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THE ADOPTION OF B2B E-COMMERCE INITIATIVES BY THE INDONESIAN GROCERY INDUSTRY

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Abstract

Electronic Commerce is concerned with conducting business transactions electronically using information and communication technologies. In this globalization era, many organisations in various countries have rapidly adopted e-Commerce to enable efficient trading with other organisations located in various parts of the world. However, e-Commerce adoption is still unilaterally concentrated in developed countries which are attributable to some issues related to the relevance of e-Commerce for organisations in developing countries. Currently, there are limited detailed studies into the adoption of e-Commerce technologies in developing countries. Therefore, in this study, we conducted a multiple case study over an extended period of time, exploring the adoption of e-Commerce technologies that support business-to-business interactions within the supply chain of the grocery industry in Indonesia, as an example of a developing country. Valuable insights have been obtained regarding the adoption of e-Commerce technologies by the participating organisations in Indonesia to better manage their supply chain. This study offers important implications to both academics and practitioners in the field of technology adoption.

Keywords: Electronic Commerce, technology adoption, grocery Industry, developing country, supply chain management.

1 INTRODUCTION

Electronic Commerce (e-Commerce) is concerned with conducting business transactions electronically using information and communication technologies (Iacovou et al., 1995). It is not only limited to buying and selling over the Internet, but it is also concerned with transferring or exchanging products/services and/or information via computer networks, including the Internet, Extranet and Intranet (Turban et al., 2006). There are two main categories of e-Commerce: Business-to-Consumer (B2C) and Business-to-Business (B2B). In this study, B2B e-Commerce (EC) is defined as the use of digital technologies to support the exchange of products (e.g. goods, services, money, information) from one organisation to another.

There are enormous benefits that organisations can obtain from their investment in e-Commerce technologies, which include improved flexibility and responsiveness, improved internal coordination, expanded market access, reduced time to market by linking orders to production, new and more efficient intermediaries, and increased use of outsourcing (Iacovou et al., 1995). Because of its potential, many countries have rapidly adopted e-Commerce (Bean, 2006), resulting in a significant growth of e-Commerce in developed countries in the last two decades and more recently in developing countries (Chowdury, 2003; Hartono et al., 2010).

In the globalization era, understanding the adoption of ICT, including e-Commerce technology, by developing countries is important for both researchers and practitioners (Tigre, 2003). Through ICT adoption, developed countries can trade with developing countries more efficiently and, in turn, helping those developing countries achieve a better sustainable economic growth. Developing countries, however, face a different set of problems and concerns completely different with that faced by developed countries and therefore need different set of approaches to technology adoption (Kartiwi

and MacGregor, 2007). For example, developing countries are more concerned with organisational barriers, while developed countries put more attention to technical issues (Kartiwi and MacGregor, 2007). Moreover, Hofstede's national culture theory shows that developing countries and developed countries differ greatly on their characteristics (Vatanasakdakul, 2004; Hofstede, 1997). However, at this stage, there are still relatively a limited number of studies and limited understanding obtained from the adoption of e-Commerce technologies by developing countries, despite a growing number of technology penetrations in these countries in the last decades (Chowdhury 2003; Kartiwi and MacGregor, 2007).

Furthermore, some noticeable gaps have been identified. First of all, there are limited empirical studies on technology adoption by large organisations in the context of developing countries. Most studies concentrate on exploring the diffusion of e-Commerce technologies among Small Medium Enterprises (SMEs) in developing countries, which are mostly conducted using quantitative methods (see for example Looi, 2005; Kartiwi, 2006; Tan et al., 2007). Secondly, most of these studies, especially in the South East Asia region, explore only general e-Commerce technology and practices (including also Business-To-Customers (B2C) technology, and general e-Mail practices). Only a handful number of studies assess other EC technologies such as Electronic Data Interchange (EDI) technology and other B2B EC- enabled initiatives (see for example, Seyal et. al., 2007; Vatanasakdakul, 2004; Kurnia and Peng, 2010). Thirdly, most of the studies also lack depth as they aggregate the whole industry adoption experience within a country. Only limited authors focused their studies on a specific industry, for example Utomo and Dodgson (2001), which concentrate on Indonesia's manufacturer of industrial products, and Kurnia (2008) which focuses on the Chinese grocery industry.

To address the above gaps, the main objective of this study is therefore to obtain a rich understanding of e-Commerce technology adoption, particularly B2B EC application, in Indonesia as an example of a developing country. Three research questions addressed are:

1. What are B2B e-Commerce technologies that are relevant for the Indonesian grocery industry?

2. What are the driving factors for the adoption of B2B e-Commerce technology enabled Supply Chain Management initiatives within the Indonesian grocery industry?

3. What are the barriers to the adoption of B2B e-Commerce technology enabled Supply Chain Management initiatives within the Indonesian grocery industry?

A multiple case study was conducted involving eight organisations with different backgrounds, sizes and positions in the supply chain within the Indonesian grocery industry. The grocery industry has been chosen as the study focus because it often pioneers technology adoption in various countries due to the characteristics of the industry that involves high transactions volume and low profit margins (Kurnia, 2008; Gibbs et al., 2003). Moreover, Indonesia has been chosen as an example of a developing country because it reflects typical characteristics of developing nations, especially in the Asia Pacific region (Seyal et al, 2007; Lertwongsatien and Wongpinunwatana, 2003; Kurnia et al., 2009). Although it enjoyed a steady economic growth at an average of 7%, between the periods of 1987-1997, it has only devoted a small percentage of its GDP to ICT implementation and has a low score for Network Readiness Index (NRI) and E-Readiness Index (ERI) (Indjikian and Siegel 2005). Therefore, the findings of this study are likely to be relevant for other developing countries, especially those with similar cultural, political, and socio-economic conditions as Indonesia.

In the next section, factors effecting E-commerce adoption in developing countries are briefly discussed, followed by an overview of the multiple case study. Then the finding is presented and finally, we discuss and conclude the paper by outlining the contributions of this study.

2   FACTORS AFFECTING E-COMMERCE ADOPTION IN DEVELOPING COUNTRIES

There are a wide range of theoretical frameworks available that can be used in a study of technology adoption.   Some underlying foundational theories that have been used in various e-Commerce technology adoption studies found in the literature includes, the Diffusion of Innovation (Rogers, 1995), the Institutional theory, the Technology-Organisation-Environment (TOE) framework, and the Resource-based theory (Tan et al., 2007). Reviewing the literature reveals that out of these popular theoretical frameworks, the TOE framework, which originates from the work of Tornatzky and Fleischer (1990), has been used in many technology adoption studies around the Asia Pacific region to explore various contributing/influencing factors that might have affected the adoption process of certain technology on organisational-level. This framework is a general, comprehensive and well-received framework in the context of innovation adoption by organisations and has been used in many studies (see for example Kuan and Chau 2001, Iacovou et al. 1995). It heavily focuses on the examination of an organisation and its context related to technology adoption (Tan et al., 2007; Zhu et al., 2006). According to Tornatzky and Fleischer (1990), technology adoption within an organisation is influenced by factors pertaining to the technological context, the organisational context, and the external environment. The external environment defines the external world in which an organisation operates, while the organisational context encapsulates factors internal to an organisation that influence adoption of innovation. The technological context represents the perceived attributes by the potential adopters (Tornatzky and Fleischer, 1990; Rogers, 1995). The TOE framework is also consistent with Rogers Diffusion of Innovation theory, which allows us to explore both drivers and barriers to technology adoption by considering the technological context, organisational context and the external environmental context (Zhu et al., 2006). Various key factors identified from the literature, categorized based on TOE framework, that affect EC or IT adoption by organisations in developed and developing countries are further discussed below. All these factors are viewed as necessary but not sufficient for organisations to adopt EC initiatives.

2.1   Technological context

Perceived benefits have been always an important factor that affects the adoption in many studies (see for example Iacovou et al., 1995; Kuan and Chau, 2001; Rogers, 1995). Perceived benefits include direct and indirect benefits obtainable from the technology adoption. If the management of an organisation does not perceive the technological innovation in a positive way and does not understand the potential benefits of it, then the organisation is less likely to adopt the technology in an active way (Iacovou et al., 1995; Kirby and Turner, 1993). Furthermore, in any online transactions, security and risks have always been an important factor that determines the adoption level. Without a proper security measures that can minimize the potential risks associated online transactions, EC adoption is not likely to take place (Martinsons, 2001; Chen and Ning, 2002; Gibbs and Kraemer, 2004; Tan et al., 2007). Last but not least, cost is a factor that cannot be undermined in the adoption of EC technology in developing countries as it was found that the overall cost of technology in some developing countries is still relatively higher than manual labour cost (Vatanasakdakul, 2004).

2.2   Organisational context

Top management of an organisation is commonly identified as an important factor for any technology adoption within an organisation. Management support can increase awareness of the potential of the technology, provide support for technology infrastructure, and offer training to use the technology (Rotchanakitumnuai and Speece, 2003; Grover, 1993; Iacovou et al., 1995; Crook and Kumar, 1998; Scupola, 2003). Financial resource plays an important role in the adoption process of a more advanced technology, which has a wider impact on the organisation and the whole supply chain (Kurnia and Johnston, 2001a). Typically small firms are slower in adopting innovations due to their limited financial resources (Iacovou et al. 1995; Kuan and Chau 2001). Finally, organisational readiness in

terms of competent internal IT expertise, level and availability of IT resources and IT knowledge, can have a great impact on the technological capability of organisation to adopt a technology (Iacovou et al., 1995; Kurnia and Johnston, 2001a; Rotchanakitumnuai and Speece, 2003; Kurnia, 2008).

2.3 External Environment context

Competitive pressure can strongly influence an organisation to adopt EC initiatives and it may affect an organisation's perception toward a technology. If competitors adopt EC, an organisation may try to imitate, or if pressured by their trading partners, then technology adoption becomes compulsory (Kirby and Turner, 1993; Thong and Yap, 1995; Iacovou et al., 1995). Moreover, government support can either directly or indirectly affect the diffusion of the Internet and EC in terms of creating a favourable environment and impetus for IT and EC adoption (Iacovou et al., 1995; Kuan and Chau, 2001; Gibbs and Kraemer, 2004; Tan and Ouyang, 2006). A strong and reliable legal frameworks and government regulations that cover topics such as legal protection for e-Commerce activities, taxation of Internet sales, and privacy and security issue proves to be crucial in E-Commerce adoption in developing countries (Gibbs et al., 2003, Humphrey et al., 2003; Hawk, 2004; Kurnia, 2008). There is also a strong relation between EC adoption and national infrastructures, for example telecommunication and transport infrastructure (Hawk, 2004; Humphrey et al., 2003), Internet connectivity reliability and bandwidth speed (Wolcott and Goodman, 2003; Hawk, 2004; Wahid, 2007), and technology standards (Stockdale and Standing, 2004). Finally, cultural factors such as preference in using existing personal networks and face-to-face interactions over technology to share information, resistance to change, and unwillingness to change current business culture and practices can also influence EC adoption in developing countries (Vatanasakdakul, 2004Humphrey et al., 2003).

3 MULTIPLE CASE STUDY

The study employs a multiple case study approach (Yin, 2003) in exploring the B2B EC adoption in the Indonesian grocery industry. The research is at the theory building stage (Shanks and Arnott, 1993), contributing to the knowledge accumulation related to technology adoption particularly in the context of developing countries. Several companies, both local and foreign-owned companies, ranging from manufacturers, distributors, and retailers, within the Indonesian grocery industry were selected for the case study.

Company	Type	Ownership	Interviewee(s)	Interview Period *	Annual Revenue
A	Manufacturer	Foreign	Unit Account Manager	1,2	US$ 79 bill. (Worldwide)
B	Manufacturer	Foreign	Business Logistics Manager	2	US$ 2 billion
C	Manufacturer	Local	Managing Director Head of IT	1,2 2	US$ 500 million
D	Distributor	Local	Business Manager, Director	2	n/a
E	Distributor	Local	Managing director	1	n/a
F	Distributor	Local	Owner	1	n/a
G	Retailer	Foreign	IT Director	1,2	US$ 632 million
H	Retailer	Local	VP Logistic, Head of IT, Operational Manager	2	US$ 665 million

* Interview period: 1 (Oct 2008 – Feb 2009), 2 (Dec 2009 – Jan 2010)

Table 1.   Overview of Multiple Case Study Participants

Several interviews with various key people involved in IT-related functions within those companies were conducted from two field trips in Jakarta (in the period of October 2008 – February 2009 and December 2009 – January 2010). Interviews were semi-structured with open-ended questions and were recorded upon official signing of a disclosure and confidentiality agreement with the interview

participants. Follow up phone interviews were conducted afterwards and further company-related digital artefacts were gathered. Once recorded, these interviews were then subsequently transcribed for further qualitative data analysis, using a three-level approach of open coding (initial grouping of themes from original transcripts based on factor-level of TOE framework), axial coding (themes linking and higher-level analysis), and selective coding (in-depth and cross-case analysis) techniques (Neuman, 2006). An overview of the participants of the multiple case study is given in Table 1.

Neuman (2006) defines unit of analysis as the unit, case, or part of social life under consideration. Unit of analysis is essential in concept development, empirical measurement or concept observation, and in data analysis. This study uses a single organisation within the Indonesian grocery, as the unit of analysis. However, since some participants have trading relationship with each other, when describing the B2B EC technologies or initiatives in use by the participants, we may include the trading partners involved for clarity.

4   THE STUDY FINDINGS

In this section, we describe various B2B EC technology initiatives currently adopted by the organisations involved in our study as well as major driving factors and barriers that have been experienced by the participants in the course of adoption.

4.1   B2B EC technologies / initiatives

As shown in Table 2, all organisations have used the barcode system and a range of EDI capabilities. In addition, some also embrace other B2B EC concepts such as VMI and cross docking. However, only two organisations have matured enough to adopt the CPFR practice. Each of these B2B EC initiatives is explained briefly below.

4.1.1   Barcode

Product numbering and automatic identification system in a form of barcode technology (including barcode printer and scanner) are commonly used by all participants. The barcode system in use was established in 1993 based on the European (EAN) product numbering system (Walker, 1996; Johnston, 2000) and is also known as the Global Standard 1 (GS1) system (GS1 Australia, 2010). The adoption of barcode within the industry was mainly driven by the large retailers in the early 1990s. There are still many small manufacturers that are not capable of producing barcodes for their products. In this case, retailers need to create their own internal barcodes.

B2B EC Initiatives		Manufacturer	Distributor	Retailer
Barcode		All	All	All
EDI	Web portal	C	E	G
	3rd party	A, B	-	G, H
	PDA	A, C	D, F	-
VMI		A, B, C	D, F	H
Cross docking		A, C	D, F	-
CPFR		A	-	G

Table 2.   Overview of the B2B EC technology initiatives used by the participants

4.1.2   Electronic Data Interchange (EDI)

EDI is an Inter-Organisational System (IOS) that allows electronic structured business information exchange between different applications of various trading partners (Iacovou et al., 1995). With the traditional EDI implementation, EDI messages have to be structured according to a particular standard

(such as EDIFACT or ANSI X.12 for International standard). However, the Internet is becoming an alternative transmission medium, which results in a new type of EDI, called the 'Internet EDI' (Mak and Johnston, 1998; Johnston, 2000). EDI technology, in a form of an Internet-based B2B web portal, is used by Company C, E, and G. The B2B web portal serves as a platform for exchanging purchase order (PO) documents electronically between the Retailer (Company G) and its suppliers, which replaces the old-fashioned fax-systems. Companies B and G, however, implement the most advanced version of EDI, through direct Internet-based third party EDI services, based upon XML standards. In this scenario, the Retailer (Company G)'s server is directly connected to the manufacturer (Company B)'s servers, via a third-party EDI provider. Similar to the previous example, Company B (Manufacturer) and H (Retailer) also implement direct Internet-based third party EDI services, based upon text file standard. Companies A and C (both manufacturers), together with their respective distributors (Companies F and D) implement EDI by using PDA devices as a tool to capture store-level sales transaction data. These devices are used by the sales and marketing personnel of the distributors, which act on behalf of the manufacturers, to help sales transactions and automate order-picking process from the outlet of the smaller retailers.

4.1.3   Vendor Managed Inventory (VMI)

VMI is a replenishment initiative in which manufacturers are responsible for replenishing retailer store inventory based on sales transaction data from the retailers. Moreover, it gives the manufacturer a greater visibility of consumer's purchasing patterns. VMI requires EDI capability of all parties involved to share sales data (Johnston, 2000; Kurt Salmon Associates 1993). Companies B and H have been employing the VMI (Vendor Managed Inventory) initiative as part of their long-term strategic joint-project commitment since 2007/2008. Through VMI, the retailer (Company H) trusts the manufacturer (Company B) to manage and maintain its inventory level by sharing its sales data and inventory level with the manufacturer periodically, through EDI. Between Companies A and C (both manufacturers) and their respective distributors (Companies F and D), VMI is achieved through the use of PDA devices initiated and provided by the manufacturers (through their distributors) to closely monitor and forecast customers' (Retailers) inventory level. When visiting customers' outlets, sales personnel of the Distributors, who act on behalf of the manufacturer, controls and forecasts customer's inventory level and proposes new orders in close collaboration with the customers.

4.1.4   Collaborative Planning Forecast Replenishment (CPFR)

CPFR is an initiative that envisions two or more trading partners exchange market information and work closely together in developing a joint market-specific business plan. It leverages collaboration between retailer and manufacturer and requires an infrastructure that can facilitate high-level information exchanges, a sophisticated forecasting system, and an integrated logistic system (Ham et al., 2003). Company A (Manufacturer) and Company G (Retailer) can be considered to have the most mature relationship and sophistication of B2B EC initiative compared to other participants, reflected by a form of CPFR activities, known as the 'Joint Business Plan'. In a Joint Business Plan, both organisations align all levels of activities including planning, forecasting, monitoring demand, and integrating other activities to achieve annual strategic objectives and mutual benefits.

4.1.5   Cross Docking

Cross docking, one of the distribution strategies involved in CRP, embraces the idea of a centralized DC without the use of buffer-stocks. It promises substantial cost saving with relatively simple technology to adopt, but requires good communication, cooperation, EC compliance and trust among trading partners (Kurnia and Johnston, 2001b). Cross-docking has been practised by Companies A and C (both Manufacturers) to serve smaller traditional stores. The suppliers (Manufacturers) have full visibility of store-level inventory of the customers through their representatives (Distributors), who capture customers' store-level transactions using the PDA. Therefore, suppliers have the ability to monitor and identify specific store orders requirements at any given time. Goods are packed for

each store at suppliers' site, delivered to the warehouse of the distributors, checked, and immediately dispatched to customers without any sorting.

4.2   Driving Factors for B2B EC Technology Adoption

Guided by the TOE framework, the case studies reveal five main factors driving the participating companies to adopt B2B EC technologies in managing their supply chain. Three of the factors are related to the external environment context, one belongs to the technological context and the other one belongs to the organisational context. These factors are summarised in Table 3 and discussed below.

Role	Manufacturer			Distributor			Retailer	
Company	A	B	C	D	E	F	G	H
Technological Context								
Perceived Benefits	V	V	V	V	V	V	V	V
Organisational Context								
Top Management Support	V	V	V	-	-	-	V	V
External Environmental Context								
Foreign Influence	V	V	-	-	-	-	V	V
Coercion	-	-	-	V	V	V	-	-
Influence of Large Organisations	-	-	-	V	V	V	V	V

Table 3.   Overview of Driving Factors

4.2.1   Perceived Benefits

The first force driving the adoption of B2B EC technologies among the participants is the perceived benefits of technologies. Most organisations find that this is a very crucial factor in every technology initiative they decide to pursue. Some of these perceived benefits include accuracy, speed, efficiency, which all finally lead to cost savings for the organisations. Some of these benefits are mentioned to be the main driving factor behind the pursuit of B2B EC technology, such as Barcode, EDI, and cross-docking. Other B2B EC initiatives such as the handheld PDA system are perceived to have additional benefits. Apart from speed and efficiency, other benefits of implementing them include: 1) ability to control and monitor human factors, imposing discipline and strict policy to ensure sufficient level of salesmen performance, 2) ability to increase information visibility for both its own employees and external customers and, 3) ability to maintain good relationships with trading partners by maintaining the face-to-face interactions. As technology adoption usually would require huge investment capital, it is thus very important for organisations to foresee the perceived benefits to be gained from such an investment in advance.

"We need to do things more efficient and faster. Automation (The PDA) reduces human errors, which results in efficiency and speed that leads to more sales. It increases our speed of processing data. Also it helps to control and impose disciplines on our salesmen. We can track down all their activities in the field."   - Managing Director, Manufacturer (Company C)

4.2.2   Top Management Support

The next crucial driving factor for technology adoption in the Indonesian grocery industry is the support and commitment from top management. This has proved to be essential in most initiatives, especially in large organisations with a typical top-down organisational hierarchy approach. Top management support leads to a strong commitment and less resistance from employees in the lower level when new technology initiative is pursued, leads to an organisational structure which puts innovation and IT as a critical function within the organisation, and ensures a clear line of communication down to the lowest level of organisation from. Interviews with the participating manufacturers and retailers revealed the importance of top management support in the adoption of B2B EC initiatives. With the participating distributors, no evidence obtained regarding the support

from top management. Distributors are relatively smaller in size and less powerful than manufacturers and retailers. All distributors in our study are engaged in B2B EC initiatives because they were required to do so by their larger trading partners.

4.2.3 Foreign Influence

The case study indicates that the presence of foreign multinational companies (MNC) is one of the most important factors that influences the adoption of new technology in general, and B2B EC technology in particular, within the Indonesian grocery industry. Foreign MNC, usually with its already advanced IT system and practices, often brings this expertise upon entering the country by imposing and supporting its local branches to also implement the same IT practices. The headquarters of these MNCs give full support and provide the required IT infrastructure, knowledge, expertise, support, and other forms of resources to their local branches. This driving factor is strongly present in Companies A, B, and G, which are all foreign MNCs. The influence of foreign headquarters of the MNCs is felt not only at the beginning of their establishment in the country, but stays as a constant driving force that strongly influences further technology adoption process throughout the journey of these participating organisations. This causes local branches and their employees to be more 'IT-savvy', more aware of new technology innovations and new trends in the industry, and more importantly, what potentials they could have on their organisations. These foreign MNCs also influence the whole industry and its local players in regards to the introduction and usage of new technology, as revealed below

"Foreign companies surely influence technology adoption in the local industry as well. They are the trend-setters when it comes to new technology initiatives. For example, VMI was initiated and directed in the beginning by our Australian manager who already had 30 years of experience in supply chain and logistics."   - Vice President Logistics, Retailer (Company H)

4.2.4 Coercion

The multiple case studies indicate that organisations in the Indonesian grocery industry also often use force or threats to persuade unwilling parties or trading partners to take part in the technology adoption process. This is a process known as coercion and it proves to be a very strong factor in the technology adoption process in the Indonesian grocery industry. For example Company G as a large retailer is in the position to force its distributors (Company E) to use its B2B web portal due to its higher bargaining power. Meanwhile, in the case of the handheld PDA system, the coerced party consists of smaller distributors (Companies D and F). Incompliance to this requirement could lead to the termination of contract for these distributors by the larger manufacturers. Internally, unwillingness of the salesmen to comply with the requirement from their employer to adopt the PDA could cost their jobs at the company. Through coercion, these companies could prevent or suppress any resistance to the adoption of new technology initiative from their unwilling employees or trading partners.

4.2.5 Influence of Large Organisations

Larger organisations, which usually have higher bargaining power compared to their smaller trading partners, often influence the direction of most B2B EC technology adoptions. Therefore, as expected, 'influence of large organisations' has been identified as a major driving force in technology adoption process in the Indonesian grocery industry. This is evident for example by how Company E, a distributor, is influenced by Company G, a large retailer, to make use of its EDI solution (B2B web portal) through various free seminar and informational sessions offered by the retailer, or by how Companies D and F, both distributors, are influenced by Companies A and C, in making use of the handheld PDA for the distributors' salesmen, again through various training and awareness programs initiated by the larger manufacturers. Similar examples are also found in the adoption of VMI technique, where a large manufacturer, Company B, influences a large retailer, Company H, to adopt VMI by offering them help and support to forecast its stock-level. These large organisations impose technology adoption to their smaller partners with the hope to attract more actors in the industry to use

the their chosen technology, thereby reducing the overall cost of the technology in general and gaining more bargaining power over these smaller partners.

4.3 Barriers to B2B EC Technology Adoption

Besides driving forces, there are six important barriers to B2B EC adoption that have been identified from the multiple case study that stem from the technological, organisational and external environmental contexts. They are summarised in Table 4 and discussed below.

Role	Manufacturer			Distributor			Retailer	
Company	A	B	C	D	E	F	G	H
Technological Context								
High Technology Cost	V	-	V	V	V	V	V	V
Organisational Context								
Incompetent Human Resource	V	-	V	V	-	-	-	V
External Environment Context								
Incompatible Culture	V	-	V	V	V	-	-	-
Lack of Critical Mass	-	-	-	V	V	V	V	-
Weak Government Regulations	V	-	V	-	V	-	V	V
Lack of Infrastructure	V	-	V	-	V	-	-	V

Table 4.   Barriers to B2B EC Technology Adoption

4.3.1   High Technology Cost

Within the technological context, high cost of technology is found to be one of the main obstacles for almost all of the participating organisations when deciding to adopt new B2B EC technology initiatives. Some particular examples of this cost barrier' to B2B EC technology adoption in the case studies include: 1) The reluctance of smaller suppliers (Manufacturers) to pursue Barcode technology when they find out that there are service fees required by the retailers (Companies G and H) and other necessary investment costs involved. This has caused smaller suppliers sometimes to withdraw their decision to adopt the new technology. 2) The high price of PDA unit was found as a major difficulty for the manufacturer (Companies A and C).

4.3.2   Incompetent Human Resources

Human resource readiness is also a major barrier in technology adoption initiatives in Indonesia. Low level of education among Indonesian workforce is a reality mentioned by several organisations that affects this human resource factor. For example, this poses a major challenge in implementing and enforcing the use of PDA for the manufacturers (Companies A and C) and the distributor (Company D) due to often undisciplined, dishonest, and unprofessional way of work of some salesmen and floor workers. Also with this PDA introduction, another challenge is posed in which each salesman is required to adapt and improve themselves more to a role as an 'analyst', rather than just a 'salesman'. For this role transformation to be successful, more analytical and critical thinking along with better knowledge of the overall business will be required from these salesmen. This clearly presents a big challenge for any company in Indonesia.

4.3.3   Incompatible Culture

Culture cannot be underestimated in its impact on technology adoption in developing countries. It is beyond the control of an organization. Its values, perceptions, and principles related to general business conduct, have been established long over time within a certain society. We found that there was a certain degree of resistance among the salesmen when the PDA system was first introduced.

This was experienced by both manufacturers (Company C and A) and distributors (Companies D and F). Salesmen often resisted to change and refused to go out of their "comfort zone". This might relate to the general culture of Indonesian people who are a bit more conservative (also in terms of technology) and pretty cautious when new findings require them to change their usual habit or way of working. Because of this, people often feel that their old way of working is better and less complicated, thus making them less enthusiastic about new technology venture. People are sceptical and already have a certain pre-judgment that "new things" are not good for them. Secondly, the importance of face-to-face communication and personal networking are also strong characteristics of East Asian culture that are still ingrained in every aspects of conducting business. In Indonesia, it is still very important and preferred to meet directly face-to-face with business partners when it comes to business relations. Good relationship with partners sometimes goes beyond the technology itself and can guarantee greater success than technology alone.

"Our culture is very different from Western culture. In our culture, people tend to sit within their comfort zone and do not want to change. People sometimes are afraid of new things and do not want to learn and adapt. They are sceptic that these new things are of bad influence and will harm them."

- Head of IT, Manufacturer (Company C)

4.3.4 Lack of Critical Mass

Another barrier within the external environmental context is that there is a small number of organisations that make use or aware of a particular technology. This is evident mainly in the early days of the implementation of barcode (Company G) and PDA introduction (Companies D and E). During the barcode implementation, this lack of critical mass has caused difficulties to Company G (Retailer) to find necessary supporting infrastructure and partner participants to fully implement the barcode solution in its supply chain. Because of this, the retailer experienced a very slow take-off during the early days of barcode implementation, as it was still very hard for the Retailer to sell the idea and convince its trading partners (Manufacturers) to join the barcode movement. Meanwhile, in the case of PDA implementation, both distributors (Companies D and E) mention that it is still very hard for them to find a market and have enough customers to use such an advanced system, and, therefore, it is also difficult to find a good justification of the return/profit they can get from such an expensive technology venture.

"We are the first company in the grocery industry to implement barcode. During the first years (1990s), nobody in Indonesia knows anything about it. It was very hard to find the papers, printers, and equipments because nobody sells them."   - IT Director, Retailer (Company G)

4.3.5 Weak Government Regulations

There exist no real government regulations that regulate the use of IT in the country. As such, this poses a big threat and a great uncertainty for most actors when deciding to pursue new technological initiatives. Most organizations, for example Company E, a distributor, are therefore, still a bit reluctant or not willing to be adventurous enough in their discovery for new technological innovations. Because of this unclear laws on IT, software piracy and other violations to electronic intellectual property are still a major issue in the country. Other examples of how Indonesian government regulations strict technology adoption can also be seen by the fact that they still require organisations to provide original printed invoice for official taxations. Therefore according to an IT director in Company G, a large retailer that although Electronic Fund Transfer (ETF) is already a common practice among organisations, they still do not exchange invoices electronically with other capable trading partners.

4.3.6 Lack of Infrastructure

Insufficient Internet infrastructure is clearly a major difficulty in the technology adoption process in Indonesia. Internet speed in some places is still slow and Internet coverage remains very limited only to major urban areas. Moreover, in rural areas, Internet connection is still considered costly and can

only be afforded by a small fraction of the population. This unfavourable condition has affected smaller suppliers and distributors in remote areas who have limited internet access in conducting business with Company H (retailer) via its B2B web platform. This is worsened by the fact that during peak hours, Internet connection becomes even more sluggish and less reliable. As a result, business processes that rely heavily on smooth Internet connection are affected. High-speed connection Internet is still considered expensive and a luxury. According to the Head of IT in Company H, a retailer, due to this unreliable Internet connection, frequent connection breakdown is inevitable, causing critical functions within organisations to stand still when the Internet is down, leading to an extensive amount of loss reflected in number of sales transactions missed.

5   DISCUSSION AND CONCLUSION

By employing the TOE framework, in this study we have investigated various B2B EC technologies adopted within the Indonesian grocery industry, along with its driving factors and barriers. It is particularly interesting to note that most factors found affecting EC adoption in the Indonesian grocery industry come mainly from the external environment context, rather than from technological or organisational contexts. Moreover, the TOE framework has proved to be suitable and useful when using organisations as the unit of analysis since it enables us to focus on certain context-related factors and to further explore those factors. Although there have been some scepticism about the relevance and perceived benefits of EC technologies for developing countries (Vatanasakdakul, 2004), this study shows that benefits offered by B2B EC are still appealing and attractive for organisations within the Indonesian grocery industry to improve process efficiency. Large organisations and foreign organisations, often with their greater financial capital and bargaining power, have created power imbalance within the industry. This results in a situation where smaller organisations often have to adhere to the requirements of their larger trading partners. The issue of power imbalance is also identified in the Chinese grocery industry, where large retailers often influence small manufacturers and distributors in their technology adoption (Kurnia, 2008). Moreover, despite the negative perception of the exercise of coercion (Gibbs and Kramer, 2004; Kurnia, 2008; Iacovou et al., 1995), it proves to be an effective approach to impose technology adoption especially to overcome cultural difficulty in Indonesia, where face-to-face contacts and personal networks are still important. Moreover, when coercion is coupled with willingness of large organisations to provide support and costly infrastructure to smaller players, this can lead to an intriguingly positive outcome in terms of B2B technology adoption. Interestingly, the presence of Government support factor, which is one of the most frequently cited driving factors in many studies of EC adoption in developing countries (Seyal et al. 2007; Gibbs and Kramer, 2004; Kurnia, 2008), is not identified as an important factor in this study. Thus, although government support is minimal, the industry seems to be proactive and self-sufficient in B2B EC technology adoption. However, the legal framework such as the requirement to have printed invoices may hinder the adoption of a complete electronic trading system as achieved in many developed countries (Johnston, 2000).

Cost of technology, as identified by Vatanasakdakul (2004) in an e-Commerce adoption study in Thailand, is also one of the major barriers to technology adoption in Indonesia. As cost of new technology is relatively higher, compared to manual labour cost, many organisations particularly small to medium sized enterprises are still not interested in IT investment. Last but not least, the importance of culture as a major barrier in e-Commerce adoption in developing countries can not be underestimated. This is also observed by Vatanasakdakul (2004), Kurnia and Peng (2010) and Humphrey et al. (2003), who recognize the importance of maintaining personal network contacts through regular face-to-face meeting, and a strong preference towards using traditional way of work over using technology. However, although many employees are still conservative and not willing to change business practices, the introduction of most B2B EC initiatives has been a relatively smooth process due to the culture of following mandates from senior managements. This might be explained by the high 'power distance' characteristic some developing countries including Indonesia, as opposed to developed countries (Hofstede, 1997), where people are expected to be instructed and led by a more senior and respected party.

We believe this study adds richness to the current literature by offering better understanding in the area of B2B EC adoption in developing countries, complementing the findings of other previous studies in similar area in developed countries and providing some directions for future research. For the industry, the findings of this study offer valuable insight into the current application of B2B EC technology initiatives in the Indonesian grocery industry. It is useful to see which B2B technologies are relevant and currently in use and how the B2B EC vision of having paperless trading can be achieved differently by organisations in Indonesia as an example of a developing nation. This understanding is especially beneficial for most local players within the industry should they wish to keep up with the latest B2B EC technologies and initiatives to stay competitive with any foreign-based companies in the ever-more competitive and saturated grocery industry. The identified driving forces and barriers are also useful for organisations to assess their position and devise an appropriate adoption strategy. In addition, the findings help understand the current situation of e-Commerce within the Indonesian grocery industry and thus guide other countries particularly developed countries in devising strategies to deal with organisations within the Indonesian grocery industry more effectively and efficiently as they extend their supply chains.

For academics, while the TOE framework has helped us explore those factors affecting the adoption of B2B EC technologies in Indonesia, particularly the driving forces and barriers to adoption, the framework only allows limited flexibility to capture the dynamic changes of various factors and their impact throughout the course of adoption process over time. In particular, our study has demonstrated that when studying the adoption of technologies that transcends organisational boundaries, limiting the unit of analysis to a single organisation simplifies and gives a better control over the study design and analysis process to enhance rigour. However, a complete understanding of the adoption phenomenon can only be obtained by acknowledging the inter-organisational nature of such technologies / initiatives which require the unit of analysis to be extended (Kurnia and Johnston, 2000). Therefore, although the unit of analysis of this study is individual organisation, detailed examinations of the technology adoption experience by the participants would naturally lead to the inclusion of the interactions between the focal organisation and their trading partners. Thus, to complement the findings of this study, a further study that involves a larger unit of analysis such as pairs of organisations (dyads) or supply network would be useful to further explore the inter-organisational interactions to better understand the adoption phenomenon and what could be done to achieve successful adoption. Similar studies involving other industries in Indonesia and other developing countries would also complement the findings of our study. Last but not least, it would also be interesting to explore the cultural aspects of technology adoption in other developing countries, as well as developed countries, to compare findings and open up new discussions in this unexplored terrain.

References

Andel, T. (1994). Define Cross-Docking Before You Do It. Transportation and Distribution 35(11): 93-98

Bean, R. (2006). China, peoples republic of retail food sector all china retail annual report 2006. GAIN report CH6804, USDA Foreign Agricultural Service.

Charalambos L. Iacovou, Izak Benbasat, A. S. D. (1995). Electronic data interchange and small organisations: Adoption and impact of technology. MIS Quarterly, 9(4):465–485.

Chen, S. and J. Ning. (2002). Constraints on E-Commerce in less developed countries: the case of China. Electronic Commerce Research, 2: 31-42.

Chowdhury, A. (2003). Information technology and productivity payo in the banking industry: Evidence from the emerging markets. Journal of International Development, 15:693–708.

Crook C.W. & Kumar R. L., (1998). 'Electronic data interchange: A multidisciplinary investigation using grounded theory'. Information and Management, 75-79.

Gibbs, J., Kraemer, K. L., and Dedrick, J. (2003). Environment and policy factors shaping global e-commerce discussion: A cross-country comparison. The Information Society, 19:5–18.

Gibbs, J. L. and Kramer, K. L. (2004). A cross- country investigation of the determinants of scope of e- commerce use: An institutional approach. Electronic Markets, 14(2):124–137.

Grover, V. (1993). An Empirical derived model for the adoption of customer-based inter-organisational systems. Decision Science 24: 603-638.

GS1 Australia. (2010). Retrieved from http://www.gs1au.org/index.asp on 19th July 2010.

Ham, Y. N., Johnston, R. B., and Riemer, K. (2003). Complexity and Commitment in Supply Chain Management Initiatives. Proceedings on the Third International Conference on Electronic Business, Singapore.

Hartono, E., Li, X., Na, K. and Simpson, J. T. (2010). The role of quality of shared information in interorganizational systems use. International Journal of Information Management 30(5), 399-407.

Hawk, S. (2004). A comparison of B2C e-commerce in developing countries. Electronic Commerce Research, 4:181–199.

Hofstede (1997). Cultures and Organisations: Software of the Mind. McGraw-Hill, USA.

Humphrey, J., Mansell, R., Pare, D., and Schmitz, H. (2003). The reality of e-commerce with developing countries. Technical report, London School of Economics and Institute of Development Studies, Sussex.

Iacovou, L., Izak Benbasat, A. S. D. (1995). Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology. MIS Quarterly, 9(4):465–485.

Indjikian, R. and Siegel, D. S. (2005). The impact of investment in it on economic performance: Implications for developing countries. World Development, 33(5):681–700.

Johnston, R. B. (2000). Electronic commerce: opportunity and challenges, chapter 3: Principles of Digitally Mediated Replenishment of Goods: Electronic Commerce and Supply Chain Reform. IDEA Group.

Kartiwi, M. (2006). Case studies of e-commerce adoption in Indonesian SMEs: The evaluation of strategic use. Australasian Journal of Information Systems, 14(1):69–80.

Kartiwi, M. and MacGregor, R. C. (2007). Electronic commerce adoption barriers in small to medium-sized enterprises (SMEs) in developed and developing countries: A cross-country comparison. Journal of Electronic Commerce in Organisations, 5(3):35–51.

Kirby, D., and Turner, M. (1993) IT and the small retail business. International Journal of Retail and Distribution Management, 21(7): 20-27.

Kuan, K., and Chau, P. (2001). A perception-based model of EDI adoption in small businesses using technology-organisation-environment framework. Information and Management, 38:507-521.

Kurnia, S. (2008). Exploring e-commerce readiness in China: The case of the grocery industry. In The 41st Hawaii International Conference on Systems Sciences.

Kurnia, S. and Johnston, R. B. (2001a). Adoption of category management by the Australian grocery industry. In The Fifth Pacific Asia Conference on Information Systems, Seoul, South Korea.

Kurnia, S. and Johnston, R. B. (2001b). Adoption of efficient consumer response: The issue of mutuality. Supply Chain Management: An International Journal, 6(5):230–241.

Kurnia, S., Alzougool, B., Ali, M., and Alhashmi, S. M. (2009). Adoption of Electronic commerce technologies by SMEs in Malaysia. In The 2nd Hawaii International Conference on Systems Science, Hawaii, USA.

Kurnia, S. and Peng, F (2010). Electronic Commerce Readiness in Developing Countries: The Case of the Chinese Grocery Industry, Electronic Commerce, In-Teh publisher, Croatia.

Kurt Salmon Associates (1993). Efficient Consumer Response: Enhancing Consumer Value in the Grocery Industry. Washington, D.C., Food Marketing Institute.

Lertwongsatien, C. and Wongpinunwatana, N. (2003). E-commerce adoption in Thailand: An empirical study of small and medium enterprises (SMEs). Journal of Global Information Technology Management, 6(3):67–83.

Looi, H. C. (2005). E-commerce adoption in Brunei Darussalam: A quantitative analysis of factors influencing its adoption. Communications of the Association for Information Systems, 15:61–81.

Mak, H. C. and Johnston, R. B. (1998). Tools for implementing EDI over the internet. The Journal of Electronic Commerce, 11(1):44–56.

Martinsons, M.G., (2001). "Electronic commerce in China: emerging success stories", Information & Management, 39: 571-579

Neuman, W. L. (2006). Social Research Methods Qualitative and Quantitative Approaches.

Pearson.

Rotchanakitumnuai, S. and Speece, M. (2003). Barriers to internet banking adoption: a qualitative study among corporate customers in Thailand. International Journal of Bank Marketing, 21(6/7):312–323.

Rogers. (1995). Di usion of Innovations. Free Press, New York.

Scupola, A. (2003). The Adoption of Internet Commerce by SMEs in the South of Italy: An Environmental, Technological and Organisational Perspective. Journal of Global Information Technology Management, 6(1): 51-71.

Seyal, A. H., Rahman, M. N. A., and Mohammad, H. A. Y. H. A. (2007). A quantitative analysis of factors contributing electronic data interchange adoption among Bruneian SMEs. Business Process Management, 13(5):728–746.

Shanks, G. and Arnott, R. (1993). A review of approaches to research and scholarship in information system. In 4th Australasian Conference on Information System.

Stockdale, R. and Standing, C. (2004). Benefits and barriers of electronic marketplace participation: an SME perspective. The Journal of Enterprise Information Management, 17(4):310–311.

Tan Z. X and Ouyang W. (2006). China: over coming institutional barriers to EC. New York: Cambridge University Press.

Tan, J., Tyler, K., and Manica, A. (2007). Business-to- business adoption of ecommerce in China. Information and Management, 44:332–351.

Thong, J.Y.L. and Yap, C.S. (1995) CEO characteristics, organisational characteristics, and information technology adoption in small business. Omega, August, 23(4): 429-442.

Tigre, P. B. (2003). Brazil in the age of electronic commerce. Information Society, 19:33–43.

Tornatzky, L. G., Fleischer, M. (1990). The Processes of Technological Innovation. Lexington, M. A.

Turban, E., McKay, J., Marshall, P., Lee, J., Viehland, D. (2006). Electronic Commerce: A Managerial Perspective. Pearson Prentice Hall.

Utomo, H. and Dodgson, M. (2001). Contributing factors to the di usion of it within small and medium-sized firms in Indonesia. Journal of Global Information Technology Management, 4(2):22–37.

Vatanasakdakul, S., Tibben, W., and Copper, J. (2004). What prevent B2B E-commerce adoption in developing countries?: A socio-cultural perspective. In 17th Bled eCommerce Conference.

Wahid, F. (2007). Using the technology adoption model to analyze internet adoption and use among men and women in Indonesia. The Electronic Journal on Information Systems in Developing Countries, 32(6):1– 8.

Walker, D. (1996). Moment of truth for Indonesia's food retailers. International Journal of Retail and Distribution Management, 24(8):25–30.

Wolcott, P. and Goodman, S. (2003). Global di usion of the internet in India: Is the elephant learning to dance? Communications of the Association for Information Systems, 11:560–646.

Yin, R. K. (2003). Case Study Research Design and Method. SAGE Publications.

Zhu, K., Kramer, K. L., and Xu, S. (2006). The process of innovation assimilation by firms in different countries: A technology diffusion perspective on e-business. Management Science, 52(10):1557–1776.