8	
Demos and online product demos	50%	2	
Introduction of the services and supports	75%	2.8	
Online consultation	50%	1.8	
Online technical communication and support	50%	2	
Downloads of drivers, upgrade, patches	75%	3.3	
Frequently asked questions	50%	2	
B2C	50%	1.3	
Marketing news	50%	2.3	
Online recruitment	75%	2.5	
Employment policies and organization culture	50%	2	
Catalogue and introduction of partners	75%	1.8	
How to be a partner	50%	2	
Application Software Development companies across all regions			
Organization Introduction	99%	3.4	3
Organization culture	63%	1.8	
News	97%	3	
Contact Information	94%	2.5	
Product catalogue and description	97%	3.3	
Services and solutions	83%	2.5	
Introduction of services and support	80%	2.3	
Online recruitment	80%	2.5	
Catalogue and introduction of partners	57%	1.1	

4.2 Analysis of Findings

Domestic companies have satisfactory performance on interface design and website technology, indicating they rank these factors highly, and have the capability to achieve a satisfactory result.

There is a big difference in the effectiveness of the applications between domestic and international companies, especially on the level and effectiveness of the applications.

The applications that are used widely and relatively more effectively are those common eBusiness applications that do not require a high level of technical support, such as introduction of products and services, news, product catalogues and descriptions, service and solution introduction, basic descriptions of customer service and support, product white papers, software upgrade and patch downloads and online recruitment. Although domestic large and public companies are starting to use applications such as online partner collaboration, online marketing, online education and training, the

level and effectiveness of such applications are still low.

Generally, there are some eBusiness applications with high usage rate but with poor effectiveness. For domestic large and public companies, such items are mainly more advanced e-Business applications such as customer support, B2C, Partner related applications. This indicates that such applications are well regarded but are not developed or deployed effectively. Medium and small companies and central and western region companies mainly employ common eBusiness applications such as product related, organization information and online recruitment applications. The level and effectiveness of the essential eBusiness applications of these companies are still low. Other points worth noting are:

- From a size perspective, large and public companies have the highest level of eBusiness applications.
- General purpose software companies and service oriented companies have the highest level of applications.
- Medium and small companies and companies in central and western regions have the lowest level of eBusiness applications
- Compared with other types of IT companies, companies in the domain application development and service area have the lowest eBusiness capability.

Overall, we confirm that there is a large gap in the effectiveness of overall domestic eBusiness applications compared with best practice (leading international companies). The difference is often at the level of 2 grade points.

We confirm the common understanding that large domestic companies usually perform better than medium and small companies; however the difference is not as great as between large mainland Chinese domestic companies and international companies

Companies in central cities do not necessarily outperform companies in the eastern region

Overall, companies in the central and western regions have the lowest eBusiness application performance.

5 SIGNIFICANCE AND FUTURE WORK

The IT software sector was chosen as the study group for the application of our eBusiness effectiveness evaluation because it would be expected to lead in the adoption of internet based technology. However the importance of maintaining an effective eBusiness presence, while widely acknowledged, is often not carried through into practice.

e-Business technology is evolving at a rapid rate, and it is important to be able to benchmark against best practice in order to understand the marketplace and to maintain a competitive advantage.

Our evaluation method enables companies to evaluate their capabilities and effectiveness against international and domestic best practice, and to highlight the gaps in their online strategies. At an industry level, this work presents an eBusiness evaluation method and process and the foundation for a set of eBusiness application models that can be applied to different industry sectors.

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