

Communications of the Association for Information Systems

Volume 14

Article 19

October 2004

An E-Readiness Assessment Framework and Two Field Studies

J.H. Huang

Tsinghua University

W. W. Huang

Ohio University, huangw@ohio.edu

C.J. Zhao

Tsinghua University

H. Huang

Bearing Point (China)

Follow this and additional works at: <https://aisel.aisnet.org/cais>

Recommended Citation

Huang, J.H.; Huang, W. W.; Zhao, C.J.; and Huang, H. (2004) "An E-Readiness Assessment Framework and Two Field Studies," *Communications of the Association for Information Systems*: Vol. 14 , Article 19.

DOI: 10.17705/1CAIS.01419

Available at: <https://aisel.aisnet.org/cais/vol14/iss1/19>

This material is brought to you by the AIS Journals at AIS Electronic Library (AISeL). It has been accepted for inclusion in Communications of the Association for Information Systems by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.



AN E-READINESS ASSESSMENT FRAMEWORK AND TWO FIELD STUDIES

J.H. Huang
Tsinghua University

W.W. Huang
Ohio University

huangw@ohio.edu

C.J. Zhao
Tsinghua University

H. Huang
Bearing Point (China)

ABSTRACT

Although e-business is increasingly important to companies competing in global markets, rushed and ineffective implementation of e-business in companies results in valuable resources being wasted without achieving significant tangible benefits. To minimize risks and maximize potential benefits in e-business implementation, a company needs to know to what degree it is ready for e-business and in what aspects it needs to improve itself before implementing e-business.

Although a few e-readiness assessment models are used in practice, relatively little is published in academic research journals on this issue. Further, the current practical e-readiness assessment models are largely based on the experience of e-business implementation in developed countries. Given the key differences between developed and developing countries, e-business implementation in developing countries could be different from that in developed countries. This paper proposes an e-readiness assessment framework from the perspective of developing countries. The assessment framework contains five hierarchical levels, including 67 specific assessment indicators. Two field studies were conducted to illustrate and test the usability of the proposed e-readiness assessment framework in 21 retail companies of China.

KEYWORDS: e-business, e-readiness, assessment framework, and field study.

I. INTRODUCTION

Many companies, including Fortune 100 companies in the USA and medium or small size companies in other parts of the world, invested heavily in e-business during the last decade by setting up commercial Internet websites [e.g., Cheung and Huang, 2002; Cockburn and Wilson, 1996; Liu and Arnott, 2000; Turban, McLean, and Wetherbe, 1999]. However, few

companies reaped tangible commercial benefits from such investments. Some e-business related implementations even ended in disastrous failure [e.g., Heeks, 2001; Kearsley, 1998].

Although, e-business may help an organization gain competitive advantages over their competitors, it unfortunately incurs high level of implementation risk. Companies, therefore, need to know whether they are really ready for implementing e-business before they jump onto the e-business bandwagon. If they are not ready, they may want to know where they should improve themselves so that they will be ready for implementing e-business later on.

Some prior research studied e-business in terms of evaluating commercial websites. Various assessment frameworks and measuring instruments for evaluating commercial websites were proposed from different perspectives [e.g., Aladwani and Palvia, 2002; Barnes and Vidgen, 2001; Lin and Lu, 2000; Liu and Arnett, 2000; Zhang and von Dran, 2002], such as assessing website quality [Barnes and Vidgen, 2001; Loiacono, 2000], end-user computing satisfaction [Harry, 1998], content types used in commercial websites [Cheung and Huang, 2002; Liu et al., 1997; Robbins and Stylianou, 2003], the usability of website design [Nielsen, 1999], and service quality [Xie and Wang, 1998]. All these studies do not directly measure the e-readiness for e-business implementation.

A few e-readiness assessment models are used as a commercial consultation tool in practice. Those models are largely used to evaluate the e-readiness of a country or community, rather than a commercial company in e-business implementation. Further, these e-readiness assessment models, in practice, are constructed based largely upon the experience of e-business implementation in developed countries. Key differences exist between developed and developing countries [Dooley, 2002; UNCTAD, 2002], such as in the availability, cost and quality of information and communication technology (ICT) networks, services and equipment. Hence, e-business implementation in developing countries could be different from that in developed countries. The current study intends to bridge this gap by proposing an e-readiness assessment framework for evaluating a company's e-business implementation from the perspective of a developing country, and testing it in two field studies.

The remaining parts of the paper are organized as follows: Section II reviews prior relevant research papers in the literature. An e-readiness assessment framework is proposed and discussed in Section III. Section IV presents two field studies to illustrate and test the proposed framework that is used to assess the e-readiness in 21 retail companies of China. Research findings and implications are discussed in the final section.

II. LITERATURE REVIEW

THE KEY FACTORS OF SUCCESSFUL E-BUSINESS IMPLEMENTATION

Prior research studied key factors for e-business implementation. Barua et al. [2001] suggest that before implementing e-business, senior managers must understand well the nature of information technology (IT), business processes, and e-business readiness along their business value chain. Further, they should clearly identify e-business drivers in their companies, which include business processes, IT applications (customer orientation, supplier orientation and internal orientation), and systems integration.

Larsen, Tonge, and Roberts [2001] posit that a proper implementation plan is the key factor for successfully implementing e-business. A good plan should cover the following important aspects: the identification of the opportunities for e-business, the identification of the weaknesses in current information systems (IS) applications, working out an effective e-business budget, monitoring an e-business project, evaluating e-business investment, analyzing e-business trends within the industry and the identification of e-business skills training and development. The e-business implementation plan is an indispensable part of a company's e-business development strategy.

Research by Gulati and Garino [2000] indicates that companies should consider their own strengths and weaknesses before making decisions about whether to merely extend their product/service to the Internet, or to build up a completely new e-business on the Internet. Further, companies must consider different reactions of managers, staff, and customers to e-business implementation. A successful e-business implementation should leverage the advantages of traditional marketing channels, without weakening the existing channels. Maruca [1999] claims that whether or not to implement e-business is a question of whether the implementation can strengthen the relationship between firms and their customers, and whether it can explore new markets. The implementation is proper and effective only when it can help a company better serve and maintain its customers.

Feeny [2001] identifies three e-opportunities as key issues in e-business implementation: (1) e-operations, (2) e-marketing, and (3) e-services. All businesses should know how to develop themselves in the three e-opportunity domains before implementing e-business. Willcocks and Plant [2001] propose an e-business framework with four crucial strategic quadrants: (1) technology, (2) brand, (3) service, and (4) market. In practice, a laggard company never makes it past the technology quadrant. On the other hand, leading organizations quickly move beyond the first quadrant. Implementing e-business in the other three quadrants generates to obtain benefits.

PRACTICAL E-READINESS ASSESSMENT MODELS FOR E-BUSINESS IMPLEMENTATION

A comprehensive literature search on assessing the e-readiness of implementing e-business was conducted by searching an SCI/SSCI reference database: Web of Science¹. The search found only two relevant journal papers in this source as of June 2003. Further, only a few e-readiness assessment models are used for commercial consulting purposes in practice. The relevant prior research is reviewed below.

Jutla, Bodorik, and Dhaliwal [2002] present a conceptual model for governments to create and sustain an appropriate climate that facilitates the national adoption of e-business. It suggests six categories of e-business readiness metrics to be used for assessing how a country is performing in terms of providing a positive e-business readiness climate.

Oxley and Yeung [2001] conducted a systematic cross-country analysis of e-commerce/e-business activity. They concluded that although the physical infrastructure explains much of the variation in basic Internet use, e-business activity also depends significantly on a supportive institutional environment. For example, the national respect for the "rule of law" and the availability of credible payment channels such as credit cards are two major factors in the supportive institutional environment. These results suggest that an institutional environment that facilitates the building of transactional integrity is critical to the development of e-commerce/e-business.

These two published journal papers on e-business readiness are from the perspective of public government policies at a country level, rather than from the perspective of private business. Due to key differences between public government sectors and private commercial companies [e.g., Bozeman and Bretschneider, 1986; Caudle, Gorr, and Newcomer, 1991; Rainey, Backoff, and Levine, 1976], their research findings on e-readiness assessment may not be directly applicable to private companies.

¹ In addition to the papers discussed in this section, CAIS published a series of papers in 2003 and 2004 in a series entitled "Globalization and E-Commerce" (Volume 10, articles 1-10). The series assessed e-commerce in 9 countries (but not China), including in most countries, the readiness of the country for e-commerce. Readers are referred to these papers for additional readiness information.

APEC'S E-COMMERCE READINESS ASSESSMENT GUIDE

The Asia-Pacific Economic Cooperation (APEC) was one of the first organizations to work out an e-readiness assessment model [APEC,1997]. The e-Commerce Readiness Assessment Guide frames critical issues for advancing e-commerce across countries in the Asia-Pacific region. The assessment result reflects the e-business implementation status in the region and can be used as a reference in making e-business decision. The Hong Kong government, for example, used this model to assess its e-business readiness in 2000 [Hong Kong, 2000]

The APEC Guide covers six key domains of e-readiness. The Guide includes one hundred indicators, each offering various options of choice in self-assessment. The six domains are –

- the Infrastructure and Technology domain (35 indicators),
- the Access to Necessary Services domain including (24 indicators),
- the Current Level and Type of Use of the Internet domain (12 indicators),
- the Promotion and Facilitation Activities domain (9 indicators),
- the Skills and Human Resources domain (9 indicators), and
- the Positioning for the Digital Economy domain (11 indicators).

The assessment method is qualitative because the choice for one indicator is descriptive and could be more than one. The result of the assessment is the overview of the region's e-readiness, not a comparison to other regions.

COMMERCIAL INDICATORS

Four readiness models used commercially were found. These models are described in Appendix I. They were developed by:

- Harvard University
- MIT
- Cisco
- PricewaterhouseCoopers

Some prior e-business assessment models were proposed to evaluate readiness for a region, or a country, or a community, rather than a business company. Because this paper focuses on assessing e-readiness for individual companies, the Net-ready model of CISCO and the emm@ model of PricewaterhouseCoopers are more relevant to the current study. However, these two e-readiness assessment models contain two major limitations.

1. Some indicators in an e-readiness assessment framework are usually more important than others in terms of influencing e-business implementation. But the two models do not consider this issue in their models²
2. The e-readiness assessment models are proposed mainly based upon the e-business experience in developed rather than developing countries. An e-business model in a developed country may not be directly applicable to a developing country.

Therefore, in the next section, we propose a new e-business assessment model that addresses the two major limitations of the prior models for developing countries.

III. A PROPOSED E-READINESS ASSESSMENT FRAMEWORK

Based on the literature review in Section II, an e-readiness assessment framework for a businesses company is proposed in this section. The model contains three main dimensions:

² In fact, all of the models reviewed do not consider this issue. They assume all assessment indicators are at the same level of importance in influencing e-business implementation. This assumption does not appear reasonable.

- internal needs for e-business,
- external environment, and
- IT diffusion and change management.

These three dimensions are finalized through interviews in China with ten Chief Information Officers (CIOs) in industries and five university professors in e-business related fields. The quantities assessed are shown in Table 1.

Table 1. Quantities Assessed in the Model.

Dimension	Quantity Assessed
Internal Needs for E-Business	Are the goals of the e-business initiative are suitable and effective?
	Do the products or services of a company meet the requirements of e-business?
	Can a company really benefit from implementing e-business?
	Is the overall e-business plan appropriate?
External environment	Does the company's e-business initiative fit well with the whole industry's development?
	Does the a company's value chain fits with the e-business initiative?
IT Diffusion and Change Management	Is the change management of a company ready for and aligned with e-business implementation?,
	Is the IT adoption and diffusion issue is being resolved within a company?

Each dimensions includes several aspects, and one or more issues for a company's e-business. Each issue consists of several indicators that are used specifically to assess the e-readiness of a company's e-business. The proposed e-readiness assessment framework contains 67 indicators. The hierarchy of the proposed framework is shown in Figure 1. Figure 2 shows the top three levels of the framework. The complete e-readiness assessment framework is provided in Appendix II.

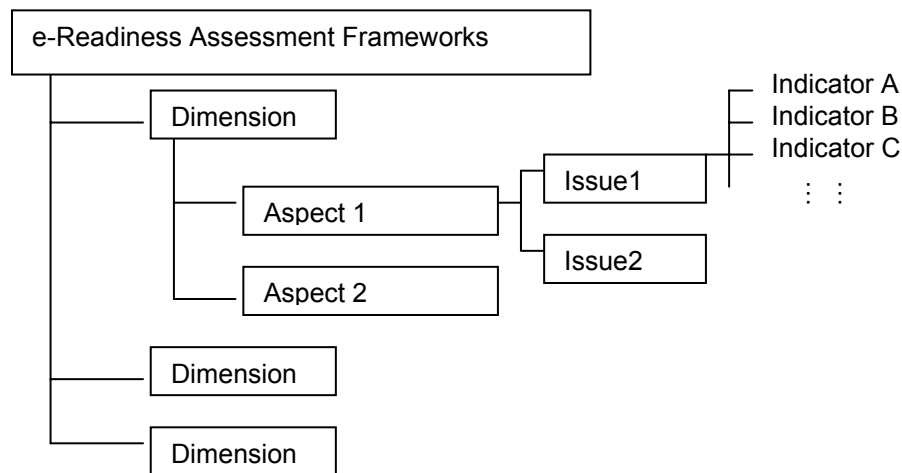


Figure 1. The Hierarchy of e-Readiness Assessment Framework

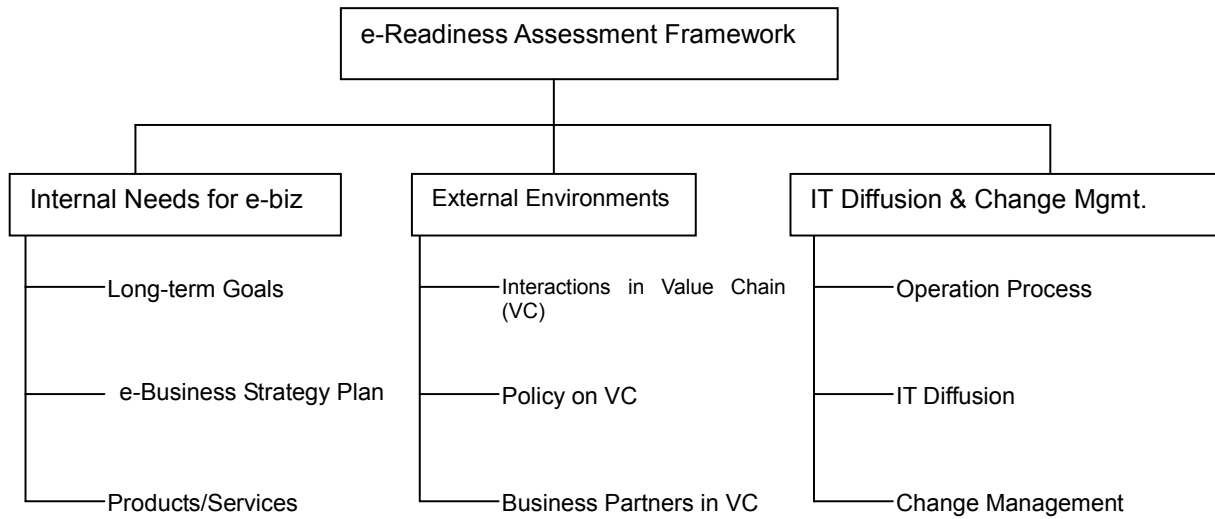


Figure 2. The First Three Levels of the e-Readiness Assessment Framework

Each dimension, aspect, issue, and indicator includes a weight attribute. The weight of the indicators is determined using an Analytic Hierarchy Process (AHP) method [Saaty 1980]³ based upon experts' judgment. Every indicator is a self-assessment statement anchored on a 5 point Likert scale:

1. absolutely no, 2. basically no, 3. neutral, 4. basically yes, and 5. absolutely yes.

For example, for the indicator “the goal of our e-business is to achieve a standardized management practice across our company”, if the answer to this statement is “basically yes”, then the score of the indicator is 4.

The self-assessment creates an assessment score for every indicator. The final e-readiness score is calculated based on the weight that is determined by the AHP method.

A matrix E is set up to carry out the paired comparisons of the relative magnitude of the assessment elements (i.e., the assessment indicators). Let the matrix E be

³ The AHP method is a methodology used for general-purpose decision making. It was initially developed by Saaty [1980]. In general, AHP provides a ratio scale of relative magnitudes expressed in priority units. The ratio scale is derived from each set of paired comparisons. Then, all of the ratio scale of priorities can be synthesized to determine a ranking of all of the decision alternatives. In this study, AHP is used to determine weights of all assessment elements in the proposed framework.

$$E = \begin{bmatrix} 1 & e_{1l,2l} & \dots & \dots & \dots & \dots & e_{1l,nl} \\ e_{2l,1l} & 1 & \dots & \dots & \dots & \dots & e_{2l,nl} \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & 1 & e_{kl,(k+1)l} & \dots & \dots & \dots \\ \dots & \dots & e_{(k+1)l,kl} & 1 & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ e_{nl,1l} & e_{nl,2l} & \dots & \dots & \dots & \dots & 1 \end{bmatrix}, e_{il,jl} = \frac{e_{il}}{e_{jl}} \quad (1)$$

The matrix shows the paired comparison of construct factor.

If matrix E satisfies the following equation, it is considered as consistent.

$$e_{il,jl} = e_{il,kl} \times e_{kl,jl} \text{ for any } k \quad (2)$$

When E is consistent, the weight vector W, which gives the relative magnitude of the elements, is identical to any one of the columns of E within a normalization factor. Hence, W is the dominant eigenvector of the matrix, namely,

$$EW = nW \quad (3)$$

Further, we set $\lambda_1, \lambda_2, \dots, \lambda_n$ to match the n solutions of

$$EW = \lambda W \quad (4)$$

If matrix E is consistent in equation (3), we can solve the equation to obtain the following result:

$$\lambda^{n-1} \times (\lambda - n) = 0, \quad \text{so } \lambda = 0, \lambda = n \quad (5)$$

$$\lambda_{\max} = n \quad (6)$$

Therefore, $EW = \lambda_{\max} W$ (7)

$$C. I. = (\lambda_{\max} - N) / (N - 1) \quad (8)$$

C.I. is the consistency index. The lower the consistency index, the higher the consistency of the paired comparison matrix.

Further, we can normalize W using

$$\sum w = 1 \quad (9)$$

and use equation (9) to obtain the weight of each factor for every construct.

α_i is set to represent the absolute magnitude of the construct,

$$\alpha_i = \sum w_{il} \times e_{il} \quad (10)$$

Repeating the analysis from equation (1) to equation (10), we can determine the weight of each construct or assessment indicator.

The final e-readiness assessment scores can be described graphically using a vector [x, y, z], as shown in Figure 3.

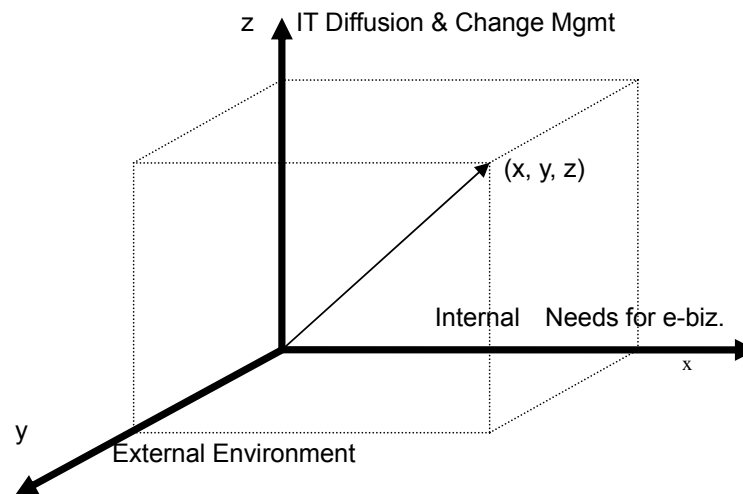


Figure 3. An E-Readiness Vector

IV. TWO FIELD STUDIES USING THE E-READINESS ASSESSMENT FRAMEWORK

Two field studies were conducted to illustrate and test the usefulness of the proposed e-readiness assessment framework. In the first field study, the e-readiness framework was applied to the Xiang Jiang Furniture Group, the biggest furniture chain company in mainland China, headquartered in Shenzhen City, which borders Hong Kong. After the successful assessment of Xiang Jiang's e-business readiness, the second field study was conducted. This time, 20 large retailing companies in China were assessed using the e-readiness framework to test the usability of the proposed framework further.

FIELD STUDY I: ASSESSING THE E-READINESS OF XIANG JIANG FURNITURE GROUP

The Xiang Jiang Group was chosen for the first assessment because:

1. It is a private company, not a state-owned enterprise (SOE)⁴ Therefore, it is not a large bureaucratic organizational system. It should be able to adopt and use the proposed e-readiness assessment framework.
2. The top management is ambitious and open-minded. The CEO, Miss Zai, received her EMBA degree from a U.S. university and her CIO, Dr. Geng, received his PhD degree from a U.S. university as well. They are both committed to developing e-business to expand their core businesses further not only in mainland China, but also in regional countries and other parts of the world. Strong support from the top management is, we believe, a key to the success of applying the e-readiness assessment framework to a real business company.

The Xiang Jiang Furniture Group was incorporated in Shenzhen City in the early 1990s. Within only 10 years, it grew into to the biggest and most successful furniture retailing company in mainland China. So far, it operates retail outlets in Beijing, Shanghai, Tianjin, Guangzhou, and

⁴ China is in the process of transitioning from a centrally controlled and planned economy into a market-oriented economy. It still includes many SOEs that are controlled and managed by the government

thirty other large cities in mainland China. Their main business is to sell home and office furniture. From the perspective of organizational structure, Xiang Jiang is still a typical traditional Chinese family-controlled private business. Leaders in the key departments of the company are either family members of Miss Zai, or her very trusted “fellows” who accompanied her to set up the company initially.

To cope with potentially big challenges in the near future after China joins the World Trade Organization, Xiang Jiang decided to invest heavily in information technology (IT) to help reengineer its business processes within the company. E-business is one of the most viable business strategies for the company. It's IT group purchased and implemented a SAP R/3 ERP system from SAP in 2002.

Our e-readiness assessment project received the full support from Xiang Jiang. Dr. Geng was the coordinator of the project. As a result, we gained access to all needed resources in the company to conduct the assessment. Three levels of related staff within the company – the top management, middle management (department managers) and operational level employees - were invited to join the self-assessment of e-business readiness. Our project team integrated the self-assessment results of the three levels of employees to work out final assessment scores using the AHP method. It took one month to finish the whole assessment.

The project team presented a comprehensive assessment report to the management of Xiang Jiang. Overall, Xiang Jiang was not immediately ready for implementing a comprehensive e-business strategy within its company. However, it could divide its e-business implementation strategy into a few stages. It could start the first stage immediately by setting up a website to publicize its products and services over the Internet and to receive customer feedback around the country. The management was generally satisfied with the assessment result, which was further evidenced by the quick payment of the consultation fee to the project team for the work done. This first field study proved that the proposed e-readiness assessment framework was workable in the business world.

The assessment framework can also provide specific suggestions to a company about what it should improve and in which aspect, so that the company can create a specific to-do list for the future. For example, we found that, although Xiang Jiang is the biggest national furniture retailing company, it had not yet set up a reliable and effective internal control system. Our e-readiness assessment framework was able to identify this weakness, and suggested that Xiang Jiang work out an effective internal auditing and control system before implementing e-business. The company has since implemented the suggestions as specified in the to-do list of the assessment report as a preliminary to implementing its e-business strategy.

Table 2 shows examples of specific weaknesses identified and suggestions provided to Xiang Jiang, based on the e-readiness assessment results.

The successful application of the assessment framework to Xiang Jiang also helped the authors to revise the assessment framework to make it easier for employees to learn and understand.

FIELD STUDY II: ASSESSING E-READINESS FOR 20 MORE LARGE RETAIL COMPANIES IN CHINA

The retail industry is one of the largest industries in China to adopt and use Internet technology in business transactions. Due to relatively limited resources for a developing country like China, not many small or medium-sized retailers possess enough available resources to implement e-business. The follow-up field study was therefore conducted in relatively large and profitable retail companies in China. Twenty such retail companies were randomly chosen and they were all willing to take part in the e-readiness assessment project. Appendix IV lists these 20 companies.

Table 2. The Assessment Scores and Suggestions for Xiang Jiang

Indicator code	Indicator	Score	Suggestions based on the assessment score
IN1-1	e-Business' long-term goals	2.98	<ol style="list-style-type: none"> 1. Invite more people to participate in e-business strategies from relevant departments and units; 2. Further improve e-business strategies and adopt an outsourcing strategy for e-business implementation whenever suitable; 3. Work out Internet marketing and sales strategy; 4. Determine suitable strategic time-line for e-business strategies.
IN2-2	The content of e-Business strategies	2.52	
IN3	Products and services	2.28	<ol style="list-style-type: none"> 5. Work out the data and information standard for implementing customer personalization strategy.
EE1-3	Communication infrastructure of value chain	2.27	<ol style="list-style-type: none"> 6. Help and/or encourage its partners along its value chain to enhance the adoption and diffusion of the usage of IT in their organizations, and prepare for business re-engineering brought by implementing e-business strategies in the near future.
EE3	Capability and intention of business partners	1.39	
IT1-2	Effective motivation and incentive system	2.74	<ol style="list-style-type: none"> 7. Improve current payment system by creating a more effective and transparent motivation and incentive system.
IT2-1	Awareness and understanding of e-business change from enterprise employees	2.04	<ol style="list-style-type: none"> 8. Educate employees to understand e-business and its related key issues, and set up an easy-to-learn e-business dictionary within an organization. 9. Educate employees to understand key concepts and significance of modern management practices and information management.
IT2-3	Employees' knowledge of information technology	2.00	<ol style="list-style-type: none"> 10. Provide a training program to employees on basic knowledge and operation of computer and its related application systems. 11. Provide a training program to employees on basic knowledge of computer networking and Internet technology.
IT2-4	The adoption and diffusion of information technology in organization	1.40	<ol style="list-style-type: none"> 12. The adoption and diffusion of office automation applications; 13. Use local area networks to exchange and transmit data and information within an organization, and use the Internet to transmit and exchange data and information with organizations outside the company; 14. Adopt and use commercial accounting systems to manage financial and accounting transactions; 15. Nurture and establish modern corporate culture within the company.

Following the assessment procedure used in the Xiang Jiang case, we interviewed management executives in the 20 companies including CIOs, managers in information systems departments, managers of e-business projects, senior managers in charge of e-business development

strategies, and ordinary employees. It took about three months to complete this 20 company field study. Table 3 reports the weights of the assessment framework for the internal needs of e-business dimension calculated using the AHP method. The weights were obtained from ten CIOs randomly chosen from the 20 companies and five univer university professors in e-business related areas. The IN columns in Table 3 refer to the complete framework shown in Appendix 2. Similar weight data were established for each of the other companies.

Table 3. Weights for the Internal Needs of E-Business Dimension of the E-Readiness Framework

Dimension	Aspects	Weight	Issues	Weight	Indicators	Weight
Internal Needs for e-Business	IN1	0.58	IN1-1	0.57	IN1-1-1	0.28
					IN1-1-2	0.19
					IN1-1-3	0.05
					IN1-1-4	0.11
					IN1-1-5	0.13
					IN1-1-6	0.11
					IN1-1-7	0.09
					IN1-1-8	0.04
			IN1-2	0.43	IN1-2-1	0.29
					IN1-2-2	0.71
	IN2	0.34	IN2-1	0.49	IN2-1-1	0.46
					IN2-1-2	0.20
					IN2-1-3	0.10
					IN2-1-4	0.13
					IN2-1-5	0.08
					IN2-1-6	0.04
			IN2-2	0.38	IN2-2-1	0.25
					IN2-2-2	0.10
					IN2-2-3	0.24
					IN2-2-4	0.12
					IN2-2-5	0.13
					IN2-2-6	0.17
			IN2-3	0.13	IN2-3-1	0.73
					IN2-3-2	0.27
	IN3	0.08	IN3-1		0.12	
			IN3-2		0.13	
			IN3-3		0.15	
IN3-4				0.15		
IN3-5				0.46		

Table 4 reports the weighted average assessment scores for the three aspects of each dimension of the assessment framework, and their respective standard deviations. This table was derived from the weights (i.e., Table 3) and from the individual assessments shown in Appendix III.

Table 4. Weighted Average Scores and Standard Deviations of the e-Readiness Assessment

Dimension	Aspects	Weighted Average	Standard deviation
Internal Needs for e-business	Long-term Goals	3.02	0.46
	Strategy and Plan	3.48	1.09
	Products and Services	2.86	1.14
External Environment	Interactions in Value Chain	2.95	1.10
	Policy on Value Chain	3.56	0.72
	Business Partner	3.51	1.04
IT Diffusion & Change Management	Operation Process	3.36	0.86
	IT Diffusion	3.07	1.65
	Change Management	2.93	1.33

Figure 4 presents an e-readiness vector {3.16, 3.24, 3.09} that describes the weighted average assessment scores of the three dimensions for the 20 companies (see data in appendix III). Because all the assessment indicators are anchored on a 5 point Likert scale, the vector {5, 5, 5} describes a perfect e-readiness scenario for e-business implementation (i.e., 100% e-readiness), and the vector {3, 3, 3} may be arbitrarily considered as the average e-readiness status. Plotting the company’s measured e-readiness vector (in the form shown in Figure 4) shows the company’s position graphically and indicates how far away its e-readiness is compared to the average e-readiness level and to the perfect e-readiness level. The company will clearly see its own weaknesses and can take actions to bridge the gap for a better e-business implementation.

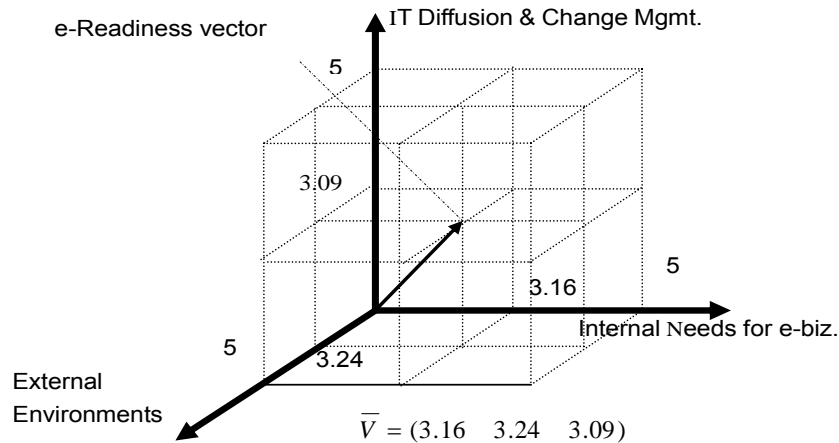


Figure 4. The Readiness Vector of 20 Chinese Retail Companies

V. DISCUSSION AND IMPLICATIONS

The e-readiness assessment results reported in Table 4 indicate the current e-readiness level in terms of implementing e-business in China’s retail industry (more accurately speaking, it describes the current e-readiness status based on a sample of 20 retail companies in China). If we arbitrarily consider the assessment score 3 as the average level of e-readiness, three aspects

in the assessment framework are below the average level: products and services (assessment score: 2.86), interactions in value chain (assessment score: 2.95), and change management (assessment score: 2.93) (see Table 4). Further, other two other aspects are only slightly above the average level: long-term goals (assessment score: 3.02) and operation process (assessment score: 3.07).

The e-readiness assessment results of China's retailing industry can help identify specific key weaknesses (internal and external) of the industry in terms of e-business implementation. Internally, products and services are not well standardized; the operational process is not well re-engineered to meet the requirements of conducting e-business on the Internet; and the change management strategy is not effectively worked out to meet the challenges of new e-business. Externally, there are still a lot of things that need to be done to improve interactions and communications with business partners along the business value chain. As a result, the assessment results could also identify the specific weaknesses for the companies to improve themselves to implement e-business successfully in the future.

Although the e-business concept is known to CEOs and/or managers in China's larger retail companies because is widely discussed in TV and newspapers, its importance and business value may not be fully understood and accepted by CEOs and managers of the companies assessed. As a result, the e-business implementation is not recognized by them as important to long-term business goals. The national information infrastructure and the technological basis for e-business, is relatively primitive compared to many developed countries. The majority of business transactions in China could likely still be conducted in traditional physical markets rather than e-business markets in the next 5 to 10 years. This situation may explain why CEOs and managers in China's retail industry do not consider e-business implementation as important to their companies' long-term goals.

In summary, the e-readiness assessment on the 20 large Chinese retail companies indicated that the retail industry is not quite ready for e-business implementation. It also helped identify specific areas where the industry should improve itself.

VI. CONCLUSION

This study proposes an e-readiness assessment framework specifically from the perspective of developing countries. It adopted the Analytic Hierarchy Process as the method to determine the weights of the assessment indicators. AHP is not used in previous assessment models. Further, two field studies were conducted to demonstrate and test the usefulness of the proposed assessment framework. The assessment framework helped identify specific weak areas for the companies to improve in order to get ready for better e-business implementation in the future. Specific suggestions on how to improve identified weaknesses in e-business implementation were accepted by the companies assessed in the two field studies and are currently being implemented.

Based on our findings, we recommend that companies should not jump hastily onto the e-business bandwagon to reap e-business benefits within a short time period. This approach may lead to the failure of their e-business implementation in the end. Instead, they should use the e-readiness assessment framework to do a thorough self-assessment before investing heavily in e-business. In this way, a company could not only reduce the total cost of implementing e-business but also increases the likelihood of successful e-business implementation.

A limitation of the current study is that the research budget constraint limited the assessment sample to 21 retail companies in China in the two field studies. This sample may not adequately represent China's retail industry. On the other hand, the purpose of the field studies is to demonstrate and test the usefulness of the proposed e-readiness assessment framework in real business companies, not to conduct a comprehensive survey to determine the e-readiness of China's whole retail industry.

Future studies can improve the proposed e-readiness assessment framework.

1. More companies in China's retail industry can be added to do the e-readiness assessment. In particular, smaller and medium sized companies should be added into the assessment sample, so that the assessment results represent the e-readiness level of China's entire retail industry.
2. The weighted average assessment scores of the sampled companies may be considered as the benchmarking scores for the industry. In this way, each company in China's retail industry could benchmark its own e-readiness assessment scores against the industry's average ones. It may help companies effectively identify weak areas of e-business implementation for future improvement.
3. Once more e-readiness assessment data are available, a new method such as the neural network method, may be used to determine the weights of the indicators in the assessment framework more accurately. In this way, the accuracy of the e-readiness assessment framework may be enhanced further in the future.

ACKNOWLEDGEMENTS

We thank the National Science Foundation of China (7997008, 70231010, and 70321001) and Key Laboratory of Information Management and Information Economics, Ministry of Education P.R.C ,which partly supported the work.

Editor's Note: This article is based on a paper presented at the American Conference on Information Systems (AMCIS) 2003. It was received on March 8, 2004 and was with the authors for 3 months for 2 revisions. It was published on September __, 2004

REFERENCES

EDITOR'S NOTE: The following reference list contains the address of World Wide Web pages. Readers who have the ability to access the Web directly from their computer or are reading the paper on the Web, can gain direct access to these references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
3. the authors of the Web pages, not CAIS, are responsible for the accuracy of their content.
4. the author of this article, not CAIS, is responsible for the accuracy of the URL and version information.

Aladwani, A.M. and P.C.Palvia (2002) "Developing and Validating an Instrument for Measuring User-Perceived Web Quality", *Information & Management*, 39(6),pp.467-476.

APEC,(1997) APEC E-Commerce Readiness Initiative, http://www.internetpolicy.net/readiness/readiness_guide_5.pdf

- Barua, A. et al (2001) "Driving E-Business Excellence", *MIT Sloan Management Review*, 43(1), pp.36-44.
- Barnes, S.J. and R.T. Vidgen (2001) "An Evaluation of Cyber-Bookshops: The WebQual Method", *International Journal of Electronic Commerce*, 6(1), pp.11-30.
- Bozeman, B. (2000) *Bureaucracy and Red Tape*. Upper Saddle River, NJ: Prentice Hall.
- Bozeman, B. and S. Bretschneider (1986) "Public Management Information Systems: Theory and Prescription", *Public Administration Review*, Special Issue, pp. 47-487.
- Caudle, S.L., W.L. Gorr and K.E. Newcomer (1991) "Key Information Systems Management Issues for the Public Sector", *MISQ*, Volume 15 (2), pp. 171 – 188.
- Cheung, W.M. and W. Huang (2002) "An Investigation of Commercial Usage of the World Wide Web: A Picture from Singapore", *International Journal of Information Management*, 22(5), pp.377-388
- Cockburn, C. and T. D. Wilson (1996) "Business Use of the World-Wide Web", *International Journal of Information Management*, 16(2), pp.83–102.
- Dooley, B.J. (2002) "Telecommunications in India: State of the Marketplace", *Faulkner Information Services*. (Doc Id: 00016872)
- Feeny, D. (2001) "Making Business Sense of the E-Opportunity", *MIT Sloan Management Review*, 42(2), pp.41-51.
- Gulari, R. and J. Garino (2000) "Get the Right Mix of Bricks and Clicks", *Harvard Business Review*, 78(3), pp.107-114.
- Hartman, A., J. Sifonis, and J. Kador (2000). *Net Ready: Strategies for Success in the Economy*, New York: McGraw-Hill.
- Heeks, R. (2000). *Reinventing Government in the Information Age*, London: Routledge Press.
- Hong Kong (2000) APEC E-commerce Readiness Assessment Guide - A Self-assessment on Hong Kong's Readiness for E-commerce, <http://www.ogcio.gov.hk/eng/archive/pupr2000/eassess.htm>
- Jutla, D., P. Bodorik, and J. Dhaliwal (2002) "Supporting the E-Business Readiness of Small and Medium-sized Enterprises: Approaches and Metrics", *Internet Research-Electronic Networking Applications and Policy*, 12 (2), pp.139-164.
- Kearsley, G. (1998) "Educational Technology: A Critique", *Educational Technology*, 38(2), pp.47-51.
- Kirkman, G.S. et al (2002). *The Global Information Technology Report 2001-2002: Readiness for the Networked World*, London: Oxford University Press.
- Larsen, P., R. Tonge, and M. Roberts (2001). "Exploring IS Planning in High-Growth Medium-Sized Companies", *Journal of General Management*, 26(3), pp.76-87.
- Lin, J.C.C. and H. Lu (2000) "Towards an Understanding of the Behavioral Intention to Use a Web Site", *International Journal of Information Management*, 20(3), pp.197-208.
- Liu, C. and K.P. Arnett (2000) "Exploring the Factors Associated with Web Site Success in the Context of Electronic Commerce", *Information & Management*, 38(1), pp.23-33.
- Liu, C. et al (1997). "Web Sites of the Fortune 500 Companies: Facing Customers through Home Pages", *Information & Management*, 31(6), pp.335-345.

- Loiacono, E.T.(2000) "WebQualtm: A Website Quality Instrument", *Dctoral Dissertation*, College of Business, University of Georgia, Athens, Georgia, USA
- Maruca, R.F.(1999) "Retailing: Confronting the Challenges That Face Bricks-and-Mortar Stores", *Harvard Business Review*, 77(4), pp.159-168.
- Neilson, J.(1999) *Designing Web Usability : The Practice of Simplicity*, Berkeley:New Riders.
- Oxley,J.E. and B.Veung(2001)"E-Commerce Readiness: Institutional Environment and International Competitiveness", *Journal of International Business Studies*, 32(4), pp. 705-723.
- Rainey,H.G.,R.W.Backoff, and C.H.Levine(1976)"Comparing Public and Private Organisation", *Public Administration Review*, March/April 1976, pp.233- 243
- Robbins, S.S. and A.C.Stylianou(2003) "Global Corporate Web Sites: An Empirical Investigation of Content and Design", *Information & Management*, 40(3), 2003, pp.205-212.
- Saaty, T.L. (1980) *The Analytic Hierarchy Process*, New York: McGraw-Hill.
- Siegel, M., F.Haghseta, and S.O'donnell(2002) "Global E-Readiness Opportunities: New Framework and Tools", The Center for E-Business@MIT, Working paper.
- Turban,E., E.Mclean, and J.Wetherbe(1999) *Information Technology for Management (2nd ed)*, New York: Wiley.
- UNCTAD (United Nations Conference on Trade and Development). Accessed September 22, 2002 from <http://stats.unctad.org/index.htm>.
- Willcocks, I. P. and R.Plant(2001) "Getting from Bricks to Clicks", *MIT Sloan Management Review*, 42(3), pp.50-59.
- Xie, M. and H. Wang (1998) "Quality Dimensions of Internet Search Engines", *Journal of Information Science*, 24(5), pp. 365-372.
- Zhang, P. and G.M. Von dran(2001) "User Expectations and Rankings of Quality Factors in Different Website Domains", *International Journal of Eelectronic Commerce*, 6(2),pp.9-33.

APPENDIX I. E-READINESS MODELS FOR COMMERCIAL USE

HARVARD UNIVERSITY'S READINESS FOR THE NETWORKED WORLD

The Center for International Development at Harvard University, working with IBM, developed the "Readiness for the Networked World – a Guide for Developing Countries" model. It describes determinants of a region's, especially a developing country's, readiness for the networked world, and includes a diagnostic tool that systematically assesses e-readiness for a country to implement out more effective policies on e-business (<http://www.readiness.org>, accessed on January 10th, 2004).

This e-readiness assessment model uses five categories with 19 indicators. The five categories are Network Access with six indicators, Networked Learning with three indicators, Networked Society with four indicators, Networked Economy with four indicators, and Network Policy with two indicators. After the assessment, the model neither offers specific advice nor provides an overall assessment score; it only seeks to offer a starting point in an Information and Communication Technology (ICT) planning process for a government.

The Harvard model, like the APEC model in Section II, is proposed to evaluate the e-readiness for a region such as the Asia-pacific region, or a country.

MIT E-READINESS DATA MODEL

The MIT e-readiness research team is developing a new framework and data model for aggregating relevant data into a tool for evaluating e-readiness. The framework is designed to account for the diverse needs of different e-business applications, to highlight alternative paths to e-business, and to clarify the possibilities within different economic contexts [Siegel, Haghseta, and O'Donnel, 2002].

The e-readiness model uses three main dimensions including several measurable components. The three dimensions are the access dimension that is composed of infrastructure (e.g., wireless density, the number of ISPs and services (e.g., telephone prices, postal services), the capacity dimension that is further broken down into three aspects – social (e.g., literacy rate, poverty index), economic (e.g., GDP per capita, number of credit card accounts,), and regulatory/strategic (e.g., telecom competition, openness of trade), and the opportunity dimension that includes applications not yet focused on up to now, such as e-banking, business to business (B2B), business to consumer (B2C), business to government (B2G), consumer to consumer (C2C), and marketing/information search. The main goal of this model is to facilitate the assessment of alternative e-readiness pathways both within and across the three dimensions of e-readiness. The model can also be applied to determine potential paths for the development of a given opportunity within a country. This model, like many others, is more suitable for evaluating the e-readiness of a country.

CISCO'S NET-READY MODEL

Cisco aims to assess the e-readiness of a specific company or organization (Hartman et al., 2000). The purpose of the assessment is to compare companies in e-business with a benchmark and to classify a company into one of the four e-business types. Cisco's Net Readiness Assessment Model is quantitative. It contains four categories: leadership, management, competence of organization and IT diffusion. Each category consists of some assessment indicators.

PRICEWATERHOUSECOOPERS'S EMM@E-BUSINESS MATURITY MODEL

PricewaterhouseCoopers, working with Carnegie Mellon University, developed an assessment framework for e-business, called emm@ E-Business Maturity Model (<http://www.ereadiness.pwcglobal.com/>, accessed on January 10th, 2004).

The emm@ model uses nine domains, each with ten assessing indicators. The domains are strategy; organization and competencies; performance management; delivery and operations; value network processes; security and privacy; systems; technology; tax and legal. When a company assesses its e-business readiness, it must choose one of the three options provided for each assessing indicator according to its current status. The three options are "not done, in progress, or done". Options are assigned values "0", "50" and "100" respectively.

One of the main problems for this model is that the three options ("not done, in progress, or done"), which may not reflect the real situation of a company's e-readiness. For example, if an assessing indicator is chosen as "done" for a company, does it mean that it is done successfully, or simply being done but not successfully? This assessment model cannot address this problem that is likely to exist in companies.

In summary, although the above e-readiness assessment models in practice are proposed from different perspectives and for different purposes, they all have the following similar characteristics:

- A systematic and operational set of measurable indicators
- A hierarchical assessment structure
- Able to do a self-assessment

APPENDIX II. THE COMPLETE ASSESSMENT FRAMEWORK

The Internal Needs for E-Biz (IN)

IN1 Enterprise's Long-term Goals

IN1-1 The necessity of e-business

IN1-1-1 The goal of e-business is to increase the efficiency of operation and to decrease cost

IN1-1-2 The goal of e-business is to achieve standardized management

IN1-1-3 The goal of e-business is to achieve transparent operation

IN1-1-3 The goal of e-business is to achieve real-time control

IN1-1-4 The goal of e-business is to enhance the buy/sell channel

IN1-1-5 The goal of e-business is to support data mining or decision support

IN1-1-6 The goal of e-business is the value chain partners' requirements

IN1-1-7 The goal of e-business is not to catch up with new technology but to match the assured needs

IN1-2 The position the enterprise located in the value chain

IN1-2-1 The enterprise is very close to the end consumers

IN1-2-2 The e-business of the enterprise is clearly positioned in the Internet economy

IN2 E-Business Strategy Plan

IN2-1 The Leaders Participating E-B Strategy Planning

IN2-1-1 Chief executives are involved in E-B strategy planning

IN2-1-2 Financial/account executives are involved in E-B strategy planning

IN2-1-3 Production executives are involved in E-B strategy planning

IN2-1-4 Management Information Systems/IT executives are involved in E-B strategy planning

IN2-1-5 Marketing executives are involved in E-B strategy planning

IN2-1-6 Human resource executives are involved in E-B strategy planning

IN2-2 The content of an e-Business strategies

IN2-2-1 The enterprise established an e-business strategy according to its products' characteristic

IN2-2-2 The enterprise established an e-business outsourcing or integration strategy according its own characteristic

IN2-2-3 The enterprise established an e-business trust strategy

IN2-2-4 The enterprise established an e-business customer relationship management strategy

IN2-2-5 The enterprise established an e-business marketing strategy

IN2-2-6 The enterprise established an e-business federation/partner strategy

IN2-3 E-business strategy plan's adjusted cycle and the time period it covers

IN2-3 -1 The e-business strategy plan is reviewed and adjusted at least annually

IN2-3 -2 The e-business strategy plan covers a time period of 1 to 3 years

IN3 Products/Services

IN3-1 The brand extends to the Internet.

IN3-2 The extent of product information standardization

IN3-3 The extent of product customization

IN3-4 Standardized customized product information

IN3-5 The customers think that the standardized data can reflect all the information of the product.

The External Environments (EE)

EE1 Interactions in Value Chain

EE1-1 The ability of the enterprise to control other business partners

- EE1-1-1 The enterprise has enough ability to overcome the resistance from other business partners
- EE1-1-2 Other business partners' businesses largely rely on the enterprise's business
- EE1-2 The terminology of the value chain can be coded without description
- EE1-3 Communication infrastructure of value chain
 - EE1-3-1 Business partners are highly informed
 - EE1-3-2 It is very easy to convert the communication methods from traditional telephone and fax to digital communication
 - EE1-3-3 The enterprise has built a portal on the internet.
- EE2 Policy on Value Chain
 - EE2-1 Well-defined information-sharing policies with suppliers
 - EE2-2 Standard purchasing procedures
 - EE2-3 Clear supplier selection criteria
 - EE2-4 Well-defined supplier evaluation criteria
 - EE2-5 Well-defined treaty for monitoring supplier quality
- EE3 Capability and intention of partners
 - EE3-1 The value chain partners have built or planed to build a web-based system to do transaction
 - EE3-2 The value chain partners are willing and able to share information electronically
 - EE3-3 The value chain partners are willing and able to correspond and communicate using Internet and information technology
- IT Diffusion & Change Management(IT)
- IT1 Operation Process
 - IT1-1 The transparent evaluation and motivation system
 - IT1-1-1The system's operation process is open to all the employees
 - IT1-1-2 The employees can access their record at any time
 - IT1-2 The effective motivation and incentive system
 - IT1-2-1 The employee knows their tasks and has their own measurement to this task
 - IT1-2-2 The employee can improve their measurement by daily contribution to the enterprise's goal
 - IT1-2-3 The employee knows their work is crucial and indispensable by the measurement
- IT2 IT Diffusion
 - IT2-1 Awareness and understanding of e-business change from enterprise employees
 - IT2-1-1 All of the employees know the goal of e-business transformation
 - IT2-1-2 All of the employees know the value which e-business transformation brings
 - IT2-1-3 All of the employees know the transformation that achieves the goal
 - IT2-1-4 There is no difference between top managers and employees in understanding the e-business transformation
 - IT2-1 -5 The enterprise has built or planned to build an e-business terminology dictionary for all of the employees
 - IT2-2 Information management infrastructure
 - IT2-2-1 The enterprise has a separate IT department
 - IT2-2-2 The enterprise has built or planned to build a LAN/WAN across all the whole enterprise
 - IT2-2-3 Computer terminals are on every desk of the enterprise
 - IT2-3 Employees' knowledge of information technology
 - IT2-3-1 Top managers and employees are very familiar with common computer operations
 - IT2-3-2 Top managers and employees are very familiar with the network
 - IT2-4 The adoption and diffusion of information technology in organization

- IT2-4-1 Office automation applications such as Microsoft Office are widely used.
- IT2-4-2 Office communication applications such as Outlook or Lotus Notes are widely used.
- IT2-4-3 Financial management uses formal financial application software instead of manual work
- IT2-4-4 Enterprise's documentation is electronically transported

IT3 Change Management

- IT3-1 There is a management team that is in charge of the e-business project
- IT3-2 The project leader is the leader of the enterprise
- IT3-3 The team consists of the executives from every department
- IT3-4 During the e-business transformation, communication meetings should be held weekly. Information should be synchronized daily during critical period. (e.g. system implementation period)
- IT3-5 The team has the privilege to reallocate any resource of the enterprise

APPENDIX III. AVERAGE LIKERT SCORE FOR THE 20 RETAILERS ASSESSED

Table A3-1. Average Assessments for Internal Needs for e-Business

Dimension	Weight	Aspects	Weight	Issues	Weight	Indicators	Weight
Internal Needs for e-Business	3.16	IN1	3.02	IN1-1	3.57	IN1-1-1	4.00
						IN1-1-2	3.44
						IN1-1-3	2.78
						IN1-1-4	3.67
						IN1-1-5	3.44
						IN1-1-6	3.33
						IN1-1-7	3.00
						IN1-1-8	4.20
				IN1-2	2.29	IN1-2-1	3.00
						IN1-2-2	2.00
		IN2	3.48	IN2-1	4.13	IN2-1-1	4.44
						IN2-1-2	3.89
						IN2-1-3	4.00
						IN2-1-4	4.33
						IN2-1-5	3.11
						IN2-1-6	3.33
				IN2-2	2.68	IN2-2-1	3.33
						IN2-2-2	2.20
						IN2-2-3	1.80
						IN2-2-4	3.60
IN2-3	3.41	IN2-2-5	2.40				
		IN2-2-6	2.80				
IN2-3	3.41	IN2-3-1	3.56				
		IN2-3-2	3.00				

				IN3-1			3.89
				IN3-2			3.22
		IN3	2.86	IN3-3			3.00
				IN3-4			2.89
				IN3-5			2.44

Table A3-2. Average Assessments for External Environment

Dimension	Weight	Aspects	Weight	Issues	Weight	Indicators	Weight
External Environment	3.24	EE1	2.95	EE1-1	3.52	EE1-1-1	3.56
						EE1-1-2	3.44
				EE1-2			2.33
				EE1-3	2.91	EE1-3-1	3.00
						EE1-3-2	3.11
						EE1-3-3	2.60
		EE2	3.56	EE2-1	2.56		
				EE2-2	3.78		
				EE2-3	3.56		
				EE2-4	3.89		
				EE2-5	3.44		
		EE3	3.51	EE3-1	3.13		
				EE3-2	3.75		
				EE3-3	3.75		

Table A-3 Average Assessment for IT Diffusion and Change Management

Dimension	Weight	Aspects	Weight	Issues	Weight	Indicators	Weight
IT Diffusion & Change Management	3.09	IT1	3.36	IT1-1	3.07	IT1-1-1	2.89
						IT1-1-2	3.33
				IT1-2	3.70	IT1-2-1	4.00
						IT1-2-2	2.78
						IT1-2-3	3.67
				IT2	3.07	IT2-1	2.79
		IT2-1-2	2.78				
		IT2-1-3	3.44				
		IT2-1-4	2.44				
		IT2-1-5	2.00				
		IT2-2	3.94			IT2-2-1	4.22
						IT2-2-2	3.89
				IT2-2-3	3.67		

				IT2-3	2.94	IT2-3-1	2.89
						IT2-3-2	3.00
				IT2-4	3.52	IT2-4-1	4.56
						IT2-4-2	2.67
						IT2-4-3	3.78
						IT2-4-4	2.89
				IT3	2.93	IT3-1	2.44
						IT3-2	3.44
						IT3-3	3.11
						IT3-4	2.33
IT3-5	2.78						

APPENDIX IV. RETAIL COMPANIES ASSESSED

Beijing Xidan Commercial Holding Co. Ltd.	Yansha Wangjing Wholesale Warehouse
Suning Group Company	Lufthansa Shopping Center
White Goating Supermarket	Beijing North Star Shopping Center
Beijing Modern Plaza	Beijing Blue Island Tower
Scitech Group Co. Ltd.	Beijing Cuiwei Tower
Beijing Book Building	Caishikou Department Store Co. Ltd.
IKEA , Beijing	Fuxing Shopping Center
Beijing Hualian Department Store Co, Ltd.	Beijing Chi Ang Trade Co. Ltd.
Beijing Wangfujing Department Store (Group) Ltd.	Beijing Guomei Electric Appliance Co. Ltd.
Beijing Friendship Store	Shanghai Jiabao Industry & Commerce (group) Co. Ltd.

ABOUT THE AUTHORS

Dr. Jinghua Huang is Associate Professor and Deputy Chair of Department of Management Science and Engineering, School of Economics and Management, Tsinghua University. She conducted her research at Sloan School of MIT and University of Waterloo as a visiting scholar. In 1997, she spent one year in University of Illinois as the Fulbright Scholar. Her main research interests include electronic business, decision support systems, and information systems analysis. Her papers appear in *Computers & Industrial Engineering*, *IEEE International Conference on Systems, Man and Cybernetics*, *IEEE International Conference on Web Intelligence*, *World Multiconference on Systemics, Cybernetics and Informatics*. She is the author of seven books in Chinese.

Wayne W. Huang is Associate Professor of MIS at the College of Business, at Ohio University. He was formerly a member of the faculty at universities in Australia, Singapore, and Hong Kong. His main research interests include Group Support Systems (GSS), electronic commerce, eLearning, knowledge management systems, and software engineering. He is the author of more than 70 papers in journals such as *Journal of Management Information Systems*, *IEEE Transactions on Systems, Man, and Cybernetics*, *Information & Management (I & M)*, *IEEE Transactions on Professional Communication*, *Decision Support Systems*, *International Journal of Global Information Management (JGIM)*, and the *European Journal of Information Systems*. He is

on the editorial board of three IS journals: *Information & Management*, *Journal of Global Information Management*, and *Journal of Data Management*.

Chunjun Zhao is Dean of School of Economics and Management, Tsinghua University. He is Professor of Management Science and an expert in Management Education. He spent 2 years as the visiting scholar and researcher in the International Institute for Applied Systems Analysis (IIASA) in Austria and . a year in MIT Sloan School and The Wharton School of University of Pennsylvania as a Fulbright Scholar to conduct the research on American management education. His main research interests include decision support systems, electronic commerce, management education, and complex system. He published more than 60 academic research papers and 10 books in Chinese.

He Huang is a consultant for BearingPoint, China. His main interests include IT strategy, IT transition planning, and SI/EAI. He participated in such projects as China Telecom System Integration Pilot, China Mobile BPR and IT Planning, and China Telecom Order Management System based on EAI.

Copyright © 2004 by the Association for Information Systems. Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and full citation on the first page. Copyright for components of this work owned by others than the Association for Information Systems must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers, or to redistribute to lists requires prior specific permission and/or fee. Request permission to publish from: AIS Administrative Office, P.O. Box 2712 Atlanta, GA, 30301-2712 Attn: Reprints or via e-mail from ais@aisnet.org



Communications of the Association for Information Systems

ISSN: 1529-3181

EDITOR-IN-CHIEF

Paul Gray

Claremont Graduate University

AIS SENIOR EDITORIAL BOARD

Detmar Straub Vice President Publications Georgia State University	Paul Gray Editor, CAIS Claremont Graduate University	Sirkka Jarvenpaa Editor, JAIS University of Texas at Austin
Edward A. Stohr Editor-at-Large Stevens Inst. of Technology	Blake Ives Editor, Electronic Publications University of Houston	Reagan Ramsower Editor, ISWorld Net Baylor University

CAIS ADVISORY BOARD

Gordon Davis University of Minnesota	Ken Kraemer Univ. of Calif. at Irvine	M.Lynne Markus Bentley College	Richard Mason Southern Methodist Univ.
Jay Nunamaker University of Arizona	Henk Sol Delft University	Ralph Sprague University of Hawaii	Hugh J. Watson University of Georgia

CAIS SENIOR EDITORS

Steve Alter U. of San Francisco	Chris Holland Manchester Bus. School	Jaak Jurison Fordham University	Jerry Luftman Stevens Inst. of Technology
------------------------------------	---	------------------------------------	--

CAIS EDITORIAL BOARD

Tung Bui University of Hawaii	Fred Davis U. of Arkansas, Fayetteville	Candace Deans University of Richmond	Donna Dufner U. of Nebraska - Omaha
Omar El Sawy Univ. of Southern Calif.	Ali Farhoomand University of Hong Kong	Jane Fedorowicz Bentley College	Brent Gallupe Queens University
Robert L. Glass Computing Trends	Sy Goodman Ga. Inst. of Technology	Joze Gricar University of Maribor	Ake Gronlund University of Umea,
Ruth Guthrie California State Univ.	Alan Hevner Univ. of South Florida	Juhani Iivari Univ. of Oulu	Claudia Loebbecke University of Cologne
Munir Mandviwalla Temple University	Sal March Vanderbilt University	Don McCubbrey University of Denver	Emmanuel Monod University of Nantes
John Mooney Pepperdine University	Michael Myers University of Auckland	Seev Neumann Tel Aviv University	Dan Power University of No. Iowa
Ram Ramesh SUNY-Buffalo	Maung Sein Agder University College,	Carol Saunders Univ. of Central Florida	Peter Seddon University of Melbourne
Thompson Teo National U. of Singapore	Doug Vogel City Univ. of Hong Kong	Rolf Wigand Uof Arkansas, Little Rock	Upkar Varshney Georgia State Univ.
Vance Wilson U. Wisconsin, Milwaukee	Peter Wolcott Univ. of Nebraska-Omaha		

DEPARTMENTS

Global Diffusion of the Internet. Editors: Peter Wolcott and Sy Goodman	Information Technology and Systems. Editors: Alan Hevner and Sal March
Papers in French Editor: Emmanuel Monod	Information Systems and Healthcare Editor: Vance Wilson

ADMINISTRATIVE PERSONNEL

Eph McLean AIS, Executive Director Georgia State University	Samantha Spears Subscriptions Manager Georgia State University	Reagan Ramsower Publisher, CAIS Baylor University
---	--	---