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35F. E-Commerce Adoption and Acceptance by Firms: Exploratory Study

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Abstract

This study attempts to explore the internal and external factors affecting the adoption and acceptance of e-commerce by businesses in developing countries. It provides an exploratory analysis of surveying 524 firms in Abu Dhabi. In an attempt to specify the factors that encourage/deter e-commerce adoption by businesses, 14 factors (8 internal and 6 external) were surveyed. The results indicated that most of the firms were either at the first or second stage on the e-commerce 5-stage adoption ladder. This indicated that the e-commerce adoption is not matching and far less than the IT readiness of both the firms and the country.

Keywords

E-commerce, adoption intention, e-commerce acceptance

1.Introduction

The global exponential explosion of Internet usage as a business environment (e-commerce) is dramatically changing the way firms structure their strategies and business processes. The proliferation of e-commerce creates new challenges and opportunities for firms. Recently, e-commerce has emerged as one of the most active research areas in the field of information systems (Hong & Zhu, 2006). The potential of the Internet and web technologies is globally acknowledged. While some firms have benefited by adopting e-commerce, others have not been successful (Chatterjee, Grewal, & Sambamurthy, 2002; Thornton & Marche, 2003). Researchers and decision makers are struggling to determine the right conditions for adopting e-commerce, and what factors facilitate or inhibit them in adopting web technologies (H. H. Teo, Wei, & Bonbasat, 2003). This is why it becomes very useful to identify and categorize the factors affecting e-commerce adoption in order to determine the reasons why firms succeed or fail in the e-commerce adoption and acceptance.

This study categorized the critical factors of e-commerce adoption by firms into external and internal factors. The internal factors were classified to 8 factors: (1) Information Technology (IT) readiness, (2) Financial readiness, (3) Staff readiness, (4) Management support, (5) Firm strategy, (6) Firm culture, (7) Firm size, and (8) Anticipated benefits. The external factors were classified to 6 factors: (1) Global competition, (2) Local competition, (3) Customer pressure, (4) Laws and regulations, (5) IT infrastructure, and (6) Government nature. A questionnaire was developed to generate identifiers for each of the 14 factors. The questionnaire consisted of 95 items. The exploratory analysis presented in this paper may provide e-commerce adopters and future researchers with implications. The analysis is based on responses from 524 firms working in the Emirate of Abu Dhabi.

Abu Dhabi is the largest of the seven emirates that make up the United Arab Emirates. The emirate of Abu Dhabi is located in the oil-rich and strategic Persian Gulf region. It adjoins the Kingdom of Saudi Arabia and the Sultanate of Oman. The emirate borders the emirate of

Dubai to its north. Abu Dhabi city is the capital and second largest city of the United Arab Emirates. It is also the capital and largest city of the emirate of Abu Dhabi. It was said by CNN to be the richest city in the world and is located in the center of the northern part of the United Arab Emirates. The city lies on a T-shaped island jutting into the Persian Gulf from the central western coast. An estimated 1.8 million people lived there in 2006, with about an 80% expatriate population.

As the e-commerce definitions given by various sources differ significantly, it is important to adopt a clear and consistent definition of e-commerce that can be used across the surveyed research studies. The adopted definition is provided by (Kalakota & Whinston, 1996) and extended by (Turban, King, Viehland, & Lee, 2006). (Kalakota & Whinston, 1996) define e-commerce from the following perspectives:

- From a communication perspective, e-commerce is the delivery of goods, services, information, or payments over computer networks or by any other electronic means.
- From a business process perspective, e-commerce is the application of technology toward the automation of business transactions and work flow.
- From a service perspective, e-commerce is a tool that addresses the desire of firms, consumers, and management to cut service costs while improving the quality of goods and increasing the speed of service delivery.
- From an online perspective, e-commerce provides capability of buying and selling products and information on the Internet and other online service.
- (Turban et al., 2006) added the following:
- From a collaboration perspective, e-commerce is the framework for inter- and intra-organizational collaboration.
- From a community perspective, e-commerce provides a gathering place for community members, to learn, transact, and collaborate.

This paper is organized as follows. First, the published factors affecting the firms' adoption of e-commerce are reviewed. Second, a new factor categorization is proposed. The research methodology is presented in the third section. Concluding remarks and future research are introduced in the last section.

2.Literature Review

2.1. E-Commerce Adoption Factors

Based on information system diffusion circuit proposed by (Swanson, 1994), the adoption factors can be classified into two categories: internal and external. The external factors represent the external push force for the adoption and the internal represents the internal pull force to the adoption. (Sohn & Wang, 1998) adopted Swanson's categorization and considered several factors within each category. They considered 5 internal factors namely inclination toward new technology, top management support, existence of champion, absorptive capacity and cost incentive. Within the external factors category, they included three factors: institutional support, competitor's move, and customer pressure.

Exploring barriers to e-commerce adoption, (Hsiao, 2001; Iacovou, Benbasat, & Dexter, 1995; Kumar & Crook, 1999; Premkumar & Ramamurthy, 1995) concentrated on internal technological factors and organizational (both inter- and intra-organizational) factors. (Riemenschneider, Harison, & Mykytyn Jr., 2002) used business anticipated satisfaction, social approval, and expected difficulty as three factors influencing the intention of

businesses to adopt e-commerce. (Ranganathan, Teo, Dhaliwal, Ang, & Hyde, 2001) in their cross-cultural research showed that the factors affecting e-commerce adoption by firms can be grouped into 6 categories: top management related factors, organizational factors, firm strategy related factors, project management factors, valuation factors, Internet IT environmental factors, collaboration factors, external IT environmental factors, and external business environmental factors.

(Min & Galle, 1998) identified mainly three strategic factors that influence successful adoption of e-commerce namely, environmental factors (laws and government regulations) organization characteristics (organization size) and technological factors (security). In an attempt to identify critical success factors in e-commerce adoption, (Godenhielm, 1999) interviewed 100 European firms. The interviews revealed 8 factors that can be grouped in two categories. The first is organizational factors (specifications of the adoption project, funding appropriateness, staffing, managerial support, existence of strategy) and the second category is environmental factors (competition, development partner, brand consistency). (Ryan, Abitia, & Windsow, 2000; Truong & Rao, 2003) provided a description of factors influencing the adoption of knowledge management technologies in the US and categorized them as organizational, technological, and environmental. (Tabor, 2000) analyzed and studied the strategy and firm characteristics related to e-commerce adoption. (Thatcher & Foster, 2003) studied the effect of cultural factors on the factors affecting e-commerce adoption decisions in Taiwan. In this study the factors affecting e-commerce adoption have been classified as organizational and extra-organizational (industrial, governmental and national culture)

Local and global Competition pressure has been identified as an important determinant of e-commerce adoption by several researchers (Dasgupta, Agrawal, Ioannidis, & Gopalakrishnan, 1999; Grover, 1993; Kraemer, Gibbs, & Dedrick, 2002; Steinfield & Klein, 1999; Zhu, Kraemer, & Xu, 2002). (Paul Chwelos, Izak Benbasat, & Albert S. Dexter, 2001) tested an Electronic Data Interchange (EDI) adoption model in which the factors had been classified to external pressure (competitive pressure, dependence on trading partner and industry pressure) and readiness (financial, information technology and trading partner readiness).

(Courtney & Fintz, 2001) stated that the factors that affect e-commerce adoption are useful in determining the reason why firms are at a certain level and categorized these factors as management and organization's characteristics. Both categories are internal factors. In an extension to this work, (Cloete, Courtney, & Fintz, 2002) added a third category and called it contextual characteristics. (van Akkeren & Cavaye, 1999) grouped the factors affecting e-commerce adoption by small businesses in Australia into two categories: manager characteristics and firm characteristics. Molla and Licker developed a perceived e-readiness model which identified contextual and organizational factors that affect E-commerce adoption in developing countries (Molla & Heeks, 2007; Molla & Licker, 2001; Alemayehu Molla & Paul S. Licker, 2005; Alemayechu Molla & Paul S. Licker, 2005). The model included two major factors: perceived organizational e-readiness and perceived external e-readiness. Molla and Licker's model was validated by (J. Tan, Tyler, & Manica, 2007) and applied on China. The study further analyzed the contextual and organizational factors that affect business-to-business E-commerce adoption in China. Their findings showed that the important inhibiting factors in China are restricted access to computers, lack of internal trust, lack of enterprise-wide information sharing, intolerance towards failure, and incapability of dealing with rapid change.

Tables 1 and 2 show a summary of the published internal and external factors influencing the e-commerce adoption decisions by firms.

Internal Factor	Ref
Technological	(Grover, 1993; Hsiao, 2001; Iacovou et al., 1995; Kumar & Crook, 1999; Min & Galle, 1998; Premkumar & Ramamurthy, 1995; Ryan et al., 2000; Sohn & Wang, 1998; H. H. Teo, Tan, & Wei, 1995; Truong & Rao, 2003)
Intra-organizational	(Anguila-Obra & Padilla-Melendez, 2006; Godenhielm, 1999; Hsiao, 2001; Iacovou et al., 1995; Kumar & Crook, 1999; Min & Galle, 1998; Premkumar & Ramamurthy, 1995; Ranganathan et al., 2001; Ryan et al., 2000; Sohn & Wang, 1998; Thatcher & Foster, 2003; Truong & Rao, 2003; van Akkeren & Cavaye, 1999)
Satisfaction & Valuation	(Ranganathan et al., 2001; Riemenschneider et al., 2002)
Social approval	Riemenschneider et al. 2002
Expected difficulty	Riemenschneider et al. 2002
Top management	Ranganathan et al. 2001; Courtney and Fintz 2001; van Akkeren and Cavaye 1999; Teo and Ranganathan 2004
Firm readiness	Chwelos et al. 2001; Molla and Licker 2005 ; Teo et al. 1995
Firm Strategy	Ranganathan et al. 2001; Tabor 2000; van Akkeren and Cavaye 1999
Project management	Ranganathan et al. 2001
Collaboration	Ranganathan et al. 2001

Table 1: Internal E-Commerce Adoption Factors

Based on the literature review presented, it can be concluded that the factors affecting e-commerce adoption by firms can be classified to two major categories: internal and external. Internal factors are within the firm while external factors are mainly environmental. Internal factors are divided further to subcategories. Each category can include several factors and indicators. In the next section, the e-commerce adoption factors, as applied to Abu Dhabi, are presented and categorized.

External Factor	Ref
Technological	(Min & Galle, 1998; Alemayehu Molla & Paul S. Licker, 2005; Ranganathan et al., 2001)
Inter-organizational	(Hsiao, 2001; Iacovou et al., 1995; Kumar & Crook, 1999; Premkumar & Ramamurthy, 1995; Ranganathan et al., 2001)
Environmental	(Godenhielm, 1999; Min & Galle, 1998; Ranganathan et al., 2001; Ryan et al., 2000; Thatcher & Foster, 2003; Truong & Rao, 2003)
Competition	<ul style="list-style-type: none"> (P. Chwelos, I Benbasat, & A. S. Dexter, 2001; Dasgupta et al., 1999; Grover, 1993; Kraemer et al., 2002; Steinfield & Klein, 1999; Zhu et al., 2002)

Table 2 : External E-Commerce Adoption Factors

2.2.E-Commerce Adoption

E-commerce has become a major factor determining the future survival or success of firms. e-commerce adoption refers to the firm's decision to provide the mandate and resources for the changes e-commerce can bring about, which in turn reflects the strategic intent of the firm on taking advantage of the interconnectivity and interactivity among the participants in e-commerce (Truong & Rao, 2003). Adoption of e-commerce by firms is defined as using computer hardware, software applications, Internet-based applications, and e-commerce to support operations, management, and decision making in the business. Following (J. Y. L. Thong, 1999), the adoption can be described and measured in terms of the likelihood of adoption and the extent of adoption.

It is so important to recognize that e-commerce activities range from entry-level activities such as having web browsers, web sites, and email, to sophisticated activities such as online payments, making purchases online, customer services, and video conferencing (Courtney & Fintz, 2001). (van Akkeren & Cavaye, 1999) state that the adoption of e-commerce practices is a progression and sophisticated technologies are unlikely to be adopted before those at the entry level have been successfully adopted. The entry-level activities provide the necessary technological infrastructure from which more sophisticated e-commerce activities can be developed.

Setting the goal of strengthening the ability of the British businesses to innovate, the UK government promoted the diffusion of new technologies to understand the opportunities and challenges of e-commerce (UK-DTI, 2000). An e-adoption ladder, adapted from Cisco led Information Age Partnership Study on e-commerce in UK Small Businesses (Cisco, 2000; UK-DTI, 2000), explains the progression of e-commerce adoption. E-Adoption ladder (shown in Figure 1) provides a picture of how businesses progress from relatively simple to more complex e-commerce activities. The adoption ladder is a useful tool to analyze where a business lies within the e-commerce adoption process.

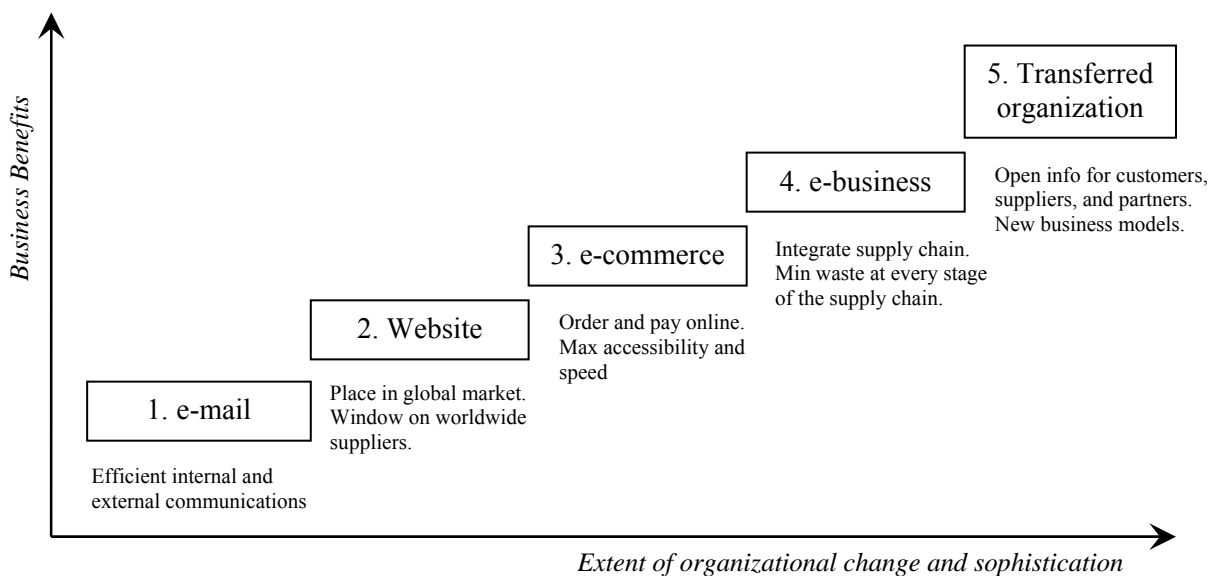


Figure 1: E-Adoption Ladder

Firms are at different levels of e-commerce adoption, as the firm implements the new changes the business is ultimately able to improve business efficiencies. The 5 steps that a firm may potentially advance through are (Cisco, 2000; Courtney & Fintz, 2001; UK-DTI, 2000):

Email	The use of email to send text messages, either to provide internal communication between staff or to allow communication between businesses and their suppliers and customers. In e-commerce, the focus is on the external use of email. Some elements of Electronic Data interchange (EDI) can also be regarded as messaging.
Website	The establishment of a website or e-mail list by a firm to publish or send information about its products and services, to provide customers with on-line access. The website may contain marketing information, prices and stock levels. This also applies to a firm's supply activities and the use of other businesses' websites to gather information on products and services or identify new suppliers. Checking the availability of products and services can also be done online.
E-Commerce	The online interaction between a firm and its customers, or a firm and its suppliers, for the placement of an order. Online activities include issuing or receiving an invoice and an electronic payment.
E-Business	The use of e-commerce to support the business relationship between a customer and a supplier, for example through the provision of interactive order progress tracking or online support. An integration of the supply chain links suppliers, manufacturing, and delivery, thus improving efficiencies and minimizing waste.
Transformed Firm	The final outcome is the integration of all these activities with the internal processes of a firm. The focus is customer service orientated.

Organizations throughout the world experience difficulty in information technology transfer. This problem is even more acute in developing countries, such as the emerging economies in the Arab world (Antonelli, 1994; Goodman, 1991; Knight, 1993). Although developing countries are eager to adopt new technologies, the process of adoption has been slow and the current utilization of IT is far below that achieved level in industrialized countries. While finances were not a problem for the affluent countries of the Gulf Countries Council (GCC) region, they have historically used far less than their available computing capacity (Attiyah, 1989; Ibrahim, 1985; Yavas, Mushtaq, & Quraesh, 1992) . With some notable exceptions, sporadic implementation and use are endemic throughout the Arab world (Cunningham & Srayrah, 1994).

Anthropological studies suggest that much of the technology designed and produced in developed countries is ethnocentric, that is, culturally-biased in favor of their own social and cultural systems. Consequently, developing countries encounter cultural and social obstacles when attempting to transfer technology, created abroad, into practice at home (Yavas et al., 1992).

A study, which used the Arab society as its setting, states that the Arab society has the most complex cultural and social system in the world (Straub, Keil, & Brenner, 1997; Straub, Loch, & Hill, 2001). The study tested the cultural influence model in the Arab region. Both quantitative and qualitative methods were used to validate and test the model. Furthermore, data analysis was based primarily on an Arabic-English questionnaire. In this study, primarily, findings indicate that specific cultural components of Arab culture have an

influence on how IT is viewed and the extent to which it might be utilized. Culture does not necessarily need to be viewed as a barrier that obstructs IT transfer. However, the study proposes using specific cultural components of culture in the IT transfer process will encourage the transfer process.

Looking at the world map, countries are at very different positions in the endeavor of building a national information infrastructure to develop e-commerce and encourage its adoption and acceptance. United Arab Emirates (UAE) as a small developing country on the Arabian Gulf has dedicated high investment to encourage information technology (IT) and e-commerce diffusion. The Emirate of Abu Dhabi, has contributed to promote e-commerce by developing one of the best telecommunication companies in the world (Etisalat). Recently, the telecommunication market has adopted a managed competition approach and introduced a second telecommunication company (du) to compete with the elite Etisalat. COMTRUST, a business unit of Etisalat, has functioned as a secure e-commerce infrastructure provider before being merged into eCompany in June 2004. E-Business solutions from eCompany offer businesses, governments and consumers a cost effective, secure and convenient method of conducting online transactions. Whether it is business-to-business or business-to-consumer segments, eCompany offers a comprehensive range of end-to-end solutions based on its advanced and reliable infrastructure located at its data centers in Abu Dhabi and Dubai.

This research fits nicely in the landscape of e-commerce infrastructure and promotion environment in Abu Dhabi, UAE, and similar developing countries. A survey instrument is developed to test hindrances and drivers of e-commerce diffusion among firms working in Abu Dhabi.

2.3.E-Commerce Adoption Factors Categorization

Based on the literature review presented in the previous section, a classification framework is proposed and shown in Figure 2. The factors affecting e-commerce adoption decisions by firms are classified to two major categories: internal and external. Internal factors are within the firm while external factors are mainly environmental. Internal factors are divided further into subcategories.

The literature revealed several factor categories that fit within the internal factors group, see Figure 2. The first is information technology (IT) readiness which refers to the level of IT usage within the firm. This category includes information and network security, system integration, data conversion, hardware and software compatibility, adequacy of the firm IT infrastructure and migration from legacy systems (Grover, 1993; Hsiao, 2001; Sohn & Wang, 1998; H. H. Teo et al., 1995). The second internal factors category refers to the firm's financial readiness. Financial readiness is reflected by the top management willingness to fund an e-commerce adoption project. The major cost of e-commerce adoption is the cost of educating and training management and employees to use e-commerce (Anguila-Obra & Padilla-Melendez, 2006; H. H. Teo et al., 1995). Another concern of the top management is the loss in productivity due to abuse of IT (such as Internet). Staff readiness factor category refers to the IT and e-commerce literacy level inside the firm.

Management support is another important internal factor category. This category represents the extent to which the top management recognizes the importance of e-commerce adoption. This recognition is reflected on the support and leadership of top management executives in

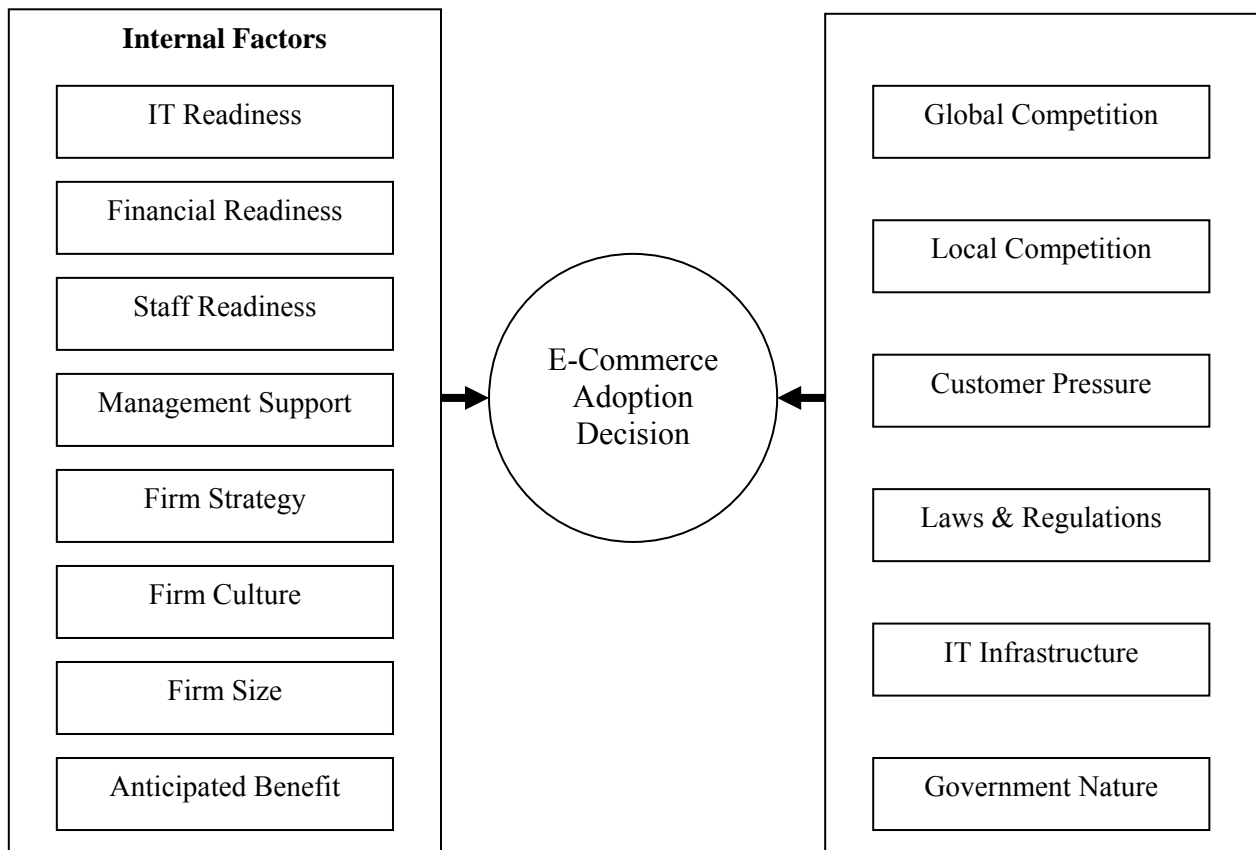


Figure 2. Factor Categories of E-Commerce Adoption Decision

e-commerce adoption process. This factor category has been identified as a key recurring internal factor that is critical to the effectiveness of e-commerce adoption initiatives (Grover, 1993; T. S. H. Teo & Ranganathan, 2004; J. Thong & Yap, 1995; van Akkeren & Cavaye, 1999). The existence of a firm strategy has been proven to be critical to the success of most of the e-commerce adoption projects (Godenhillem, 1999; Tabor, 2000). Firm internal culture refers to the collaboration level and style among the different managerial levels and team spirit and dedication to the business processes. Firm size is one of the determinants of e-commerce adoption decisions (Anguila-Obra & Padilla-Melendez, 2006). (M. Tan & Teo, 2000) found that small firm size is one of the main reasons for not adopting e-commerce. Larger firms have more resources and infrastructure to facilitate implementation of e-commerce adoption projects. The anticipated financial and managerial benefits are important factors affecting the adoption decisions.

Several external factor categories have been considered in the literature. Figure 2 shows 6 external factor categories. The first two categories include the pressure exerted by competitors on a firm. Teo et al. (1995); Grover (1993); Truong and Rao (2003); and Thong and Yap (1995) argued that competitive intensity increases the need for e-commerce adoption by firms. The competition leads to environmental uncertainty and increases the need and rate of adoption. (Allen, Colligan, Finnie, & Kern, 2000; Karake Shalhoub, 2006) emphasized the importance of trust in maintaining productive adoption of e-commerce. Culture has been considered as a critical factor affecting e-commerce adoption (Ranganathan et al., 2001; Hsiao, 2001). Customer pressure on firms to adopt e-commerce is also considered as an important category. Government nature is among the most important factor groups affecting

e-commerce adoption. The governments need to build knowledge and set standards. Policies and regulations are also important factors at the local and global stages.

The factor structure shown in Figure 2 is used as a frame within which indicators and items are generated to measure each internal and external factor separately. An instrument was developed which includes 95 indicators to measure the 14 factors and an additional section used in getting general information about each firm included in the study.

3. Research Methodology

3.1. Participants

The target population of this study was all firms in the emirate of Abu Dhabi. Small, medium, and large firms were within the scope of this research. A field survey method was adopted to survey the firms included in this study. A team of professional interviewers was hired to hold one-to-one interviews with executives and top-level senior managers who were qualified to answer questions about the firm's e-commerce activities and strategies. A 95-item questionnaire was developed to cover the 14-factor structure shown in Figure 2. The team of interviewers succeeded in collecting 524 responses. Table 3 shows the general information about the participating firms.

3.2. Instrument

Following the factor structure shown in Figure 2, an instrument was developed to answer the following questions:

- How firms perceive e-commerce?
- Are the firms ready to adopt e-commerce?
- What is the extent of e-commerce adoption in Abu Dhabi firms?
- What are the inhibitors of e-commerce adoption as perceived by firms' decision makers?
- What are the critical success factors of e-commerce adoption as perceived by firms that have adopted e-commerce already?
- What are the chances that the lagers will adopt e-commerce in the future?
- What is the satisfaction level of the surveyed firms with the online services provided by the Government of Abu Dhabi?

The internal factors effect on e-commerce adoption, as applied to this study, was measured using 8 factors:

Item #	Item Description	(%)	Item #	Item Description	(%)
1	Firm size:		2	Firm's primary business:	
	≤ 10	31.3		Agriculture	1.5
	11-20	21.4		National Resource Industries	2.9
	21-30	9.9		Contract Agency	2.1
	31-50	8.7		General Trading	23.9
	51-100	10.7		Training	1.1
	101-500	11.9		Insurance	1.0
	501-1000	2.6		General Contracting	6.7
>1000	3.4	General Maintenance	1.7		
3	Percentage of International sales:	45.7	Manufacturing Industry	1.1	
	0% - 20%	31.1	Commission Agency	17.4	
	20% - 40%	12.5	Services	8.8	
	40% - 60%	6.7	Consultancy	7.4	
	60% - 80%	4.0	Tourism and Travel	1.3	
	81% - 100%		Telecommunications	1.0	
4	How the product/service sold:		Commercial	5.7	
	Fixed contracts	25.6	Representation	3.4	
	Bulk sales	10.7	Commercial Agency	2.3	
	Direct to business	13.5	Financial Institute	3.2	
	Direct to customer	41.4	Medical	0.6	
	Other	8.8	Transport	0.2	
5	Primary market:		6	Percentage of purchases from international suppliers:	
	Abu Dhabi	52.6		0% - 20%	32.0
	United Arab Emirates	31.6		20% - 40%	16.9
	Gulf Countries Council	3.7		40% - 60%	10.9
	Middle East	3.3		60% - 80%	21.8
	World wide	8.9		81% - 100%	18.4
7	Number of PCs in the firm:		8	Number of phone lines in the firm:	
	≤ 5	30.1		≤ 5	59.6
	6-10	24.6		6-10	19.5
	11-20	17.8		11-20	10.2
	21-50	14.6		21-50	6.1
	51-100	6		>51	4.5
	>101	6.8			

Table 3 : Sample Firms' General Information

IT Readiness	Level of IT usage in the firm. This factor can be measured by the availability of information security, network security, information systems integration, data conversion, hardware and software compatibility, adequacy of the firm IT infrastructure, migration from legacy systems (measured by 6 items).
Financial Readiness	Is reflected by the willingness of the top management to invest in the e-commerce adoption process by training and educating the work force (measured by 13 items).
Staff Readiness	Refers to the IT and e-commerce literacy level inside the firm (measured by 2 items).
Management Support	Represents the extent to which the top management recognizes the importance of e-commerce adoption. This recognition is reflected on the support and leadership of top management executives in the e-commerce adoption process (measured by 3 items).
Firm Strategy	Measured by the existence of a firm strategy (measured by 8 items).
Firm Culture	Refers to the collaboration level and style among different managerial levels and team spirit and dedication to the business processes (measured by 7 items).
Firm Size	Small, medium, and large (measured by 1 item).
Anticipated benefits	Refers to both financial and managerial benefits (measured by 26 items).

The external factors effect on e-commerce adoption by firms was measured using 6 factors:

Global and Local Competition	Refers to the pressure exerted by global competitors and by local competitors (measured by 3 items).
Customer Pressure	When a major customer adopts e-commerce, firms are likely to adopt e-commerce (measured by 2 items).
Laws and Regulations	This includes the enforceability of electronic contracts, the legal jurisdiction of international transactions, intellectual property rights, copyright laws, and tax issues (measured by 3 items).
IT Infrastructure	Refers to the National Information Infrastructure (NII) available in the country (measured by 6 items).
Government Nature	Government policies that enhance the ability of the firm to compete in the marketplace have a strong positive influence on e-commerce adoption decisions (measured by 4 items).

4.Data Analysis – Internal factors

One of the essential components of e-commerce initiatives' success is the firms' Information Technology Infrastructure (ITI), and its readiness to accommodate e-commerce applications and transactions. Internal IT Readiness was measured by 6 indicators. Around 73% of the surveyed firms agreed that they had the adequate IT infrastructure (applications, databases, telecommunications...) for e-commerce, 73% had the adequate IT/e-commerce expertise, 42% of the surveyed firms said that there are limitations posed by existing IT infrastructure, 36% of the surveyed firms believed that there was a lack of inter-operability between e-commerce applications and those of business partners (suppliers, customers, etc), 34% stated that there were difficulties in integrating e-commerce applications into existing applications and legacy information systems.

The firm readiness to adopt e-commerce was measured by 13 indicators. Each indicator represented an e-commerce capability. Some of the capabilities were already available at most of the surveyed firms such as:

- Firm email was available at 82% of the surveyed firms,
- Internet dial-up access was available at 66% of the surveyed firms,
- Products/services database was available at 63% of the surveyed firms,
- Suppliers database was available at 60% of the surveyed firms,
- Internet access via dedicated or leased line was available at 58% of the surveyed firms,
- Customers database was available at 57% of the surveyed firms,
- Firm's website that shows products/services was available at 55% of the surveyed firms

Around 33% of the surveyed firms indicated that they already have had a firm strategy for developing e-commerce, 32.30% had placed orders with suppliers over the Internet, 31.90% had customer orders received through their Internet Website, 25.90% of the surveyed firms had customer services provided on the Internet, only 14.30% had the ability of making payments to suppliers over the Internet, and only 12.70% had customer payments by credit card through the Internet.

The staff readiness to deal with e-commerce applications was measured using two indicators. Around 37% agreed that there was an inadequate training on e-commerce for organizational staff, and 34% of the surveyed firms stated that there was not enough time to develop skills for e-commerce adoption. Approximately, 47% of the surveyed firms indicated that there was no lack of management support while 26% indicated lack of management support. Around 48% agreed or strongly agreed that there was no lack of senior management support to e-commerce initiatives in their firms while 24% confirmed the existence of a lack of senior management support. About 49% of the surveyed firms had no problem with the senior management awareness of e-commerce benefits while 24% of them referred to the lack of senior management understanding about potential benefits and issues related to e-commerce.

The firm strategic planning to adopt e-commerce was measured by 8 items, 62% of the surveyed firms agreed or strongly agreed that they had a strategic vision for e-commerce adoption, about 57% had a strategic plan for e-commerce adoption, and 51% had an alignment of e-commerce adoption plans and the firm plans. There was a proven and accepted business plan models for e-commerce adoption in about 46% of the surveyed firms. Half of the surveyed firms claimed that they had an adequate commitment of resources for e-commerce adoption. When asked about the time involved in e-commerce adoption, 33% of the surveyed firms did not think that the time needed was too much while 26% stated that the time needed to adopt e-commerce was too much. Around 22% of the surveyed firms indicated that there was a lack of communication among the organizational members on e-commerce adoption, while 37% indicated the opposite.

Touching on the difficulties that might be associated with e-commerce adoption, the surveyed firms were asked 7 questions. When asked about the difficulties in making organizational and management changes required for e-commerce systems, 37% confirmed the difficulties, while 32% indicated that there should be no difficulties with managing the changes required for e-commerce adoption. The flexibility of the current organizational structure was tested and 37% of the surveyed firms had difficulties changing their current organizational structure to fit e-commerce adoption while 32% did not. Regarding the adaptability of the firms' culture to accommodate e-commerce, 36% of the responded firms indicated that their

organizational culture had no problem to change to adopt e-commerce, while 32% indicated the opposite. Firms were asked if they would have problems re-engineering their business processes to fit e-Commerce initiatives, Around 35% confirmed that there would be difficulties in redesigning the business processes, while 32% had no problem with the business process re-engineering. Approximately, 33% of the surveyed firms indicated that they had e-commerce project champion(s), while 29% did not have champions to lead e-commerce projects. Respondents were asked if there were any difficulties in gaining cross-functional cooperation for e-commerce, 30% confirmed and 28% denied any difficulties. Firms were asked about the support of other departments to e-commerce projects, about 29% indicated that there was inadequate support from other departments for the e-commerce projects, while 35% had adequate support.

Benefit is one of the main goals firms are looking for, and if the firms are aware of the benefits of the adoption of e-commerce they will be more interested in adopting it. The majority of the surveyed firms viewed the improvement of information exchange with customers as important, only 19% viewed this benefit as not important. Around 60% of the surveyed firms viewed the increase in customer loyalty and retention due to adoption of e-commerce while only 18% viewed it as not important. Around 76% of the surveyed firms felt that increasing service to customer through e-commerce is either important or very important, while only 16% viewed it the other way.

Around 75% of the surveyed firms felt that the adoption of e-commerce is either very important or important to increasing the customer awareness of their products / services, while 16% felt that it is not important. Regarding the international market accessibility via e-commerce projects, 76% felt that achieving easier access to international markets was either very important or important, while about 15% felt that this factor is not important.

The majority (76%) of the surveyed firms perceived that expanding business reach through the use of e-commerce initiatives was either very important or important, while 14.5% perceived it as not important. When asked about the importance of e-commerce as a tool to reduce the cost of maintaining up-to-date company information, 62% of the surveyed firms perceived it as either very important or important, while 21% perceived it as not important. Around 70% of the firms felt that e-commerce was either important or very important in improving information exchange with the suppliers, while 16% felt the opposite. Regarding the importance of e-commerce to reduce the costs through web-based purchasing and procurement, 61% of the respondents felt that it is either very important or important while 20% felt that it is not important.

Regarding the importance of e-commerce adoption to improve their competitive position, 70% of the surveyed firms felt that it was either important or very important while 15% felt that it was not important. Approximately, 70% perceived that e-commerce adoption was either very important or important to attract new investments to the firm, while 19% perceived it as not important. Around 55% of the respondents felt that e-commerce could be very important or important to facilitate billing activities while 20% felt the opposite. When asked about the importance of e-commerce adoption in improving efficiency and effectiveness, 72% felt that it was either very important or important while 18% felt that it was not important. The majority (64%) of the surveyed firm felt that e-commerce provision of better information for management decision making was either important or very important, while 19% felt that it was not important to the managerial decision making..

Inhibitors to the adoption of e-commerce were tested by 8 items. The results were inclusive in 6 of them. Inhibitors to the adoption of e-commerce included the limited knowledge about the required e-commerce technology (34% agreed), 29% of the firms were not convinced of the financial and business benefits, 26% of the firms didn't have the financial ability and they felt that the costs of computers and network technologies were too high, and around 18% of them felt that the level of computerization was too low in their firms.

5.Data Analysis – External factors

The local and global competition was tested using three items. Around 49% of the surveyed firms indicated that it was easy for their customers to switch to another company for similar services/products, while 24% of them indicated the opposite. When asked about how intense the rivalry among firms in the same business, 67% of the firms indicated that it was very intense and 10% indicated that it was not intense at all. About 55% of the surveyed firms indicated that there were many products/services in the market which are different from theirs but perform the same function, while 15% indicated the opposite. The majority of the surveyed firms indicated that there was no pressure from the suppliers (55%) or the customers (61%) to adopt e-commerce.

Regarding the law and regulation that might affect the e-commerce adoption in Abu Dhabi, 32% of the responded firms either agreed or strongly agreed that there was a lack of clear legal environment for conducting e-commerce in Abu Dhabi. Regarding the legal issues involved in conducting electronic transaction with business partners, 32% of the surveyed firms indicated that these legal issues were complex. Around 18% agreed or strongly agreed that there were inconsistent taxation laws related to e-commerce in Abu Dhabi, while 26% indicated that the taxation laws were consistent.

The national IT Infrastructure is an essential factor of successful adoption of e-commerce by firms in Abu Dhabi. Table 14 and Figure 28 show summary of the responses of the surveyed firms to 6 items measuring the readiness of Abu Dhabi IT infrastructure as perceived by the surveyed firms. None of the 6 indicators provided conclusive results. When asked about the existence of unresolved security issues in Abu Dhabi IT infrastructure, 24% of the firms agreed or strongly agreed and 18% disagreed or strongly disagreed. Only 28% of the surveyed firms confirmed the existence of unresolved encryption issues in Abu Dhabi IT infrastructure while 17% had no problem with the encryption in the emirate. Approximately, 25% of the firms had problems with the authentication while 19% did not. Regarding the existence of adequate e-commerce transaction data and information protection, 33% of the responded firms confirmed and 14% had no problem with the current protection system. Around 39% of the firms felt that the current online payment system was adequate while 10% felt that it was inadequate. Only 26% of the surveyed firms perceived the Abu Dhabi IT infrastructure as robust and stable while 10% did agree with that perception

When asked whether firms use the electronic services provided by Abu Dhabi Government through the Internet, 60% of the surveyed firms used the services provided through the Internet while 40% did not. The majority of the surveyed firms that used the Abu Dhabi Government online services (65%) liked the online Abu Dhabi directory service, followed by 22% of firms liked all information available online, events & activities online service, and tenders services are the most liked services by surveyed firms for each. To improve the online services provided by the Government via the Internet, the firms that indicated that they did not use the online services were asked to specify the reasons for not using these services. Around 46% of these firms stated that they were not aware of such services. This meant that

around 18% of all surveyed firms were not aware of the Internet-based services provided by the Government. Around 21% of these firms didn't use these services because the provided services didn't suite their need, 11% mentioned that it was hard to access the services, around 9% mentioned that they didn't know how to use them.

Firms should be aware of the e-commerce benefits so that they can adopt it in the future. Around 22% of the surveyed firms felt that it would be more efficient to work through the internet, while 21% felt that e-commerce would reduce the cost, around 20% expected to open new markets using e-commerce, 16% felt that e-commerce would expand their businesses, about 8% expected that e-commerce would increase revenue.

6. Conclusions and Recommendations

Based on the analysis of the responses received from 524 firms came from 21 different business categories and of different sizes (small, medium, and large), using descriptive statistics, the following conclusions are in order:

Applying the E-Adoption ladder (shown in Figure 1) on the responses collected from 524 firms working in Abu Dhabi, firms are lagging in adopting e-commerce. Table 4 shows the percentages of firms at each step on the ladder. It is clear that most of the firms still at the first or second step of the E-Adoption ladder. Only, 32% of the firms indicated that they accept customer or business orders on the Web.

Extent of Organizational Change & Level of Sophistication	Percentage of Firms
E-mail	93%
Website	64% (have websites of their own) 69.7% (own registered domain)
E-Commerce	32%
E-Business	0
Transformed Organization	0

Table 4: E-Ladder applied to the surveyed firms

Although only 32% of the surveyed firms adopt some form of e-commerce (online interaction between the firm and its customers / suppliers, online payment, and issuing or receiving invoices), 76.3% view Internet as a tool for business trade and 84.8% view Internet s a tool for global trade. This indicates a positive attitude towards e-commerce but this should be translated to higher adoption among firms.

Surveyed firms have the necessary information technology infrastructure in place for developing and maintaining e-commerce applications. Sufficient e-commerce experts and adequate IT infrastructure exist in 73% of the firms. There is a firm strategy to develop e-commerce 61% of firms. There are no complains about top management support as an obstacle of adopting e-commerce.

- Most of the surveyed firms (more than 50%) agree on the following benefits of e-commerce:
- Increase customer awareness of the firms' products/services.
- Increase customer services, loyalty, and retention.

- Expand business reach.
- Easy access to international markets.
- Improve information exchange with customers and suppliers.
- Improve operational efficiency and effectiveness.
- Provide better information for decision support.
- Improve the competitive position of the firm.
- Firms reported the following e-commerce adoption inhibitors:
- E-Commerce use is too low among customers (51%) and suppliers (46%).
- Firms have concerns about Internet security (43%) and legal issues (38%).
- Firms have limited knowledge about the required technologies.
- Firms indicated that there were no pressure by customers and suppliers to adopt e-commerce. On the other hand, competition among rivals is very intense (67%) indicating that e-commerce can lead to competitive edge if adopted.

Based on the findings from the survey, the culture of E-Commerce has not yet been developed in Abu Dhabi. This is evident, because none of the surveyed firms have adopted sophisticated E-Commerce capabilities yet. The following recommendations can make a difference in the promotion of an e-commerce adoption culture in Abu Dhabi:

Conduct a business symposium aiming at educating executives and business men on how to plan, develop, and implement effective e-commerce applications. A questionnaire should be administered at the end of the symposium to get the attendees feedback.

Looking at the current status of firms on the E-Adoption ladder, most of the firms need assistance to move up on the ladder. Firms on the first two stages of the ladder need training, information support, mentoring and software selection support. Firms on the third stage of ladder need assistance in adopting more advanced e-commerce tools.

Abu Dhabi government should take the lead in developing and maintaining reliable Internet security infrastructure. This could be done jointly with Etisalat and/or du, Tejari.com, and e-Company

As mentioned by 38% of the surveyed firms, the legal structure is a concern that might deter the e-commerce adoption and acceptance. Abu Dhabi government should participate with the banking systems and federal government organizations to develop a customer and business protection bylaws. The UAE government started a cyberlaw structure; however businesses and consumers need to be aware of it.

7. Future Work

Basic results based on descriptive statistics presented in this report suggest a natural direction for future research work. So far, what is presented in this paper focused on presenting the survey results and analyzing them to fit the needs of Abu Dhabi Government to promote and build an e-commerce culture for firms doing business in the Emirate, country, and the whole World. The future work will be pursued in three stages. The three stages are as follows:

The first stage will continue on the exploratory factor analysis (EFA) to identify the underlying critical indicators in each factor of the 14 factors considered in this study. The same EFA will be used to validate e-commerce acceptance and adoption factors. LISREL 8.8 will be used as the software tool to carry out the EFA. Factor loadings will be calculated for

each indicator in each factor of the 14 factors. The average extracted variances and Cronbach alpha values will be computed to test the internal reliability of the factors under consideration. If the first stage results indicate acceptable validity and reliability measures, the second stage can start.

Based on the results obtained in the first stage, the second stage will use Confirmatory Factor Analysis (CFA) to develop two measurement models, the first represents the internal factors and the second represents the external factors. The purpose of this stage is to describe how well the observed indicators serve as critical and important measure of the underlying factor. Polychoric correlation and asymptotic covariance matrices will be used in generating the factor loadings. Measurement models will be tested using LISREL 8.8.

In the last stage, a causal structural equation model will be developed that will include three constructs, namely the internal factors, external factors, and the e-commerce adoption intention. The objective of the research model will be to study the effect of both the external and internal factors on the e-commerce adoption intention.

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