

Association for Information Systems

**AIS Electronic Library (AISeL)**

---

ICEB 2002 Proceedings

International Conference on Electronic Business  
(ICEB)

---

Winter 12-10-2002

## **Multiple Phases of Adopting Extranet by Business Networks: A Study of Plastics Industry in Taiwan**

James K.C. Chen

Eldon Y. Li

Follow this and additional works at: <https://aisel.aisnet.org/iceb2002>

---

This material is brought to you by the International Conference on Electronic Business (ICEB) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICEB 2002 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# Multiple Phases of Adopting Extranet by Business Networks: A Study of Plastics Industry in Taiwan

James K.C. Chen

Johnway Industrial Co., Ltd G. Manager  
johnway@ms33.hinet.net

Eldon Y. Li

Orfalea College of Business  
California Polytechnic State University  
eli@calpoly.edu

## Abstract

Extranet has received growing popularity among business-to-business trading partners today. It has been used to reduce delivery lead-time and improve customer service. The inter-organization nature of Extranet, coupled with the omnipresence of Internet, create competitive advantages for a company over those who do not have Extranet linkage. This study investigates the factors affecting the adoption of Extranet in rubbers and plastics industry. The results reveal that "characteristics of end user" is the most importance factor affecting the adoption. The other significant factors include the characteristics of business itself, degree of understanding new technology, the characteristics of business network, and the support of top management.

## 1. Introduction

Electronic network linkages in the value chain have fundamentally changed the nature of inter-organizational relationships (McIvor et al., 2000). Many companies today are sharing their information resources through a competent network infrastructure, known as the Extranet. Internet has been commonly known as the first revolution of network, followed by Intranet and Extranet. More and more businesses are redesigning their internal structure and their external relationships, creating value chain networks to facilitate improvement of information quality, communication of data, and knowledge, while improving coordination, planning, and decision making (Warkentin et al., 2001). Under today's dynamic business environment, competitive pressures are forcing companies to take necessary actions on compressing time between each stage of the value chain and achieving costs down (McIvor et al., 2000). Many companies have utilized information technology to create competitive advantages (Bakos and Treacy, 1986; Cash, et al., 1992. Ives and Learmonth, 1984). They have been upgrading their enterprise information systems to improve the efficiency and the effectiveness of supply chain networks. The inter-organization nature of Extranet has made it a vital vehicle for maintaining these networks. In this study, we first identify the potential factors affecting the adoption of Extranet. Through factor analysis and discriminant

analysis, these factors are tested for their significant effects. Finally, conclusion and recommendation for managers are presented.

## 2. The Research Methodology

### 2.1 Research Model

Through the review of related literature, we have developed a research model as indicated in Figure 1.

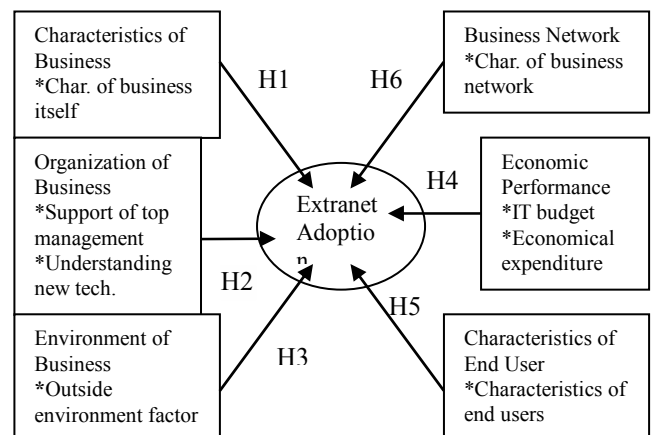


Figure 1. Research Model

### 2.2 Research hypothesis

Following the research model in Figure 1, we have formulated six hypothesis.

H1: The characteristics of business affect the adoption of Extranet in an enterprise.

H2: The organization of business affects the adoption of Extranet in an enterprise.

H2a: The support of top management affects the adoption of Extranet in an enterprise.

H2b: Understanding new technology affects the adoption of Extranet in an enterprise.

H3: The environment of business affects the adoption of Extranet in an enterprise

H3a: Outside environment factor affects the adoption of Extranet in an enterprise.

H3b: Outside environment threat affects the adoption

of Extranet in an enterprise.

H4: The economic performance of business affects the adoption of Extranet in an enterprise.

H4a: IT budget affects the adoption of Extranet in an enterprise.

H4b: Economical expenditure affects the adoption of Extranet in an enterprise.

H5: Characteristics of end user affect the adoption of Extranet in an enterprise.

H6: Business network affects the adoption of Extranet in an enterprise.

### 3.3 Data Analyses and Hypothesis Tests

This section utilizes difference analyses to test the hypotheses and reports the results.

#### 3.3.1 Different Discriminant functions

In addition to the discriminant loading, we further utilize profile group difference, discriminate weight, and individual discriminate weight to contrast the findings and identify the most significant factor determining the adoption of Extranet. Table 4 shows that “Characteristics of end user” is the most significant factor.

**Table 4. Summary of methods used in this study**

Method	Criterion	Results
Profile group difference	The difference of variable mean	Understanding new technology
Loading	The weight of loading values	Characteristics of end user
Discriminate Weight	The amount of Weight values	Characteristics of end user
Individual Discriminate Weight	The difference of variable mean	Characteristics of end user

#### 3.3.2 The Accuracy of Discriminant Function

In order to examine the accuracy of the discriminant function, 50 (33.3%) respondents were held out as for validation purpose. The remaining 100 respondents are use as the training sample to derive the discriminant function. Table 5 indicates that the resulting discriminant function is able to classify correctly 80% of the held-out sample. This value (0.80) is larger than the threshold ( $C_{pro} \times 1.25 = 0.545$ ) recommended by Hair et al. (1995). Therefore, the discriminant function we derived in this study has significant discriminant power.

**Table 5. The accuracy of discriminant function**

Training sample				Held-out sample			
Not adopt		Adopted		Not adopt		Adopted	
Summary				Summary			
Not adopt	<b>36</b>	22	58	Not adopt	<b>28</b>	6	34
Adopted	11	<b>31</b>	42	Adopted	4	<b>12</b>	16
Overall accuracy = <b>67%</b>				Overall accuracy = <b>80%</b>			

## 4. Discussion

This study focuses on rubbers and plastics

relationship industries that there are a lots of factors of itself and influence to adopt Extranet. Following these influence factors to do discussion.

### 4.1 Character of business

The result was displayed on adopt extranet, characteristic of business, understanding new technology and characteristic of end user that these functions enable to keep heavy discrimination power. But the characteristic of business network and support of top management that two items functions to adopt extranet also to keep significations discrimination effect (see figure 2). The enterprise dependents IT more heavy than technology efficiency was powerful. Opposite, the others efficiency is weak (Applegate et al., 1996). Following in analysis data have got characteristic of business to adopt extranet discriminate effectiveness p-values is 0.0032 that less standard values 0.05, the result is supported H1 hypothesis.

### 4.2 Business organization

Asano (1989) at his research have argued many enterprise executive e-business technology there are signification difference of development. In this data also examine literature view point, the support of top management affects the adoption of Extranet in an enterprise. It's p-values is 0.0223. Pinto and Mantel (1990) have expressed administrator and end-user low ideals and acknowledges to IT, it should be influence enterprise adopting IT. This analysis data have developed that understanding new technology affects the adoption of Extranet in an enterprise. The p-values is 0.0016 to keep more discriminate power. This result is supported H2 hypothesis (see table 6).

**Table 6. Results of Hypothesis Testing**

Hypothesis	p-Value	Test Result
H1: The characteristics of business affect the adoption of Extranet in an enterprise.	0.0032	Supported
H2: The organization of business affects the adoption of Extranet in an enterprise.	N/A	Supported
H2a: The support of top management affects the adoption of Extranet in an enterprise.	0.0223	Supported
H2b: Understanding new technology affects the adoption of Extranet in an enterprise.	0.0016	Supported
H3: The environment of business affects the adoption of Extranet in an enterprise	N/A	Not supported
H3a: Outside environment factor affects the adoption of Extranet in an enterprise.	0.0868	Not supported
H3b: Outside environment threat affects the adoption of Extranet in an enterprise.	0.0709	Not supported

H4: The economic performance of business affects the adoption of Extranet in an enterprise.	N/A	Not supported
H4a: IT budget affects the adoption of Extranet in an enterprise.	0.3441	Not supported
H4b: Economical expenditure affects the adoption of Extranet in an enterprise.	0.6658	Not supported
H5: Characteristics of end user affect the adoption of Extranet in an enterprise.	0.0007	Supported
H6: Business network affects the adoption of Extranet in an enterprise.	0.0257	Supported

### 4.3 Business environment

How to succeed in today's rapidly changing competitive environment is a question weighing heavily on many a manager's mind. The business competitive environment more multiples than IT roles more key issues of business environment (Hannan, McDowell, 1984; Levinet, et al., 1987). In the data showed as outside environment factor and outside environment threat that affects the adoption of Extranet in an enterprise. The p-values is 0.0867 and 0.0709 (see table 6). Also this research not support H3 hypothesis.

### 4.4 Economic performance

Competitive pressures are forcing enterprises to take available actions to compress time between each stage of the supply chain and costs down (McIvor et al., 2000). Ives and Jarvenpaa (1991) have argued when the enterprise beginning adopt computerize. IT equipment cost is adopt information systems one of successful issue factors. This data showed as IT budget and economical expenditure affects the adoption of Extranet in an enterprise. The p-values is 0.3441 and 0.6588 (see table 6). Also this research not support H4 hypothesis.

### 4.5 Character of end user

Pinto and mantel (1990) appealed to the research, the experience, profession technology and understand IT knowledge of end user, these factors enable influence business successful adopt IT equipments. Morris and Trotter (1990) research end user and IT adopt have argued accept new IT degree, learning new technology interest of end user, these factors become business adopt IT successful key issue. Hendry (1989) also have argued enterprise focus staff growth, training education degree, enable influence end user operation IT interest. The result was showed the characteristics of end user affect the adoption of Extranet in an enterprise. The p-values is 0.0007 more less than standard 0.05, so this result supported H5 hypothesis.

### 4.6 Character of business network

Erenguc, Simpson, and Vakharia (1999) review the effective management of operations using SCM. They suggest that a firm's competitive position and the nature of

the relationship among SCM participants play a significant role. They also explain why the determination of contractual agreements between the channel members and the incentive structures for information sharing should be further researched. Johnson and Mattson (1987) have argued that business network is one group firm was depended by each other, and rely on long-turn benefit for each relationship. In business network not only keeps competitive and compensation but also has exchange and adaptive interaction relationship.

This data showed as business network affects the adoption of Extranet in an enterprise. The p-values is 0.0257 (see table 6). Because this research support H6 hypothesis that business network affect the adoption of Extranet.

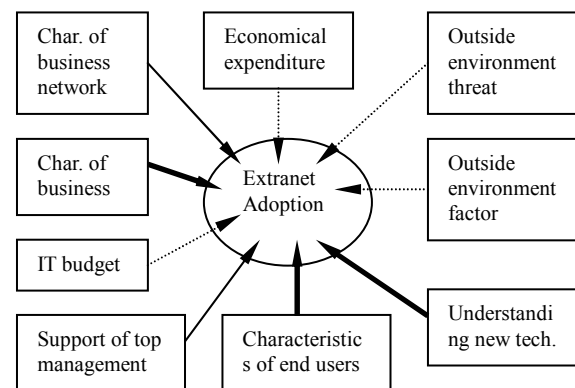


Figure 2. Discrimination

Heavy power: General : Weak :

## 5. Conclusion and Recommendation

Under today's ever-increasing competitive pressure, the quest for competitive advantages has been the vital action of every business. Many success stories have been told in the literature regarding the use of information technologies by businesses to improve the competitive edge. In particular, the Extranet has been an outstanding tool for a business to exchange and share information among inter-organizational partners within a business network. Our study has revealed the critical factors that influence Extranet adoption of a business. Both the characteristics of end user and the characteristics of business itself are the two factors most significantly affect Extranet adoption.

Another two factors of significant importance are the support of top management and understanding of new technology. It is apparent that the degree of understanding new technology would directly affect the support of top management toward adoption of new technology. Therefore, we strongly recommend top management to tirelessly capture new knowledge and establish a culture of learning organization. This in turn would increase the users' interest in learning and using new technology and increase the chance of success in introducing a new technology into the company.