

B2B e-commerce adoption decisions in Taiwan: The interaction of organizational, industrial, governmental and cultural factors¹

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ABSTRACT

Business-to-business (B2B) e-commerce has become an important initiative among firms in the last few years. The factors affecting IT adoption decisions have been well-documented but few of the studies investigate how or whether culture plays a role in IT decisions. Using exploratory methods we examine whether the factors previously identified by researchers influence B2B e-commerce adoption in Taiwan and the extent to which culture plays a role in the adoption decision. This study is based on data derived from over 20 interviews with CEOs, CIOs, and MIS managers in electronics and textile companies in Taiwan. This study contributes to existing literature by describing the degree to which various organizational, industrial, governmental and cultural factors influence B2B e-commerce adoption decisions in Taiwan. It is one of the first studies investigating B2B e-commerce adoption decision factors in an emerging economy. Results indicate that organizational, industrial and governmental factors do indeed influence B2B e-commerce adoption decisions and cultural factors moderate the direct influence of government policies and industry pressures.

1. Introduction

In recent years, many firms have undergone profound transformations in the pursuit of reducing costs and providing better services to customers. Whole value chains between firms and their customers and suppliers are being re-engineered. Inter-organizational systems have been an essential part of managing these

changing relationships. In addition, the increasingly internationalization of products and companies has created the need for cross-border inter-organizational relationships that rely on B2B e-commerce systems. Little has been published on the adoption of IT in general and e-commerce in particular in emerging economies. This paper seeks to begin to address the question of what factors influence B2B adoption strategy in such economies. In particular, we are interested in understanding the role that culture may play in the adoption decision. Therefore, the purpose of this paper is to delineate some salient features of organizational, industrial, governmental, and cultural factors that support or hinder the decision to adopt B2B E-commerce systems in Taiwan, an emerging economy.

2. Background

2.1. B2B e-commerce

B2B e-commerce encompasses a wide range of technologies and there is no standard definition. For the purposes of this paper, we have defined B2B e-commerce as the process of deploying computer and communications technology to support the entire value chain from suppliers through the firm to customers [31]. More traditionally, e-commerce has involved the use of Electronic Data Interchange (EDI) in which suppliers' and customers' computers are able to send formatted messages electronically. EDI has been the basis for early Supply Chain Management (SCM) systems. The internet has opened up a new set of B2B applications. Moving beyond simple web-based ordering systems, Customer Relations Management (CRM) systems allow suppliers to facilitate cooperation and collaboration with

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their customers [30]. What is important about these examples is that the SCM, CRM and ERP technologies are built on the foundation of mutual interdependence in the buyer-seller relationship [5, 40].

Models of IT adoption recognize both organizational and extra-organizational factors. A brief review of both the conceptual and empirical literature provided below discuss some of the most important factors that might affect B2B e-commerce adoption decisions.

2.2. Organizational factors and IT adoption

Innovation and adoption research as well as organizational behavior research have been used to theoretically explain the relationship between organizational factors and IT adoption [32]. The level of IT sophistication and organizational readiness has often been identified as a predictor of successful IT adoption [7, 8, 23]. The size of the organization has also been identified as a predictor of IT and more specifically, SCM systems adoption [32, 39]. It has been widely recognized that the support of top management is crucial as a success factor in IT adoption decisions [33, 32, 35]. Although the organization is at the nexus of the decision to adopt technology, the organization is influenced by its environment [37].

2.3. Extra-organizational factors and IT adoption

2.3.1. Industrial factors and IT adoption.

The industry within which an organization operates may be instrumental in determining the degree to which an organization participates in B2B e-commerce [7, 39]. Dyer, Cho & Chu (1998) show very clearly how the big auto companies pressured their suppliers to use specific supply chain systems. Another variable reflected in the institution of industry is the competitive environment. Some researchers argue that companies must choose a supply chain strategy that balances efficiency and responsiveness [5, 38, 34]. Companies that choose responsiveness will decide to adopt a B2B e-commerce system; those that choose an efficiency strategy may place less emphasis on B2B e-commerce because it may increase their costs.

King, et al. (1994) argue that trend-setting companies (defined as powerful domestic companies performing important functions that have influence) and multi-national corporations (defined as cross-national companies that influence the movement of technology where they operate) both have influence on IT innovations. Industry pressures could involve a dominant customer pressuring its suppliers to implement relationship specific IT investments [7, 9,

15, 40]. These relationship specific investments could involve EDI, SCM, or CRM applications which are all part of B2B commerce. International companies often insist that Asian suppliers use particular electronic services or lose their business [28]. B2B e-commerce systems tend to be tightly coupled systems and must work together seamlessly. In addition, they tend to be expensive and require a lot of manpower to implement so it is important that any decision a company makes with regard to a B2B e-commerce system will be supported by the companies with which it has relationships.

2.3.2. Governmental factors and IT adoption.

Institutional forces that are political in nature may influence IT adoption [1, 29]. National policy for training and maintaining an adequate workforce may induce IT adoption [39]. A Pricewaterhouse Coopers poll of 60 CEOs of major corporations were very concerned about IT-related policies enacted by governments in other countries [44]. The potential negative impact of transparent transactions on the complex bargaining relationship between government entities and a firm may discourage implementation of B2B commerce such as in The People's Republic of China [3, 12].

However, there can be a number of other ways that the institution of government can influence an organization's decision. This may be particularly true in Asian countries where there is a symbiotic relationship between government and businesses. Burn (1995) suggests that differing rates of EDI implementation in Asian countries stems partially from the extent of government intervention. The adoption of EDI in Singapore was extremely successful due to the government's control of IT developments and by launching a major educational program exposing the business community to EDI and success stories from other nations [4, 41].

2.3.3. National Cultural Factors and IT Adoption.

Culture has been defined as the shared values of a particular group of people [10] and as "the collective programming of the mind which distinguishes the members of one group or category of people from another" [20, p. 5]. In either case, national culture refers to the idea that a group of people will feel, think and react similarly in a given context.

The limited research on the effects of national culture on IT adoption is presented below. Technologies often reflect the socio-cultural systems of the country in which they are developed [42,2]. Gefen & Straub (1997) and Straub (1994) found that perceptions and use of information technology differed between Japanese and US workers. Raman and

colleagues [19, 36] found that perceptions and use of electronic meeting systems were influenced by culture. Hill, Loch, Straub & El-Sheshai (1998) found that communicating via technological means is not desirable since it runs counter to the affective nature of communicating with a family member, peer, employer, or employee. Christiaanse & Huigen (1997) found that in the case where an inter-organizational system (IOS) was successfully implemented, the implementation process occurred in an egalitarian fashion that reflected the cultural biases of both the users and the producers of the software. Goodman and Green (1992) argue that cultural and political factors are the main explanations for the lack of IT diffusion in the Middle East because the Western assumptions that free movement of information have positive connotations violates the cultural environments of many Middle Eastern countries.

Burn (1995) found that there were a number of cultural inhibitors to the development of a public EDI service in Hong Kong including the unwillingness of organizations to share information and extend their business chains through other organizational networks [4]. One aspect of B2B e-commerce is a willingness to freely share information with other companies. On the other hand, B2B e-commerce systems automate processes that are traditionally done either face-to-face or between individuals who have an established relationship. Culture may be a factor which encourages or inhibits this sharing of information [39].

Perhaps one of the most accessible frameworks for exploring the role of culture in information technology comes from Hofstede (1980). Based on a survey of 160,000 employees from 40 countries, Hofstede (1980) found that national culture explained more of the differences in work-related values than title, gender or age. The five dimensions found in Hofstede's study are: *Power Distance* (the extent to which the members of a society accept that the power in organizations is distributed unequally), *Uncertainty Avoidance* (the degree to which members of a society feel uncomfortable with uncertainty and ambiguity), *Individualism vs Collectivism* (the extent to which a person sees herself as an individual rather than part of a group), *Masculinity vs Femininity* (preference for achievement, heroism, assertiveness and material success as opposed to feminism which is preference for relationships, caring and quality of life), and *Time Orientation* (the relative importance of the here-and-now versus the future).

Hall and Hall (1990) have also studied cultures using a dimension of *High Context vs. Low Context* (the amount of information that surrounds an event, inextricably bound up with the meaning of that event).

The Taiwanese culture is rated as relatively high on the dimensions of power distance and uncertainty avoidance, very high on the dimensions of collectivism and long-term orientation, and relatively low on the dimension of masculinity compared to other countries [21, 22]. Taiwan is seen as a polychromatic and high context society as determined by Hall & Hall's (1990) cultural dimensions. In doing business with Chinese cultures much has been made of the need for *guanxi*. *Guanxi* is most often used to reference the importance of who one knows but it is also the reciprocal interdependencies that result from the relationship. The concept of *guanxi* has a close interdependence with Hofstede's cultural dimensions of collectivism, high uncertainty avoidance and low masculinity.

Based on the literature review and findings from previous research, this study explores the organizational, industrial, governmental, and cultural factors influencing B2B e-commerce adoption decisions in Taiwan. The key research question emerging from the theoretical discussion is: which organizational, industrial, governmental, and cultural factors influence the decision to adopt B2B e-commerce systems in Taiwanese companies?

3. Research Study

3.1. Methodology

The methodology used for this research is qualitative and exploratory as specified by Miles & Huberman (1984). All the data was text-based and comprised of organizational documents, documents from government agencies, and transcripts of 20 semi-structured interviews with IT staff, CIOs and CEOs of organizations. In these interviews the researchers recorded answers to specific questions on the history of the organization's relationships with its suppliers and customers, its familiarity with various forms of B2B e-commerce, its current and future plans for adopting and implementing B2B e-commerce systems, and the attitudes influencing their B2B e-commerce-related decisions. Since the interviews were exploratory in nature, special attention was made not to guide the discussion towards the authors' personal viewpoints. As soon as possible after each interview, a transcript was created from the tape. Any other information that was collected (informally before or after the interviews) was written down as soon as possible after the interview was completed.

3.2. Data collection methods

The electronics and textile companies that were interviewed were selected from lists provided by the

Taiwan government's Market Intelligence Center. The electronics company list included all the Tier 1 original equipment manufacturers (OEMs) consisting of 20 companies. The textile list included over 30 companies.

Firms in the electronics industry are part of the Global Silicon Network (GSN) and should be leaders in their respective countries in terms of the adoption of e-commerce [24]. Textile manufacturers were used as a comparison industry because they are representative of more traditional industries.

The data used for this study is descriptive in nature and the method of collection is as follows. Data on the adoption of B2B e-commerce systems in the Taiwanese electronics industry was collected by one of the co-authors during a three-week trip to Taiwan in May 2001. Although not native to the region, the co-author has spent an extensive period of time in Greater China studying telecommunications policy in the region. Participants from the textile industry were interviewed by an additional member of our research team during a one-week period in July 2001. A translator accompanied both interviewers on all of the interviews. In addition, a copy of the interview questions in Chinese was available in case there was any confusion with regard to the nature of the questions. Before the data collection visits, there were preliminary contacts to identify the organizations and interviewees were appropriately informed about the study.

4. Data analysis (Results)

These reports and documents were analyzed by comparing the information in them to the parameters of organizational, industrial, governmental and cultural factors as laid out earlier in this paper. Although the data were collected at the organizational level, the results are discussed at an industry-level of analysis. This was done because organizations in the two industries had similar environments and government involvement. We extracted only that data which relates to these four factors. Two raters independently extracted the information that related to the four factors and these raters were different from the individuals who conducted the interviews. The particular factors are displayed in Table 1.

4.1. Organizational influences

4.1.1. Electronics industry. The electronics companies we interviewed had all been in business for over ten years. The firms interviewed had between 2000-5000 employees and had manufacturing facilities in both Taiwan and the PRC. Many also had operations in North America and Europe.

Table 1: Factors in B2B adoption decisions in the electronics and textiles industries in Taiwan

| FACTORS | |
|------------------------------|-------------------------------|
| Organizational | Government |
| IT Sophistication | Policies promoting B2B |
| Top Management Support | Subsides promoting B2B |
| Firm size | Culture |
| Industry | Power distance |
| Importance of responsiveness | Uncertainty avoidance |
| Importance of cost cutting | Individualism vs collectivism |
| Multinational companies | Masculinity vs femininity |
| Trendsetting companies | Time orientation |
| | High vs low context |

The IT infrastructure of our participants in this industry was relatively advanced as all of the companies had implemented EDI approximately five years ago, primarily using the GE Information Services's (GEIS) value added network (VAN). Over the past couple years, they had also implemented EDI with their larger local suppliers using a Taiwanese based VAN. All of the electronics OEMs that we interviewed had implemented some form of Enterprise Resource Planning (ERP) application. Most of the companies had four of five years of experience with ERP and were involved to some degree in Enterprise Application Integration (EAI). Firms saw that the inter-organizational integration involved in B2B e-commerce had the potential to pay significant dividends because it leveraged the internal integration within the firm.

The top management of the top tier Taiwanese OEMs, many who had been educated in the West, were committed to implementing, and were willing to make the investments in, sophisticated information technology strategies that integrated B2B e-commerce with ERP and EAI. Top management support was often cited as a major driver of advanced e-commerce in the electronics industry. One MIS Director explained, "top management supports more B2B connectivity, especially system to system connectivity."

4.1.2. Textile Industry. The textile companies we interviewed had been in business between 25-50 years reflecting a more mature industry than that of the electronics companies. The firms interviewed had between 2000-10,000 employees and had manufacturing facilities in both Taiwan and the PRC.

The companies in the textile industry were much less sophisticated in terms of information technology. Information silos exist that serve as barriers to the automation of the workflow of the firm. Although EDI was used by some firms, some firms had to rekey data into different systems. Because of a lack of enterprise integration, firms were not ready to leverage

sophisticated forms of B2B e-commerce. Few of the top managers had been educated in the West and top management commitment to adoption and implementation of B2B e-commerce was unclear. For example, one interviewee said that the MIS department was directly under the Board of Director's control but that the "Director of the Board hasn't yet realized the importance of B2B." This resulted in a loss of one of their biggest customers.

4.2. Industry influences

As has been shown in previous research [9], industry pressures are a main source of influence in the adoption of technology in Taiwanese businesses. International customers for Taiwanese IT products have been demanding shorter delivery times [26]. This sentiment was echoed in our interviews with Taiwanese MIS managers. When asked why they were automating their value chains, the general response of company MIS managers was, "We have no choice, we have to stay in business."

4.2.1. Electronics Industry. The competitive pressures in an industry do not only influence the initial technology acceptance decision but also influence the type of technology that a firm adopts. Electronics firms, each of which has multiple customers, have found integrating multiple systems into their own ERP system both difficult and expensive. In developing B2B e-commerce systems, it quickly became clear that implementing proprietary Web based solutions had its limitations. Under an initiative called Rosettanet, the global electronics industry, is collectively developing such process-based standards based on the EXtensible Markup Language (XML) to facilitate inter-organizational communication.

Taiwan's electronics companies are rapidly adopting Rosettanet technology. Although it will take a couple of years for Rosettanet, or its replacement, to spread from the initial companies to Taiwan's whole supply chain, the electronics companies are putting the human and technical resources in place to integrate the ERP systems of multiple supply chains. By staying at the cutting edge of B2B e-commerce technology, the Taiwanese electronic OEMs are ensuring that they can interface with the communication standards of the world's top computer companies.

Shore (2001) suggests that companies entering a high-tech consumer-related industry must develop sophisticated supply chain management systems because the industry is characterized by responsiveness. The electronic companies we interviewed in Taiwan are pressured to be both responsive and to reduce costs. Thus, the investment in B2B e-commerce systems is

occurring simultaneously with the movement of manufacturing sites to the PRC. Information from industry association sources and the interviews with electronics company managers agree that industry forces are a leading influence in affecting B2B e-commerce adoption decisions.

4.2.2. Textile Industry. The interviews conducted with individuals working in the textile industry were also strongly influenced by the industry; specifically, international customers. There is little in the way of industry association sources with regard to the development or adoption of B2B e-commerce systems in the textile industry. However, all of the respondents in our study said that they did not have an extensive CRM or SCM system established but both e-mail and EDI were used to exchange information and even to place orders. In addition, all of the textile company managers we interviewed said that at least one large international company (usually from the U.S.) required that they use a predetermined web site or platform to bid on a particular order. When companies did business with more than one large international company, they were often forced to use different systems. For example, one interviewee stated, "our second largest customer in the U.S., which requires us to use B2B, retains an agent website other than the one that [the largest customer] uses...we have to purchase another system in order to transact with the second customer."

All of our interviewees were in agreement that their industry is "customer-driven" and they would respond to the requests of their largest customers to engage in B2B e-commerce systems. The interviewees also felt that B2B e-commerce would not succeed in the Taiwanese textile industry until (1) seamless ERP integration had occurred across internal departments, (2) a common platform in the textile industry was established, and (3) that top management bought into the idea.

The textile industry, in contrast to the electronics industry, is responding mainly to issues of efficiency rather than responsiveness. As mentioned in the interviews, the industry is using various technologies (e-mail, EDI, some are using ERP) so that they can provide cheaper goods to their customers. They are even engaging in the use of these technologies when there are potential downsides because efficiency issues are crucial. This is reflected in one interviewee's comment, "Currently we are worrying more about efficiency of our communication than security issues." Therefore, like in the electronics industry, industry factors have a very strong influence on the degree to which companies are adopting B2B e-commerce systems.

4.3. Government influences

Governmental policies and incentives are influential in encouraging (or discouraging) companies to adopt B2B e-commerce systems in Taiwan. In contrast to the U.S., the Taiwanese government has been heavily involved in encouraging B2B e-commerce in some industries[26].

4.3.1. Electronics industry. In 1999, Taiwan's Executive Yuan, the nation's highest administrative body, released the Industry Automation and e-Business Plan commonly known as the A and B Plans that directly influence the electronics industry. Plan A companies refer to the large global customers such as IBM, Compaq, and HP. Plan B companies are the larger Taiwanese original equipment manufacturers (OEMs) such as Arima, Delta and Acer. Tier 2 companies are suppliers to Plan B companies. The goal of this plan is to facilitate the transformation of the personal computer industry in Taiwan as well as other related IT products by automating the supply chain process [26]. While Plan A targets automation of the relationships between global companies and their Taiwanese vendors, Plan B targets the supply chains of the Taiwanese vendors and the component manufacturers that support them. Under Plan B, companies implement part of Rosettanet with 20-30 of their Tier 2 suppliers. This has required considerable effort on the part of Plan B companies. Although there is much pressure from customers to automate, it is clear that most of the Plan B companies have implemented Rosettanet with a few choice suppliers by September of 2001 because of government efforts.

Managers from the electronics companies that we interviewed did feel that the government incentives and plans influenced their decision to implement Rosettanet. For example, one individual said, "The government's Rosettanet program has been very useful to moving our enterprise forward." Another emphasized, "Money helps!" Although the subsidies were important in affecting their decision, for many firms the government's commitment to and involvement in the Rosettanet standard was an important incentive. It enabled the Plan B companies to evoke the government plan when "pushing" the system onto its suppliers. This is reflected in one interviewee's comment, "The government made things happen by setting deadlines."

4.3.2. Textile industry. The government's involvement in the textile industry has looked very different. There is no standard platform that the government has endorsed for the textile industry. Some company representatives saw that as a major problem.

"We think that it's necessary for the government to make the standard for the industry." Others seemed to think that it would be better for the industry players to make decisions without government involvement. "Actually, we don't expect too much from the government. We think it's better and practical to do it by ourselves."

Taiwan's Bureau of Industry has developed plans for promoting e-commerce in traditional industries and the government does provide tax deductions for e-commerce implementations. It is nowhere near the outright subsidy of US\$29 million that is provided to companies in the electronics industries. The respondents replied that this tax deduction is "inadequate" for the encouragement of adopting a B2B e-commerce system. The lack of government involvement in B2B e-commerce systems in the textile industry has had a big impact on the textile companies. The people we spoke with were keenly aware of the degree to which the government was involved in the electronics industry and were disappointed in the government's policies toward textiles. As one respondent put it, "We have given suggestions to the government many times. But the government hasn't protected us...they let the textile industry stand alone."

Thus, both the government policies and monetary incentives have had a huge positive impact on the electronics industry as they move forward with the adoption of the Rosettanet platform. The textile companies feel that the lack of a formal plan by the government has hindered their move to B2B e-commerce systems despite monetary incentives (tax deductions).

4.4. Cultural influences

Since all respondents came from Taiwan, we assumed that they were all representative of the Taiwanese culture regardless of organizational or industry affiliation. Previous research has shown that the management style in Taiwan conforms to a management style typically found in Chinese cultures [11, 17]. Thus, we were interested in whether or not the cultural factors that are indicative of Chinese culture are important factors in B2B e-commerce adoption decisions. Our findings suggest that cultural factors do indeed influence adoption decisions but that culture seemed to have differential effects on adoption decisions depending on the interviewees' industry affiliation. This finding is consistent with the exploratory work done by Hempel & Chang (2002) that concludes that Chinese managers of high-tech companies are more Western in their management style than managers of traditional industries. To describe our

findings, we look at each of the cultural dimensions described in Table 1 in turn.

4.4.1. Power Distance. The Taiwanese, according to Hofstede (1980), have a relatively large power distance and this is reflected in the way that B2B e-commerce adoption systems are being made. Within the electronics industry, top-down efforts reflected by industry pressures and government policies have been influential in company decisions to adopt and implement Rosettanet. There seems to be genuine respect and desire for the government to play a strong role in this issue which may not necessarily work in countries where there are low levels of power distance. Power distance in the electronics industry is also reflected in the way that Tier 1 companies plan to “push” the Rosettanet system onto their Tier 2 suppliers with little resistance.

Within the textile industry there has been little movement by the government, industry associations, or top management in making crucial decisions affecting B2B e-commerce adoption decisions. Many of the people we interviewed (in MIS departments) saw the benefits of B2B e-commerce systems and knew that in order for their company to survive they would need to make some decisions; however, they felt that they were not in a position to make the decisions. When individual customers, with strong buying power, required that the company do business electronically, the Taiwanese supplier’s felt comfortable complying with those requests.

4.4.2. Uncertainty avoidance. The Taiwanese have a medium-strong desire for uncertainty avoidance [21]. Getting involved with supply chain management through the development of a web-based application represents, at least for the electronics industry in Taiwan, a response based on a relatively high level of uncertainty avoidance. Given the realities of competitive pressures, electronics companies feel they are unable to take the risk of *not* automating. However, adoption of Rosettanet, which is a standard that is still evolving and is very complex, can only be explained by the fact that the government is pushing the industry to adopt this emerging standard and thus represents the option with the least amount of risk.

For individuals in the textile industry, uncertainty avoidance plays an equally important role in how they have responded to competitive pressures. Textile companies have agreed to engage in some B2B e-commerce where there is the chance of losing large customers and in some cases, have purchased multiple systems and work off of multiple platforms. Many firms in the textile industry also discussed the uncertainty associated with doing business electronically rather than

face-to-face. For example, one interviewee stated, “so far we don’t use B2B because in Taiwan personal contacts/relationships is important in doing business in Taiwan.” By interacting with customers and suppliers directly, managers believe they have access to more information. This reduces the risk associated with doing business. Without the influence of the government and a concerted industry policy, the least risky path for textile firms with regard to adoption of B2B-commerce systems is to respond only to the demands of the largest customers.

4.4.3. Individualism vs collectivism. According to Hofstede’s (1980) research, Taiwanese people have more of a collectivistic orientation than an individualistic one. In the electronics industry, managers embraced new standards and re-engineering for the good of the company and its customers. In none of the interviews did we get a sense that the companies’ B2B effort was the result of one individual’s vision or drive. B2B was something that the government, the industry, and the individual companies were committed to from the management on down. The MIS managers were focused on carrying out this collective vision. This was particularly true in the case of implementing Rosettanet, which for some involved significant difficulties and risks for individual MIS managers. It is interesting to note how the industry is collectively embracing B2B e-commerce.

The collectivistic orientation can also help explain why the textile industry has not been as actively involved in the adoption of B2B e-commerce systems. Given that there is no agreement among the government, industry associations, and players in the industry on what standard should be used, companies feel uncomfortable going out on their own. The language that was used by the interviewees in the textile industry reflected a collectivistic orientation and a sense that unless decisions were made by a coalition of industry, government, and company representatives, little would be done to adopt B2B e-commerce systems.

4.4.4. Masculinity vs femininity. The way that B2B e-commerce systems are implemented may partially reflect the relative femininity basis of the Taiwanese culture. Within the electronics industry, the fact that Taiwanese firms are implementing B2B systems to enhance their relationships with their customers is a reflection of the femininity of the culture, even if it is also a response to competitive forces. Despite the “pushing” of Rosettanet onto Tier 2 suppliers, Tier1 suppliers have also shown concern for how their B2B efforts would impact their suppliers. Some managers expressed the hope that B2B e-commerce would enable them to improve their personal

relationships with the customers and suppliers because they could spend more time nurturing the relationships and less time responding to administrative details.

The femininity trait was reflected in discussions with managers in the textile industry in a couple of ways. First, many managers worried that electronic interactions would reduce the amount of friendships/personal relationships that were so important in business. Second, many employees in textile firms are older and not well-versed in computers. Managers were concerned about how these employees would feel if forced to engage in computer work. "It's a very big problem that when we want our employees to do their jobs by computer, it is very challenging and hard work for them to do it." Third, there was a desire for the company to grow in a way that incorporated better relationships with customers and suppliers. "When our ERP can work better than today in the future, we can have better business relationships with our customers and suppliers, and do more things with B2B." Thus, respondents from both industries expressed concern for their workers and their business partners as they contemplated the move to B2B e-commerce systems.

4.4.5. Time orientation. Taiwan's Confucian culture takes a long-term view [22]. Policy makers and business leaders make decisions based on long-term consequences. This is particularly true of the decision by the government to have each of the Plan B electronics companies implement Rosettanet with a few key customers in the interests of the long term maturation of Taiwan's electronics supply chain. The sentiment was that the Taiwanese government felt that the electronics industry is crucial to both the current and future development of the economy; thus, policy and funding should be used to support the industry.

Taiwan's business and political leaders that we talked to did not see much long-term success for the textile businesses in Taiwan. One interviewee said, "I personally believe in the next few years the textile factories in Taiwan will all be closed. Taiwan will become a transaction agent center, only for placing orders and purchasing." This interviewee went on to suggest that a good way to survive would be to implement B2B systems that would enable them to become a transaction agent center. On the other hand, some of our respondents felt that the only way they would survive would be to lower their costs and move all their offices and factories to the PRC. Thus, all respondents in the textile industry were making business decisions based on the long-term orientation characteristics of Confucian cultures but they were responding in different ways. Some of the respondents felt that B2B e-commerce would not enable them to

survive in this competitive low-cost industry while others felt that B2B e-commerce systems would enable them to play a different role (that of a transaction agent) in the future textile industry.

4.4.6. High context vs low context. Taiwanese culture, as most Asian cultures, scores relatively high on Hall and Hall's (1990) concept of the importance of context in communications. There is much more meaning to a relationship than is coded in a particular transaction. This is an interesting variable because it gets at the relationship between information and personal relationships. As mentioned earlier, managers in the electronics industries felt that adopting B2B e-commerce systems would allow for better "personal" relationships because administrative issues would have been automated by the system.

In our interviews with textile managers, there was a sense of wariness about B2B systems because it was believed that they would not support high context relationships. Individuals spoke about a "Taiwanese" way of doing business that is very much based on personal relationships. They emphasized the importance of "looking their suppliers in the eyes" when asking for a quote. They felt that automating their processes may not be effective since they will be unable to rely on the personal relationships that have been nurtured over a period of years.

Our findings here differ from those in Hempel & Chang (2002) in that Hempel & Chang found that managers in high-tech industries were less likely to rely on personal relationships than managers in traditional industries. We found that personal relationships were just as important in the electronics industries as in the textiles industry but the relationships were being managed in different ways. In our study, there was common agreement among the interviewees that the context of relationships was important, but there were different outcomes with regard to adoption decisions across industries. It may be that most of the interviewees who worked for an electronics company, where the decision to adopt B2B e-commerce systems had already been made, felt the need to explain how using B2B e-commerce systems was consistent with their culture. This differed substantially from the responses from individuals with a more traditionally-based view, as represented by the textile industry.

5. Discussion and limitations

This is one of the first papers to explore the influence of cultural factors along with the antecedents typically studied in inter-organizational technology adoption such as EDI or B2B e-commerce systems. In addition, this is one of the first studies to examine these factors in an

emerging economy. As has been shown in previous EDI-adoption studies in Western countries, organizational and inter-organizational factors do matter in adoption [32, 33, 34, 35]. This brings up the question of whether B2B e-commerce system implementations are immune to geographic and cultural differences. We do not think that this is the case because it is clear that culture and government pressures are considered in the case of Taiwanese businesses. However, the possibility of losing business is a strong incentive and may have a muting effect on culture and government pressures.

Cultural institutions not only impact whether B2B e-commerce systems are adopted but also how they are implemented. However, one cannot view cultural institutions as independent from organizational, industrial and governmental factors. The interviews from members of the textile industry reflected the idea that culture hampered the degree to which companies have decided to engage in B2B e-commerce. In the case of the electronics industry, it was clear from the number of times that the interviewees mentioned industry factors, that competitive pressures overrode cultural tendencies. In addition, under different industry and government pressures the same cultural values that might be a source of resistance in one circumstance may promote implementation of B2B e-commerce systems in another.

Clearly more research needs to be done to validate the findings in this study. Empirical research is needed. A focus on only certain cultural practices may be in order rather than using Hofstede's and Hall's generic dimensions. There is also a need to generalize the results to other industries and countries. Finally, the definition of B2B e-commerce systems was deliberately left vague in this study. However, some researchers suggest that research on IT adoption must take into account the specific technology being adopted [34].

6. Conclusions and future research

Consistent with previous research on IT adoption, the results from our interviews with MIS managers at Taiwanese companies have shown that organizational, industrial, and governmental forces exert powerful direct effects on the decision to adopt B2B e-commerce systems. In addition, cultural tendencies do have an effect on B2B e-commerce adoption decisions in an indirect manner. Government and cultural factors may play a more important role in emerging economies than in Western-based capitalist countries. The results show that culture influences information technology decisions but unless one has a deep understanding of the organizational, governmental and industrial forces, the picture will be incomplete. Given these findings, we lay out two propositions for future testing:

Proposition 1: Industry, organizational, government, and national culture are all important factors in B2B e-commerce adoption decisions

Proposition 2: Organizations in less advanced countries will have stronger governmental and cultural influences in B2B e-commerce adoption decisions than organizations in more advanced countries.

As an exploratory study, this research leaves a number of partially answered questions that deserve further investigation. It would be helpful to focus on specific parts of the value chain such as supply chain management rather than on the overly broad category of B2B. There is a need to empirically identify the strength of the individual factors influencing B2B adoption. Such an effort is complicated by the fact that people are to a great degree unconscious of the role of national culture in their decision making. There is a need to do comparative work looking at the role of national culture in B2B adoption decisions in other countries. The models of culture developed by Hofstede and Hall are helpful to a certain extent. However, neither model fully sheds light on the way social networks (*guanxi*) condition Taiwanese business practices especially when those business practices are mediated by information technology. In order to get at this, the relationship between businesses and their suppliers deserves closer attention to identify the ways culture moderates IT adoption.

Our results have important public policy implications. Government policies to spur B2B need to take into account organizational, industrial and cultural factors when making decisions. The same government policy may have different results depending on the culture and industry in which it is enacted. As countries try to encourage e-commerce as part of their effort to find their niches in the global economy, there is a need for more research into the interaction of industry, culture, and government factors. This is particularly important in developing countries where governments are introducing policies designed to encourage information technology in transforming their economy. We have seen from the Taiwanese electronics and textile industries that Chinese culture can be either resistant to or supportive of B2B e-commerce given the right political and economic forces.

6. References

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