THE ANTECEDENTS AND CONSEQUENCES OF E-BUSINESS ADOPTION IN MALAYSIAN MANUFACTURING FIRMS

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Thesis Summary

Theory suggests that firms that adopt innovation share some common characteristics, just as those who do not adopt innovation and firms adopt a particular technology because the functions provided by the chosen technology fulfils their needs. Building on these arguments, this research project investigates the antecedents and consequences of e-business adoption among manufacturing firms in Malaysia. This thesis develops from the existing literature of organisational innovation adoption, information technology and strategic marketing/management. It further adds to the existing literature by using cultural-based predictors representing organisational characteristics consisting of market orientation, innovativeness and organisational learning. The study also formalises the theoretical framework of organisational-environment-technology. This study develops a new construct called technology motivation in addition to the introduction of several e-business technology scales.

The results substantiate the significance of firm technology motivation in determining firm adoption of the various e-business initiatives. In addition, business environment and market orientation are found to influence firm choice of technology motivation. Meanwhile, innovativeness and organisational learning are shown to influence the magnitude of a firm's e-business adoption. Finally, the results show that firm adoption of e-business technology does not influence organisational performance. This investigation clarifies the rationale and importance of firm technology motivation in adopting the various e-business initiatives. It also highlights the importance of having the appropriate organisational culture in ensuring a successful technology adoption.

Key Words: e-business, technology adoption, technology motivation, antecedents, organisational culture, organisational performance.

DEDICATION

This thesis is dedicated with affection to my wife Fariza Hashim and my four lovely daughters; Farzanah, Fathini, Faatihah and Fariheen. They are truly a blessing in my life.

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Glossary of Terms

Term	Definition
Automated answer	A response to a routine, non-special case query which can be answered quickly and without special handling.
Back-end process	Computing applications running and using data stored on large mainframe computers and other legacy computers or servers.
B2B	Business-to-Business e-commerce, i.e. between businesses over the Internet or using EDI.
B2C	Business-to-Consumer e-commerce, i.e. between businesses and consumers over the Internet.
CRM	Customer Relationship Management is an information industry term for methodologies, software, and usually Internet capabilities that help an enterprise manage customer relationship in an organised way.
Digitised	It means that the physical form of good or services that can be coded using digital technology and thereby distributed over the Internet.
Dotcoms	These are Internet-only retailers that do not have physical stores.
EDI	Electronic Date Interchange is a standard for processing and transmitting information between computers over private networks called value-added networks (VANs). It requires expensive and complex custom software, dedicated communication links and in many cases strictly compatible equipment.
EFT	Electronic Fund Transfer is a system that optimises the transfer of electronic payments, including remittance information, over secure private networks between banks. Direct deposit of employee pay checks into their bank accounts is one example of the use of EFT.

Term	Definition
e-mail	Abbreviation for electronic mail. An electronic means for communication in which (a) usually text is transmitted (but sometimes also graphics and/or audio information), (b) operations include sending, storing, processing, and receiving information, (c) users are allowed to communicate under specified conditions, and (d) messages are held in storage until called for by the addressee. Some e-mail software permits the attachment of separate electronic files, e.g., word-processor files, graphics files, audio files.
Eprocurement	The management of the order and purchase of indirect goods – goods that do not constitute the parts and products manufactured by the company.
ERP	Enterprise Resource Planning (ERP) offers a centralised system to control information flow through a manufacturing environment. ERP covers functions such as capacity planning, cost and accounting, order entry, production management, inventory and finance. Examples: SAP, Oracle.
Extranet	An intranet has been extended to include access to or from selected external organizations such as customers or suppliers, but not the general public. Note: Connections may be via leased lines, dial-up connections, or network interconnections. The overall network may be, but is not necessarily, a virtual private network.
IT	Information Technology is the branch of technology devoted to (a) the study and application of data and the processing thereof; i.e., the automatic acquisition, storage, manipulation (including transformation), management, movement, control, display, switching, interchange, transmission or reception of data, and (b) the development and use of the hardware, software, firmware, and procedures associated with this processing.

Term	Definition
Intranet	A private network based on Internet protocol, usually located within organisations.
mCommerce	e-commerce that takes place through mobile devices, such as WAP enabled mobile phones.
Portal	This a term for the World Wide Web site that is or proposes to be a major starting site for users when they get connected to the Web or that users tend to visit as an anchor site. There are general portals and specialised or niche portals. Some major portals include Yahoo, CNET, Microsoft Network.
SCM	Supply Chain Management is the management of the order and purchase of direct goods - products that constitute parts of the products manufactured by the company.
WAP	Application Protocol is a secure specification that allows users to access information instantly via handheld wireless devices such as mobile phones, pagers, two-way radios, smartphones and communicators.
Video conferencing	1. A teleconference that includes video communications. 2. Pertaining to a two-way electronic communications system that permits two or more persons in different locations to engage in the equivalent of face-to-face audio and video communications.

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CHAPTER ONE: INTRODUCTION

1.1 Background of Innovation Studies

In today's increasingly dynamic and complex industrial environment, the adoption of innovation is a strategic issue for organisations striving to gain and maintain a competitive advantage (Porter, 1980; Schewe, 1996). Noticeably, firms are using technology in responding to market demand to maintain or improve competitiveness (Gagnon and Toulouse, 1996; Pu Shao, 1999; Utterback, 1994). The adoption and use of technology is said to be no longer an option but a matter of survival, as well as one of the essential features of most successful firms (Clark and Starkey, 1988; Gagnon and Toulouse, 1996; Horwitch, 1986).

The importance of technology adoption towards economic contribution is also well documented. Economists see it as one of the factors that cause increased productivity (Baumol, 1991); create opportunities (Fink, 1998) and promote economic growth at the industry level (Scherer, 1984). Technology markets are important to the economy and their importance is expected to increase in the future (Mandel, 1998). Gold (1980) for instance postulated that the US economic growth and productivity until the early 1960s could be credited to the US economy's orientation towards innovations.

Hence, the importance of innovation has inspired many researchers to study this subject. Adoption has been an important area of research inquiry in marketing for many years (Plouffe et al., 2001). The number of articles produced bearing on consumer and organisational innovation reflect its significance (Allen, 2000). Nevertheless, despite the proliferation of studies on innovation within various disciplines, the theoretical and practical value of research from one field is not entirely clear for another because, of differences in research focus and variations in the way innovation is defined (Gopalakrishnan and Damanpour, 1997). This explains researchers' disagreement on the causes and effects of organisational innovation adoption (Gopalakrishnan and Damanpour, 1997; Weiss and Heide, 1993; Wolfe, 1994).

However, despite the disagreement and inconsistencies of previous research, the subject continues to draw attention from new researchers. The assessment of the characteristics of the "technologically progressive firms" has created a particular field of research within innovation research (Avlonitis et al., 1994). It is accepted that those who adopt innovation share some common organisational characteristics, just as do those who do not adopt innovation (Leonard-Barton, 1988). Therefore, identifying the characteristics of these firms could facilitate a faster rate of diffusion for the respective innovations (Rogers, 1983) by mimicking the organisational characteristics of benchmarked firms (Abrahamson, 1991).

In relation to the emergence of new technologies like e-business, firms 'innovativeness' in adopting these technologies varies distinctly. Although the technologies are proclaimed to provide numerous benefits to the firm, the acceptance of e-business among firms has been far from expectations (Kendall et al., 2001). Many firms are undertaking e-business initiatives quite cautiously by taking one step at a time or preferring to 'wait-and-see'. Hence, it is imperative that a study on e-business adoption in firms is carried out to determine the factors that influence firms' propensity to adopt technologies. Our assertion is supported by the Marketing Science Institute (MSI), which has identified the topic of e-business and measuring marketing performance as the main research priority for 2000-2002 (MSI, 2000).

1.2 E-business Technology Growth

The conduct of commerce in the electronic marketplace has been claimed as a source of fundamental change to business practice, changing the way businesses transact and deliver their services. Goldman Sachs predicts that the value of B2B transactions in Asia Pacific will reach US$440 billion by 2005, with US$127 billion in Australia alone. The company estimates that the total global value will exceed US$4.5 trillion. Meanwhile, ICG projects that the European B2B market will be worth more than US$2.3 trillion by 2004. The number of companies conducting Internet technology-based increased by 215% for the period 1998 to 2002 for the whole of Europe and United States (Berezai, 2000). Finally,

the OECD forecasts global e-commerce to be worth $1 trillion by 2003-05 (OECD, 1998). However, despite these optimistic forecasts, companies are still wary of the promised benefits of the technology and its impact on firm performance. In addition, there are barriers to adoption, especially in countries outside the developed economies. Thus, in comparison with the developed countries, the adoption of e-business by Asian businesses across all industries is still not encouraging (Kendall et al., 2001). Therefore, it is timely that research is done to fill the knowledge gap about e-business adoption in the developing economies.

1.3 Research Problem

Studies on organisational technology adoption have identified various factors that influence firm propensity to adopt new technology (Kimberly and Evanisko, 1981; Meyer and Goes, 1988; Ramamurthy et al., 1999; Gopalakrishnan and Damanpour, 2000). Rogers (1983) and Damanpour (1991) identified these sets of variables as organisational characteristics, management characteristics, technology characteristics and environmental characteristics. However, previous studies on innovation adoption have primarily taken an organisational theory perspective and explored the organisational determinants of innovation adoptions (Damanpour, 1988, 1991; Saleh and Wang, 1993). The organisational characteristics that have been widely studied include firm size, centralization, specialization and functional differentiation (Chengalur-Smith and Duchessi, 1999; Premkumar and Roberts, 1999; Thong and Yap, 1995; Wu, Mahajan and Balasubramanian, 2003).

These organisational characteristics consist of "visible" features of an organisation. We take the position that although these studies are useful in providing insights toward the understanding of organisational innovation adoption, we agree with Mohamed (1995) that adoption does not guarantee usage. Studies of organisational innovation adoption show that although firms could "technically successful" in adopting new technology, the adoption could "fail organisationally" in that people do not actually use it (Grayson, 1973; Keen, 1981; Urban, 1974). Behaviour-related problems (Biggart, 1977; Markus, 1983) are

commonly recognised as reasons why the "appropriate" organisational culture is pertinent in accommodating new technology. This is corroborated by Cravens, Piercy and Low (2002), who asserted that the assessment of innovation success in organisations often points to the importance of delivering a culture committed to innovation.

Nevertheless, although previous research has provided empirical evidence that organisational culture determines technology adoption strategies (Kitchell, 1995), yet there is not a single study to date that has examined the effect of culturally-based organisational characteristics as predictors in studying organisational technology adoption or e-business adoption specifically. In addition, the effects of other sets of variables such as management and environmental characteristics have been largely ignored (Ancona and Caldwell, 1992; Damanpour, 1988; De Bretani and Ragot, 1996; Lefebvre and Lefebvre, 1992).

To date, few studies address the combined effects of management characteristics, organisational characteristics, technology characteristics as well as environmental characteristics on innovation adoption in organisations (Howell and Higgins, 1990a; Howell and Higgins, 1990b; Srinivasan, 2000; Tabak and Barr, 1999). Therefore, there is a considerable lack of theory development and corresponding empirical investigation addressing the combined impacts of the various sets of variables on organisational innovation adoption (Damanpour, 1988).

Different types of innovations go through different types of adoption processes (Daft, 1978) and have different determinants (Damanpour, 1987; Ettlie et al., 1984; Moch and Morse, 1977; Zmud, 1984). Damanpour (1988) reiterated that the effects of different predictors on adoption behaviour vary depending on the type and stage of innovation. Thus, it is argued that the propensity for a firm to adopt innovation is not constant across all innovations. The various characteristics of an organisation interact together with the specific dimension an innovation possesses to determine the probability of innovation adoption.

Consequently, prior research has given attention to differences in types of innovation in examining adoption behaviour (Tabak and Barr, 1999). As a result, previous developed theories have been based entirely on a single dimension of innovation or described innovation in uni-dimensional terms referring to a new idea, process or product offering (Cooper, 1998). These theories group innovations based on similarity of attributes and proposed specific relationships between each group of innovations and their antecedents and consequences. In addition, the focus of previous studies has somehow be shaped by the characteristics of the innovation which 'limits' itself as either being technological or administrative, product or process, and radical or incremental. This is portrayed in previous studies where clusters of researches have focused on the different types of innovations such as Advanced Manufacturing Technology (AMT) (Alcorta, 1999; Belassi and Fadlalla, 1998; Swamidass and Kotha, 1998), Electronic Data Interchange (EDI)(Crook and Kumar, 1998; Damsgaard and Lyytinen, 1998; Ramamurthy, and Premkumar, 1995), e-commerce (Elliot and Loebbecke, 2000; Min and Galle, 1999; Poon and Swatman, 1999,) or simply a general Information Technology (IT) adoption (Fichman, 1992; Thong and Yap, 1995).

However, the emergence of e-business has changed the situation, as the technology is comprehensive, comprising various types of contrasting dimensions of innovation. The multidimensionality of e-business characteristics includes technological and administrative innovations (i.e. SCM and ERP), process and product innovations (i.e. SCM, CRM and virtual products e.g. information), radical and incremental innovations (mobile commerce and e-commerce/brochureware). Cooper (1998) argued that the traditional approach of treating innovation as a unidimensional term fails to answer the persisting questions of researchers and practitioners alike. The author further argued that the prevailing evidence suggests that it is most appropriate and beneficial to treat innovation as a phenomenon that consists of multiple dimensions at the same time. Therefore, proceeding on Cooper's (1998) argument, we believe that by studying the antecedents and consequences of e-business adoption in firms, we would be able to 'consolidate' the determinants of the different types of innovation into one single study.

The developed theories would therefore take into consideration the multiple dimensions of innovations (Cooper, 1998; Damanpour and Gopalakrishnan, 1998).

Another matter of concern is the role e-business takes in organisation. A study by Datamonitor (Lord, 2001) reveals that the industry has different levels of adoption in the four areas of e-business initiatives. These are enterprise resource planning (ERP), customer relationship management (CRM); supply chain management (SCM) and e-commerce. Given that innovations are adopted with the intention of increasing organisational performance (Damanpour, 1990 and Damanpour, 1991), examining the motivation and selection of the specific e-business initiatives is a significant issue. As argued by Sarrina Li (2003), different technologies provide different functions and a firm adopts a particular technology because the functions provided by the chosen technology fulfils its needs.

Currently, more and more organisations are investing heavily in new technologies in order to stay competitive in their given industries. Given the financial stakes involved, determining the impact of technology investments on organisational performance is a pertinent issue for both academics and practitioners (Sriram, Stump, and Banerjee, 1997). However, while past research has explored the factors that are related to the adoption of technological innovation by organisations (Kimberly and Evanisko, 1981; Meyer and Goes, 1988), there is a lack of empirical research examining the relationship between organisational technological adoption and firm performance (Irwin, Hoffman and Lamont, 1998; Subramanian and Nilakanta, 1996). There appears to be an implicit assumption in much of the literature, known as a "pro-innovation bias", that the adoption of innovations is intended to contribute to the performance of the adopting organisation (Damanpour, 1991; Rogers, 1983). Thus, although this relationship has generally not been tested, the "pro-innovation" bias resulted to research being concentrated on the actual adoption of innovations rather than the consequences of these adoptions.

Finally, the majority of the studies on organisational innovation adoption were done in the United States or other developed economies like United Kingdom. There is a dearth of research on organisational innovation adoption in developing economies. As the

importance of innovation in developing countries increases, so does the need for research on the subject. There is a need to understand the motivation and factors that influence a firm's propensity to adopt new technology, specifically e-business, in developing countries. So far, research on the subject has been mostly focused on gathering evidence from the developed economies, and building theories based on that evidence. However, there are few indications on the extent to which those theories may explain innovation elsewhere. Deshpandé (1999) corroborated that there has been little interest in the generalisability of the marketing concepts, models, theories to non U.S. / non-Western context, even though such concepts and models might be theoretically inappropriate for emerging markets and transitional economies. Therefore, there is a pressing need for more research based on questions and variables reflecting the reality of developing economies to be conducted.

1.4 Research Objectives

As mentioned earlier, innovation has been researched from various perspectives and definitions (Gopalakrishnan and Damanpour, 1997; Burgelman and Sayles, 1986). The innovation literature reveals extensive debate among theorists as to the nature of the innovation process and its definition. While this will be discussed at length in the literature review, this study takes the view of the organisation as an adopter of an innovation (Gopalakrishnan and Damanpour, 1997). This approach assumes that a number of predicting variables at a particular point in time determine actions or decisions regarding the adoption of an innovation. We concur with Damanpour (1987) and Leonard-Barton (1988) that "innovative" organisations have identifiable organisational characteristics that distinguish them from their non-innovative counterparts. Hence, the first objective of this research is:

1) to identify and determine the variables influencing e-business adoption in existing business firms.

Past research has identified numerous variables of organisational innovation adoption. However, given that innovations are adopted with the intention of increasing organisational performance (Damanpour, 1990 and Damanpour, 1991), examining the motivation for adoption and the selection of specific e-business initiatives is a significant issue. Premkumar and Ramamurthy (1995) argued that a firm's decision to adopt new technology is based on certain internal and external motivations. Nevertheless, with the exception of the work by Chengalur-Smith and Duchessi (1999), there is very little information available on firm motivations in new technology adoption. Therefore, it is the purpose of this study to construct a measure of organisational technology motivation and test the relationship of this construct with the adoption of the various e-business initiatives. Accordingly, the second objective is:

2) to construct the measurement of organisational technology motivation and test the relationship of this construct with the adoption of the specific e-business initiatives.

Previous literature has shown that firm main purpose of investing in technology is to achieve competitive advantages and better firm performance (Gupta and Capen, 1996; Palvia and Palvia, 1992; Ragowskyet et al., 1996). Nevertheless, there have been inconsistent findings of previous research on IT adoption and firms performance (Barua et al., 1995; Brynjolfsson, 1993). In many studies, researchers have not found a positive relationship between IT adoption and firms' performance (Ragowskyet et al., 1996). This leads to some firms being more cautious (Feeny and Ives, 1990) and sceptical about the role and contribution of IT to organisational productivity (Gurbaxani and Whang, 1991). Therefore, when firms are expected to make adoption decisions based on performance outcomes associated with new technology (Rosenberg, 1976), the consequences may be detrimental. Consequently, this leads to our third objective:

3) to determine the effects of e-business adoption on firm's performance.

Apparently, the relationship between adoption and firm performance is complex and multi faceted. With reference to e-business, firm's involvement varies according to the different e-business initiatives such as ERP, CRM, SCM and e-commerce (Lord, 2001). The study by Lord (2001) showed that different industry groups have different levels of adoption for the four e-business initiatives. Hence, this research aims to investigate the impact of the specific e-business initiatives on firm's performance. Therefore, the fourth objective is:

4) to determine the relationship between the adoptions of the specific e-business initiatives and firm performance.

1.5 Significance of Research

The study of e-business adoption by firms is of interest to researchers in marketing as well as managers. As e-business is relatively new, the subject itself deserves a study. In addition, in incorporating e-business as an innovation, this study addresses the call for research in this important domain (MSI, 2000). E-business is not entirely about technology but rather about business. However, the case for e-business has not yet been made convincingly. Uncertainties concerning the benefits of e-business and management unfamiliarity with e-business process and solutions pose significant obstacles to e-business development. Hence, as technology markets continue to be of importance to the economy (Mandel, 1998); identifying the factors that influence e-business adoption in firms is important. The findings from this study could assist change agencies in achieving a faster rate of diffusion for e-business (Rogers, 1983).

The process of adoption of new technology is often plagued with uncertainties. Although managers in adopter firms want to make an appropriate decision, it is not a simple task. Previous technology investments could be rendered obsolete, while buyers and trading partners could face switching costs as a result of commitments to earlier technologies (Heide and Weiss, 1995). Furthermore, the "abundance" of technology options and the "overlaps" of technology applications could further confuse managers in deciding which

technology is appropriate for their situations. Hence, the findings of this study are expected to aid managers in selecting the appropriate technology with respect to the firm's technology motivation. On the other hand, from the perspective of the technology seller firm, understanding the technology motivation of their customers is crucial in developing effective marketing strategies for their product. Hence, the identification of firm technology motivation would enable technology marketers to develop segmentation strategies for their products.

In an area where studies of organisational innovation adoption in developing countries are scarce, the attempt of this research to quantify the predictor variables of innovation adoption is warranted. Besides, the results of this study would further test the constructs developed by previous studies, by investigating their applicability in different environments and economies. The relevance of our predictors, derived from previous developed constructs, like market orientation; organisational learning, innovativeness and business environment, needs to be proved in this context. Scholars like Hooley et al. (2000) have called for replication studies of "developed economies' constructs" like market orientation in different environments and economies. Hooley et al. (2000) argue that if the constructs are reliable and valid, they should be applicable to these differing conditions. In addition, despite voluminous discussion on the adopted constructs, there has not been an empirical study that interrelates market orientation from the cultural perspective with organisational learning and innovativeness in organisational innovation adoption, or that discusses these issues in a context of a developing economy.

Finally, the findings of this research are also expected to be useful to managers and policy makers. Technology is not merely an enabler of organisational processes but is increasingly becoming the core of a firm's business strategy (Orlikowski, 1992). The findings on firm e-business initiatives and performance would enable firms to relate the intended motives or strategies with the expected outcome of the selected e-business technology. Further, the identification of managerial and cultural antecedence of technology adoption would provide insights on how managers and firms can proactively

manage new technologies. Consequently, the Malaysian government could use the findings of this study to review its policies and incentives in promoting the adoption of technology in the manufacturing industry.

1.6 Malaysia's Economic Background

In this study, Malaysia is chosen as the country representing the developing countries in e-usiness adoption. Malaysia is selected for several reasons. With a population of only twenty-four million inhabitants, hence a small work force, relative to neighbouring countries (i.e. Singapore, Thailand, Indonesia, China, India) Malaysia has to move into value-added, knowledge-based industries to maintain its competitiveness and economic prosperity. Malaysian firms are accustomed to the challenges of changes and technology adoption, as the country has experienced several decades of economic transformation brought about by trade, global competition and rapid growth.

Malaysia is one of the developing countries in South-east Asia with a population of twenty-four million in 2002 (Statistics Department of Malaysia, 2002) and surrounded by other developing nations like Thailand, Indonesia and Singapore. The country's GDP grew at 8.6% in 2000, slowing in 2001 to growth of 4%. The Malaysian economy rebounded from a sharp recession in 1998 when real GDP contracted by 7.4% in 1998. Despite the contraction, Malaysia managed to attract foreign direct investment of about US$3.7 billion in 1998 (UNCTAD, 2000). The foreign direct investment in Malaysia was spread across all sectors, and of the US$3.7 billion, the bulk US$3.4 billion was invested in the manufacturing sector.

Malaysia has developed successfully from a commodity-based economy to one focused on manufacturing. The economy grew 6.1% in 1999 and a strong 8.3% in 2000, led by rapid growth in exports, particularly of electronics and electrical products. In the past forty years, Malaysia's economic record had been one of Asia's best. From the early 1980s to the mid-1990s, the economy experienced a period of broad diversification and sustained

rapid growth, averaging almost 8% annually. New foreign and domestic investment played a significant role in the transformation of Malaysia's economy.

The manufacturing sector became more important in the economy and was the engine of growth of the Malaysian economy, growing from 13.9% of GDP in 1970 to 33% in 2000. In contrast, agriculture and mining, which together had accounted for 42.7% of GDP in 1970, declined to 8.4% and 6.9%, respectively, in 1999. The exports of manufactured goods make up 85.2% of the country's total exports. These statistics reveal that manufacturing is becoming a dominant sector and a major contributor in the Malaysian economy. Hence, the understanding of this sector is increasingly vital to improve the country's economy.

Malaysian economic development is based on a ten-year economic plan known as the Industrial Master Plan (IMP). At present, Malaysia is in its second Industrial Master Plan (IMP2), 1996-2005. The IMP2 moves beyond a mere focus on manufacturing operations to include strengthening industrial linkages and enhancing productivity through a full integration of activities such as R&D and design capabilities, and development of supporting industries on the one hand, and packaging, distribution and marketing on the other. Under the IMP2, Malaysia's industrialisation will continue to be private sector and market driven, with a strategic shift to knowledge-based, technology-intensive and high-tech industries.

The key manufacturing sectors that are encouraged according to the Second Industrial Master Plan (IMP2), are high technology industries such as the electronics and electrical sectors, especially semiconductors and other electronic products, petrochemicals, pharmaceuticals, automotives, and machinery and equipment (MIDA, 2001). These sectors not only contribute in terms of high production and high employment, but also help to boost the country's exports. For the year 2002, the electrical and electronic sector at 46.7% was the largest contributor; the petroleum and gas sector contributed 10.6%, chemicals and chemicals products, 7.6%, fabricated metal products 3.6% and transport 3.0% (Malaysian Economic Report, 2003). The electrical and electronics industry is Malaysia's leading industrial sector and accounts for about two-thirds of total

manufactured exports. Exports by the electrical and electronics sector totalled MR18.5 billion (US$4.9 billion) in 2001 (MIDA, 2001). These figures reveal that the high technology industries are crucial to the country's development and they will remain important in future years.

This is clear as the government has emphasised that the future thrust in the electrical and electronics industries will be the development of high technology industries, which will entail a higher level of R&D activities, the establishment of more water fabrication facilities, the manufacture of components to support the consumer and industrial electronics sector, the manufacture of computers and computer peripherals, telecommunications equipment and office equipment. The chemical industry is also gaining importance in Malaysia and has massive investments from MNCs. The sectors involved include petroleum products, petrochemicals, inorganic chemicals, oleochemicals and industrial gases. Oil and gas exports in 2000 amounted to RM25.5 billion (US$6.7 billion) or 6.8% of the country's total export earnings (MIDA, 2001).

1.6.1 Malaysia ICT Development

Malaysia's aspiration to become a developed country is spearheaded by the manufacturing sector. Enhancement of technical capabilities and diffusion of sophisticated technology are often an effective way to improve productivity and competitiveness. Malaysia has established a niche presence in the manufacture of electronic components for the Information and Communications Technology (ICT) sector in particular. Recent estimates suggest that Malaysia accounts for some 2.5% of the global electronic sector (Datamonitor, 2003). Concurrently, the country is also heading towards the modernisation of its manufacturing facilities in the production, operations and distribution facilities.

Hence, Malaysia's investments in ICT expanded at a rate of 9.2 per cent per annum from RM3.8 billion (US$1 billion) in 1995 to RM5.9 billion (US$1.55 billion) in 2000 (Economic Planning Unit, 2004). According to research firm IDC Malaysia, spending on IT was expected to increase by about 8.6% from an estimated RM9.42bil (US$2.48bil) in

2003 to about RM10.24bil (US$2.69bil) in 2004 (INTECH, April 27, 2004). This was largely due to the increasing awareness of Malaysians of the importance of production, diffusion and utilisation of knowledge and information for improving competitiveness and overall economic importance. With respect to the recent drop in sales due to the global economic slump, technology spending is expected to remain a top priority for many manufacturing companies to help boost efficiency and productivity. According to the Federation of Malaysian Manufacturers, investments in ICT will continue in the manufacturing sector, with the emphasis on productivity, better inventory management and collaborative innovation (NST, November 18, 2002).

The manufacturing sector recorded the highest investments in ICT amounting to almost RM1.2 billion (US$316 million) or 20 per cent of total ICT expenditure in 2000. In a study undertaken in 1998 in the manufacturing sector, it was revealed that the use of ICT was most prevalent in for administration, payroll and finance functions. This was followed by ICT for communications, control and logistics, and production processes. About 28 per cent of local firms used ICT for administration and finance, compared with 7 per cent using ICT for control and production (Economic Planning Unit, 2004).

E-business technologies have been heralded as technologies that will change business practice and offer many benefits to the adopter. Their emergence has also led to various growths and economic forecast. The e-commerce market, for instance, was estimated to increase from US$1 billion in 1998 to US$6 billion in 2000 in the Asia Pacific region. Meanwhile, in terms of global B2B online transactions, it is estimated that by 2005, the Asia Pacific market will transact US$1,173 billion, or twenty-two per cent of the whole global market (Lord, 2001). With the ongoing innovations in ICT and the developments of the specific infrastructure, special focus is given promoting and encouraging the wider use of e-business as a new way of doing business through the digital network.

The initiative involves connecting Malaysian suppliers in the electronic and electrical sector to multinationals (MNCs) using an emerging electronic messaging standard called RosettaNet. More than 400 companies worldwide engaging in IT, electronic components

and semiconductor manufacturing and accounting for over US$1 trillion in annual revenues currently participate in RosettaNet's standards development, strategy and implementation activities. RosettaNet is breaking language barriers by building a common language for e-business processes. Private corporations like Dell have also participated in the initiative by signing a joint venture deal worth RM12.4 million (US$3.26 million) with the country's largest telecommunication company, Telekom Malaysia, to develop and market a RosettaNet-enabled trade engine platform. The trade engine services will be jointly marketed as a packaged service of TM Net to Dell suppliers within Malaysia and its neighbouring countries.

1.7 Conclusion

In responding towards the dynamic and competitive industry environment, firms have resorted to technology in order to meet market demand or improve firm competitiveness (Gagnon and Toulouse, 1996; Pu Shao, 1999; Schewe, 1996; Utterback, 1994). Numerous researchers have agreed that the adoption of new technology is a strategic issue and is essential for firms to be successful (Clark and Starkey, 1988; Gagnon and Toulouse, 1996; Horwitch, 1986; Porter, 1980). The "explosion" of the digital economies has further magnified the importance of this area for further understanding. Hence, adoption of innovation continues to be an important area of research inquiry in marketing for many years (Plouffe et al., 2001).

Nevertheless, although previous studies have identified various factors that influence firm propensity to adopt new technology, there seems to be a focus on organisational characteristics. Hence, variables such as management characteristics, technology characteristics and the business environment have been given less emphasis in previous studies. In addition, although previous research has provided empirical evidence that organisational culture determines technology adoption strategies (Kitchell, 1995), yet there is not a single study to date that has examined the effect of a culturally-based organisational characteristics as predictors in determining firm technology adoption or e-

business adoption specifically. Therefore, this study fills the gap in the literature by using organisational culture-based predictors in its theoretical research framework.

In examining firm innovation adoption, this study focuses on e-business as its construct. The selection of e-business was made based on various reasons. First, being relatively new, e-business has been heralded as technology that will change the entire business practice and provide numerous benefits to the adopter. Therefore, by studying the role of e-business in firms and its impact on organisational performance, the findings will provide greater understanding and evidence of the perceived benefits of technology. Second, e-business differs from previous technology, in that it consists of various dimensions of innovation. By taking e-business as the focus of study, the findings it will be possible to "consolidate" the determinants of the different dimensions of innovation into one single study. The developed theories would therefore take into consideration the multiple dimensions of innovations (Cooper, 1998; Damanpour and Gopalakrishnan, 1998). Finally, by examining firm motivation and selection of e-business initiatives, the findings will aid managers in finding the "appropriate" e-business technology to fit their intended motives.

The majority of previous studies of organisational innovation adoption were done in the United States or other developed economies. Hence, the evidence and theories were based on these studies. Nevertheless, there are few indications on the extent to which those theories may explain innovation elsewhere. Therefore, it is important that research is conducted, whose questions and variables reflect the reality of developing economies.

In conclusion, the study of e-business adoption by firms is of interest to researchers in marketing as well as managers. The findings are expected to aid managers in technology decision-making. In addition, the research will provide some information to the Malaysian government in reviewing its incentives towards the adoption of technology in manufacturing firms. As this study is conducted among Malaysian firms, some general information about the Malaysian economy and ICT take up was presented to provide some background.

CHAPTER TWO: LITERATURE REVIEW

This chapter summarises the literature of the main areas of the research, which are innovation adoption, the determinants and moderators of organisational innovation adoption and the influence of technology adoption on firm performance. The review of innovation adoption discusses the definition adopted in this research with emphasis on organisational adoption. Consequently, the section elaborates on e-business technology and its components as an innovation. The review of the determinants and moderators of organisational innovation adoption examines the studies relating to the subject matter and identifies the proposed determinants and moderators. Next, the review of technology adoption and firm performance deliberates on the potential influence of technology adoption on firm performance. In conclusion, the chapter summarises the adopted definition of innovation adoption, and the inter-relationship of the proposed determinants is illustrated in the research theoretical framework.

2.1 Definition of Innovation Adoption

The study of innovation has been a popular area of research in academic circles with research conducted in disciplines such as economics, sociology, education, business strategy, marketing etc (Damanpour and Gopalakrishnan, 1998; Subramanian and Nilakanta, 1996). Within the area of business discipline, there are two groups of innovation research. The first group is interested in understanding the causes of innovative behaviour of consumers. Consumers who display a consistent tendency to buy new and innovative products are the target of this research because it is believed that these consumers are opinion leaders, and they significantly influence the buying behaviour of non-innovative consumers. A major emphasis of innovation research seems to be in this group (e.g. Fishbein and Ajzen, 1975; Davis, Bagozzi and Warshaw, 1989; Rogers, 1983). The second group is primarily interested in the organisational characteristics of innovative organisations. This research focuses on organisations that adopt innovative products or

processes and the effect of the adoption of innovations on organisational performance (e.g. Damanpour and Gopalakrishnan, 1998).

The fascination with innovation has resulted in proliferation of innovation studies and theories. Nevertheless, despite those efforts, the theoretical and practical value of research from one field is not entirely clear for another, because of differences in research focus and variations in the way innovation is defined (Gopalakrishnan and Damanpour, 1997). Hence, this results in confusion and controversy, where debate on the definition of innovation continues to emerge in the literature determining what constitutes innovation. Van de Ven (1986) noted that the complexity of innovation contributes to this argument. As innovation has been conceptualised in many ways (Damanpour, 1992), it is important that care is taken when defining what is meant by innovation. This corroborates Cooper's (1998) argument that the key contributor to the controversy is the failure to define adequately what is meant by innovation. Thus, the following paragraph will discuss the literature of the different views on the definition of innovation.

Researchers and practitioners have defined innovation in several different ways (Burgelman and Sayles, 1986). Some researchers viewed it as a "process", which is "the process of introducing something new," (Ettlie, 1980; Rogers, 1983, Van de Ven, 1986). Meanwhile, others viewed innovation as a "discrete event, product or outcome", which is "a new idea, method or device" (Damanpour and Evan, 1984; Kimberly and Evanisko, 1981; Meyer and Goes, 1988). Advocates of the "process" approach see innovation as a process consisting of several stages that the potential adopter goes through over the course of an innovation effort. These stages include identifying problems, evaluating alternatives, arriving at a decision, and putting innovation into use (Rogers, 1983).

Some theorists (Robertson, 1974; Zaltman et al., 1973) view that these stages as progressing in a linear fashion, while others view innovation as a complex process with multiple, cumulative and conjunctive progressions of convergent, parallel and divergent activities (Kline, 1985; Rogers, 1983; Schroeder et al., 1989). For "process" approach researchers, the objective is to understand how innovation emerges, develops and becomes part of the routine activities of an organisation (Gopalakrishnan and Damanpour, 1997;

Van de Ven et al., 1989). As the process of innovation continues in the organisation, specific tasks and roles of organisational participants change (Burgelman and Sayles, 1986). The interaction of events and people at each stage of the process influences events in subsequent stages, determining whether the adoption process will continue or not.

Meanwhile, advocates of the "product, outcome or discrete event" approach do not necessarily ignore the processes involved in innovation. However, implementation of innovation occurs when there is actual acceptance of risk and the commitment of resources occurs. In this approach, differentiation between innovators and non-innovators occurs when the innovation is put to use within the organisation. Thus, researchers taking this approach would try to determine the contextual, structural and process under which organisations would innovate (Damanpour and Evan, 1984; Kimberly and Evanisko, 1981; Meyer and Goes, 1988). The research questions normally concern what types of firms are more prone to the adoption of innovation, or in what types of organisations the adoption of innovation will be more successful. Kurnia and Johnston (2000) refer to these theories as the factor approach. The theories assume that a number of predicting variables at a particular point in time determine actions or decisions regarding the adoption of an innovation.

Both the "process" and "product" approaches have merit, in that adopters may be differentiated from non-adopters within a referent set of organisations. From the "process" perspective, the issue of concern is the adoption stage or phase of implementation, which ultimately spells success or failure for subsequent phases of the adoption and of the innovation itself. Meanwhile, the "product" approach is suitable for assessing the merits of particular organisational structures and business strategies in the adoption of innovation. Thus, what constitutes innovation depends on the researcher's intended outcomes and scope of study. Subsequently, the "product, outcome or discrete event" approach to studying innovation is appropriate for those seeking to differentiate between adopters and non-adopters of innovation (Cooper, 1998).

The central focus of this study is on innovation adoption by organisations and we seek to identify and integrate the factors that influence organisation technology adoption. We agree with Leonard-Barton (1988) that companies that adopt innovation share some common organisational characteristics, just as do those that do not adopt innovation. Therefore, adopting the "product, outcome or discrete event" approach, we define innovation as the adoption of an idea or behaviour, whether a system, policy, programme, device, process, product or service, perceived as new to the adopting organisation (Daft 1982; Damanpour, 1991,1992; Damanpour and Evan 1984; Zaltman et al., 1973). Similarly, Tabak and Barr (1999) define innovation as a product, idea, process, practice or object which is new to the perceiving individual and the adopting unit. The common element in both of these definitions is that what matters is whether the product (or idea, process, practice or object) is new according to the perceiving individual or adopting unit. Whether it is new objectively is not important, as long as it seems new to the adopting unit.

From this perspective, the newness attached to an innovation remains a matter of perception, so being first to adopt does not matter. This is not to say that being the first mover within a market or industry is not relevant. But in this approach, in understanding innovation the key question for the adopting unit involves uncertainty associated with the idea, process or object. Uncertainty arises because the adopter has incomplete knowledge with which to evaluate and make judgements about the appropriateness of the innovation and the long-term consequences of adoption (Robertson and Gatignon, 1986).

Finally, another important clarification to this study is the concept of adoption. A number of authors have defined adoption in a variety of ways and have distinguished between adoption, diffusion, initiation, development, implementation and use. While recognizing these legitimate distinctions, for this study we have chosen to use "adoption" in the broadest sense so that it encompasses "the generation, development, and implementation of the technologies" (Damanpour, 1991).

2.1.1 Organisational Innovation Adoption

The earlier adoption models and theories of innovation adoption were mainly from studies conducted over the consumer market. Among the popular innovation adoption and diffusion models were the theory of diffusion of innovations (Rogers, 1983), the technology acceptance model (Davis, Bagozzi and Warshaw, 1989), the theory of reasoned action (Ajzen and Fishbein, 1980) and the theory of planned behaviour (Ajzen, 1991; Ajzen and Madden, 1986). From this, it can be seen that organisational adoption of innovations has received less attention in the literature than innovation adoption in consumer markets (Day and Herbig, 1990; Frambach and Westbrook, 1993; Frambach and Schillewaert, 2002).

Nevertheless, interest in organisational innovation adoption began to develop as the prevailing belief that innovation adoption improves organisational performance began to spread widely (Damapour, 1991; Irwin et al., 1998; Rogers, 1983). In addition, the researchers' approach in considering innovation as a means of changing an organisation, either as a response to changes in the organisational environment (Donaldson, 2001; Kast, 1973) or as a pre-emptive action to influence the environment (Child, 1972) has attracted various strategic scholars. This has resulted in a growing number of researches conducted focusing on organisational characteristics influencing the adoption decision (Avlonities et al., 1994; Damanpour and Gopalakrishnan, 1998; Gopalakrishnan and Damanpour, 1997).

The call for more research to be conducted on organisational innovation adoption was also due to the major differences between those focusing on individual and organisational characteristics. There was criticism of researchers applying the innovation theories derived from consumer studies directly to organisational research (Lundblad, 2003). Consequently, this resulted in various studies conducted on organisational characteristics such as firm size (Nystrom et al., 2002), structure (Damanpour, 1987; Scuilli, 1998), degree of formalisation (Rogers, 1983; Zaltman, Duncan and Holbek, 1973), centralisation of an organisation (Ettlie et al., 1984) and strategy (Parthasarthy and Sethi, 1992) in relation to the adoption of new technology. Since then, the probable determinants of

organisational technology adoption continue to appear in numerous studies with various models and theories. Nevertheless, despite the rigorous effort of research on organisational innovation, researchers are still far from agreeing on the causes and effects of organisational innovation adoption (Avlonities et al., 1994; Damanpour and Gopalakrishnan, 1998; Gopalakrishnan and Damanpour, 1997).

2.1.2 E-Business Technology as an Innovation

Adoption of new technology in industrial firms and its actual influence on company performance in general have been studied and analysed by a number of international scholars, such as Ayres (1991), Lal (1996, 1999) and Chen and Fu (2001). Current research on the adoption of new technologies such as e-business, electronic data interchange (EDI), advanced manufacturing technology (AMT) and e-commerce has already made extensive use of the innovation research tradition. This practice is relevant to Ilori and Irefin's (1997) argument that successful adoption of any form of technology by a firm may be regarded as an innovation. Hence, various studies have used features of organisation, the technology and the nature of the business environment to explain how likely organisations are to adopt new technologies.

Similarly to studies of organisational innovation adoption, the motivation of these studies was the prevailing belief that adoption improves organisational performance and that it is an organisational response to changes in the business environment (Damanpour, 1991; Irwin et al., 1998; Rogers, 1983) or a pre-emptive action to influence the environment (Child, 1972). The emergence of new technologies was publicised with great fanfare, promising many great benefits to the adopter (Peppard, 2000). Nevertheless, despite the hype surrounding these technologies, the adoption among firms was not as expected.

This situation led to a stream of research examining the factors that influence and those that inhibit firms in adopting technologies. Among the technologies that have received extensive attention are e-business technologies. E-business technologies comprise various

other technologies such as e-commerce, supplier chain management (SCM), customer relationship management (CRM) and enterprise resource planning [(ERP) (Mesenbourg, 1999; Moodley, 2002; Wu, Mahajan and Balasubramanian, 2003)].

Emergence of e-business technology has been heralded as technology that will change business practice and offer many benefits to the adopter. Consequently, this led to a growing number of articles and publications on the subject. This in turn resulted in confusion where the term e-business was used interchangeably with others such as e-commerce and Internet (Chang et al., 2002; Pires and Aisbett, 2003). Rosen (2000, p. 5) for instance describes e-commerce saying that it "covers the range of online business activities for products and services, both business-to-business and business-to-consumer, through the Internet". This description is similar to that given by Schneider and Perry (2000) for "e-business", a terminological interchangeability that is at odds with the view of e-commerce as an element of e-business (Huff et al. 2000; Kowtha and Choon, 2001; Strauss and Frost, 2001). There are also instances of the use of the terms "e-commerce" and "Internet" being so confused that the advantages of the latter are appropriated by the former (Banaghan and Bryant, 1998; Evans and King, 1999) and instances of the term "e-commerce" being used where the emphasis is on a particular Internet characteristic such as "electronic interactivity" (Hodkinson and Keil, 1996).

Acknowledging the differences and confusion of the many definition of the various technologies, we have taken a "conservative" approach where in defining the technology, we would refer to the "original" context of the developed technology. In doing so, Porter's (1980) value chain analysis is by far the most widely used impact model. Value chain analysis helps in identifying key value-adding processes that could be made more effective using information technology (Lumpkin, Droege and Dess, 2002; Pires and Aisbett, 2003). The framework suggests that value creation within a business unit can be traced through distinct stages – beginning with the inbound interface (where supplier-related processes are concentrated), through the business itself, and culminating at the outbound interface (customer-related processes are concentrated). We concur with Wu,

Mahajan and Balasubramanian (2003) that e-business technology and its components centre on business value chain activities (Porter, 1980).

This study defines e-business as any form of commercial or administrative transaction or information exchange that takes place via an information communication technology - based, computer network (Moodley, 2002). This definition concurs with Mesenbourg's (1999) definition as any process that a business organisation conducts over a computer-mediated network. The process may range from internal production processes such as the usage of an enterprise resource planning (ERP) package that is implemented by many companies to integrate their business processes in productions, finance and human resources. Back end management includes procurement, ordering, automated stock replenishment, payment processing and other electronic links with suppliers consisting of supplier chain management (SCM) software that is implemented to complement existing ERP packages to integrate ERP functions with supplier's inventory and demand forecast systems.

Meanwhile, the front end management includes sales and marketing-focused processes which consist of business transaction and customer management. Business transactions include marketing and selling activities, processing of customer orders and payment. It is normally focused on e-commerce technology, defined as any transaction completed over a computer-mediated network that involves the transfer of ownership or rights to use goods and services (Fraumeni et al., 2000). Finally, customer relationship management (CRM) software is the latest addition to e-business application in an effort to create more integrated customer information systems. These include functions such as customer service and other marketing functions as well. Figure 2.1 illustrates e-business technology, which consists of e-commerce, ERP, SCM and CRM as its components.

Figure 2.1: E-Business Technology Framework

Source: Turnbull (1999)

2.1.3 Conclusion

This section discuss the various approaches and definitions of innovation comprised in the innovation literature. While recognising the merits of the various approaches, this study adopts the "product, outcome or discrete event" approach, which defines innovation as the adoption of an idea or behaviour, whether a system, policy, programme, device, process, product or service, perceived as new to the adopting organisation (Daft 1982; Damanpour, 1991,1992; Damanpour and Evan 1984; Zaltman et al., 1973).

Responding to the call for more research in the organisational innovation, this research focuses on the adoption of innovation among firms. As such, in defining adoption, the researcher concurred with Damanpour (1991) by taking adoption in its broadest sense, encompassing "the generation, development, and implementation of the technologies". The study also assumes that innovation adoption is an organisational response to changes

in the organisational environment (Donaldson, 2001; Kast, 1973) and as a pre-emptive action to influence the environment (Child, 1972).

2.2 Conceptualisations of Technology Motivation

The technology motivation construct adopted in this study is based on previous studies that used perceived benefits as their theoretical basis. In exploring firms' adoption of new technologies, various studies have used Rogers' (1983) perceived benefits as their predictor variable (e.g. Iacovou and Benbasat, 1995; Kuan and Chau, 2001; Premkumar and Roberts, 1999; Sánchez and Pérez, 2003). Although perceived benefits have been shown as an important predictor of firms' new technology adoption, there is not a single study that seeks to determine the "antecedents" of the construct (Min and Galle, 2002). This is an unusual phenomenon because a firm cannot evaluate the need for or benefits of a new technology without a clear notion of what the technology encompasses. In today's technology, for instance e-commerce or e-business, what is meant by the term itself varies (Banaghan and Bryant, 1998; Peterson, 1997). These technologies include so many activities that it can be difficult for managers to decide where and how to use them in their businesses (Schneider and Perry, 2000).

Another possible explanation for this lack of attention to the antecedents of technology motivation could be Rogers' view that the motivation for innovation is almost exclusively problem-driven (Elliot and Loebbecke, 2000). As a result, the perceived benefits sought by firms in new technology adoption are mainly reactive or 'product-oriented'. By taking a 'product-oriented' approach, researchers assumed that the decision making processes of an organisation are product oriented or technology oriented, whereas with technology motivation, firms' response could be proactive or reactive. Therefore, by determining the "antecedents" (technology motivation) of firm selection in perceived benefits, the study fills a current gap in the organisational innovation adoption literature.

In determining the factors that influence firms to adopt new technology, various adoption models have been suggested within the innovation and Information Technology (IT) field. Rogers (1983) and Damanpour (1991) in their review of organisational innovation adoption literature have identified various sets of variables that influence firms' propensity to adopt an innovation. These variables are organisational characteristics, innovation characteristics and the firm's business environment characteristics. Within the characteristics of the innovation itself, quite a number of innovation studies have used Rogers' (1983) attributes of innovation, which are relative advantage, compatibility, complexity, observability and trialability, as their theoretical basis (e.g. Harrison et al., 1997; Moore and Benbasat, 1991).

Tornatzky and Klein (1982) conducted a review and meta-analysis of seventy-five innovation studies and identified ten characteristics that had been addressed most frequently, which included Rogers' innovation attributes. Within Rogers' (1983) attributes of innovation, the element of relative advantage is the only variable that has been consistently identified as a critical adoption factor (Kuan and Chau, 2001), the most important factor for IT growth in small firms (Cragg and King, 1993) and EDI adoption (Premkumar and Ramamurthy, 1995). Other studies in IT adoption have found this variable important in the context of various information technologies adopted (Cooper and Zmud, 1990; Premkumar et al., 1994). Relative advantage has been conceptualized in terms of perceived benefits by various researchers (e.g. Iacovou and Benbasat, 1995; Kuan and Chau, 2001; Premkumar and Ramamurthy, 1995). Perceived benefit refers to the level of recognition of the relative advantage that the particular technology could provide to the organisation (Kuan and Chau, 2001). This is consistent with Rogers' (1983) assertion that "the degree to which an innovation is perceived as being better than the idea it supersedes that has a direct impact on the likelihood of adoption". The reasoning implies that the decision to adopt a new technology is based largely on a rational calculation of the benefits expected.

Rogers (1983) asserted that the attributes of an innovation explained 49 to 87 per cent of the variance in the adoption rate. However, the findings of Völlink et al. (2002) revealed

that not all attributes are relevant to the potential adopter at the same time. They found that potential adopters seem mainly interested in the perceived benefits of an innovation. Plouffe, Vandenbosch and Hulland's (2001) studies also showed that for many innovations, firms choose to concentrate on improving the perceived benefits to enhance the probability of adoption. Only when the perceived benefit is considered sufficiently high, will they proceed with evaluating the intervention on the basis of the other attributes. When the benefits are perceived as minor, the evaluation process is stopped. Thus, the decision making about an innovation is a stepwise process in which perceived benefits is the first critical attribute for continuing or discontinuing the assessment of an innovation. The perceived characteristics of an innovation can be considered as cognitive indices (or beliefs) reflected in an attitude towards the innovation (Rosenberg and Hovland, 1960; Le Bon and Merunka, 1998). Le Bon and Merunka (1998) elaborated that there is conceptual and empirical evidence that, in organisational settings, attitudinal components mediate the influence of external variables, such as motivation, on behavioural intentions.

Following that rationale, it is plausible that a firm's 'selection' of the technology perceived benefits is a manifestation of its technology motivation. As argued by Premkumar and Roberts (1999), the primary motivation by businesses' adoption of new technologies is the anticipated benefits these technologies would bring to the company. Corroborating this argument, Chengalur-Smith and Duchessi (1999) in their synthesis of technology implementation process (TIP) models based from Cooper and Zmud (1990), Kwon and Zmud (1987) and Preece (1991) conducted a study on firms' adoption motives of client-server technology adoption in organisations. Their theoretical reasoning was based, on the TIP model, which consists of a final stage where the management accesses the technology's benefits for approval. This is consistent with Kwon and Zmud (1987) argument that successful Information System (IS) implementation occurs when sufficient organisational resources are directed, first toward motivation, then toward sustaining the implementation effort.

Perceived benefits, which may be strategic or operational (Kuan and Chau, 2001; Reekers and Smithson, 1994), correspond with *adoption motive* through strategic implementation

of the respective technology. However, the perceived benefits of a particular technology are largely determined by the firm's knowledge and understanding of how the technology would benefit them. Iacovou and Benbasat (1995) in their study of the adoption of EDI among small firms indicated that non-EDI adopters primarily focused on efficiency benefits (operational); EDI-capable firms mentioned the potential of EDI to transform interim relationships to allow entry into new and remote markets (suggesting strategic benefits). The authors suggested that the discrepancy could be due to lack of awareness about EDI's strategic benefits prior to adoption.

Lal's (2002) study on e-business adoption among SME's in the manufacturing sector found that a majority of 'offline technology-using firm's did not perceive a significant impact on the competitiveness (strategic perceived benefits) of firms, while ninety-one per cent of 'portal-using' firms perceived that e-business technologies significantly strengthen the competitiveness of firm. The findings for efficiency benefits also revealed that 'offline firms' did not perceive any significant impact on the firms, while firms that adopted 'portal-using' e-business technology reported an impact on efficiency (operational perceived benefits) in transactions.

This differs from technology motivation, where firm motives are manifested either explicitly or implicitly in their strategy, objectives, organisational culture or management's decision criteria when adopting a technology. Clark et al. (2000) elaborated that expected motivations describe a set of considerations which are notionally of significance to those contemplating technology adoption, while stated motivations can be viewed as a framework of considered actions, or decision space. This rationale correlates with Greer's (1985) interpretations of hospital technology adoption decision systems, which are fiscal-managerial, strategic-institutional, and medical-individualistic. Although it has been argued that none of the specific decision systems are able to explain technology adoption in hospitals satisfactorily, it is likely that *dominant motivations* may exist within hospitals as a result of their strategic intent, demographic characteristics or dominant coalitions (Teplensky et al., 1995).

Therefore, it is justifiable that the technology motivation construct is developed in view of the reasons and arguments put forth. The following sections further argue the proposed relationship between technology motivation and technology adoption. Finally, the section concludes by identifying the various technology motivation "themes" in organisational technology adoption.

2.2.1 Technology Motivation and Technology Adoption

Organisational technology adoption, like any other strategic issue, is an event perceived by decision makers to have a potential impact on the future effectiveness of the organisation (Ansoff, 1980; Dutton et al., 1983). As argued by Rogers (1983), organisations adopt an innovation only if it provides significantly better benefits than existing methods. The innovation has to provide solutions for existing problems or open up new opportunities in order to motivate the organisation (Premkumar and Ramamurthy, 1995). Therefore, technology motivation 'tactfully' guides organisations in choosing the technologies that could fulfil their needs. The perceived benefits of the respective technology provide 'cues' for the organisation in looking for a "compatible" solution. Kaplan's (1999) study reveals that motivation or perceived needs help drive every component of the early adoption decision process in firms. Gagnon and Toulouse (1996) inferred that each motivation represents an opportunity for the organisation and such opportunities are widely considered as a clear driver for adoption. Clark et al. (2000) studied the diversity of technology motivations and perceptions that characterise individual organisations' operational experience in managing the adoption process. They found that firm adoption motivations correlate well with observations of actual adoption intentions.

Since literature focusing on firm adoption motives is scarce, studies that used perceived benefits or relative advantage as their determinants are reviewed to probe for possible relationships. This follows our earlier argument that perceived benefits provide 'cues' for organisations in looking for a compatible solution. However, we would like to emphasise

that the perceived benefits referred in this study relate to the "core proposition" of the technology. This is due to the current scenario where a particular technology is claimed to offer various different benefits that overlap with those of other technologies.

Benbasat et al. (1993) elaborated that higher managerial understanding of perceived benefits of a respective technology increases the likelihood of the allocation of the managerial, financial and technological resources necessary to implement the system. This conforms to Petroni and Rizzi's (2001) finding that the adoption and implementation of a technology rest on a preliminary analysis of the potential benefits induced by the technology under consideration. The greater the extent to which these benefits are explored, the bigger the probability of adoption. This correlates with the work of Iacovou and Benbasat (1995) which indicated a positive relationship between perceived benefits and adoption. In the adoption of Internet among SME's, Mertens et al. (2001) revealed that perceived benefits is one of the factors that influenced firm adoption and these were consistent across different Internet innovations such as email, web browsing, and having a web site. Meanwhile, in the field of resource management innovations, the perceived benefits of enhanced competitiveness (Shrivastava, 1995) and marketing benefits (Zimmer et al., 1994) have been identified as reasons for adoption.

In a study of demand chain management (DCM) in manufacturing and services firms, Frohlich and Westbrook (2002) found that the perceived benefits of greater access to new markets influence adoption. The researchers found that technology adoption is influenced by factors like performance and market share. Another widely cited example of the use of DCM to achieve market growth and competitive motives is Dell's model in computers (Magretta, 1998). By satisfying existing clients, the technology allows companies to win over the most profitable customers in the new markets.

In the adoption of advanced manufacturing technologies (AMT), it has been argued that AMT play a strategic role in improving competitiveness by utilizing the manufacturing function more effectively in overall business strategy. Sohal et al. (2001) in their study of 476 manufacturing companies in South Africa revealed that the major forces motivating

firms to adopt AMT are obtaining competitive advantage and financial benefits. Sriram et al. (1997), investigating IT investments in the purchasing department of US firms, found that the internal motivation of improving efficiency influenced the types of adoption decision. Finally, Mertens et al. (2001) found that the perceived benefits of efficiency and effectiveness were important determinants in the adoption of Internet among SME's.

2.2.2 Technology Motivation Themes

Various adoption motives have been quoted in technology adoption research. Among the most widely referred are the competitive motive, which represents company's desire to gain or maintain competitive advantage; efficiency and effectiveness motives, referring to a company's desire to attain internal efficiencies; market growth through expansion of new markets, and a customer retention motive through better customer service by shorter lead time and more up-to-date information about transaction status (Chengalur-Smith and Duchessi, 1999; Davila et al., 2003; Lal, 2002; Pfeiffer, 1992; Prasad et al., 2001; Sriram et al., 1997). Chengalur-Smith and Duchessi (1999) found that the motivations for employing the client-server technology in firms, which are competitive, efficiency and operational, are business-driven rather than technical in nature. Chen's (2003) decision criteria also consist of financial (operational) and strategic motives in determining the factors affecting the adoption and diffusion of XML and Web services standards for e-business systems.

The notion of e-business technologies attempts to link e-business with the strategic opportunities that it creates to the firm, in particular, the functionalities of the specific e-business applications and the anticipated benefits of their adoption. As argued by Sarrina Li (2003), different technologies provide various functions and firms adopt certain technologies because the functions provided by these technologies fulfil their needs. Thus, it is posited that the adoption motives of firms would correlate with the perceived benefits expected from adopting the specific e-business application. However, this does not mean that firms adopt specific technologies to gain immediate benefits. As Poon and Swatman

(1999) argued, although some of the benefits of e-business are still unrealized, businesses are still connected to the Internet not because of tangible profits but rather because of the promise of future opportunities.

There are various motives for a firm to adopt e-business technologies. However, as the demarcation and definition of what constitute e-business and other related technologies tend to be different between authors, it is quite difficult to relate the motives of adoption to the e-business technology components. Nevertheless, among the most commonly held e-business motives are to increase the efficiency and effectiveness of a firm's business transactions (Chang et al., 2002; Drew, 2003; El Sawy et al., 1999; Mehrtens et al., 2001). Davila et al. (2003) reported that companies that use e-procurement technologies report savings of 42 per cent in purchasing transaction costs. This cost reduction is associated with less paperwork, which translates to fewer mistakes and a more efficient purchasing process.

Competitiveness is another motive commonly noted (Lal, 2002). Morrell and Ezingeard (2002) stated that traditionally, the objectives of supply-chain management have been efficiency driven, aiming to pass the product through the chain in the shortest time with the lowest cost. Effectiveness and competitive advantage are now at the centre of many supply-chain improvement initiatives. Lambert et al. (1998) elaborated that the objectives of SCM are maximizing competitiveness and profitability for the company as well as the whole supply chain network including end customer. Lambert and Cooper (2000) found that SCM produces a competitive advantage that positively impacts the performance of the firm. Lord's (2001) study revealed that the associated increase in competitiveness from increased efficiency is one of the main drivers of B2B e-commerce / SCM solutions. Thus, firms would adopt SCM with the motivation of increasing competitiveness through the associated increase in efficiency and effectiveness.

Meanwhile, better customer service through improved service response time and faster problem resolution is also noted in e-business adoption. CRM is claimed to improve customer service and retain existing customers. Moore (2001) defines CRM as "all tactical

and strategic initiatives implemented by the organisation to improve the quality of that organisation's knowledge of the customer, tailoring products and services to the customer, and delivering those products and services to those same customers". The premises of CRM are that existing customers are more profitable than new customers; that it is less expensive to sell an incremental product to existing customers; customer retention would be maximised by matching products and levels of service more closely to customer expectations; and attracting new customers is expensive (Peppard, 2000). The central objective of CRM is thus to maximise the value of a customer to the organisation.

Hence, customer relationship is an important determinant of marketing success, since loyal customers tend to be less price sensitive and are cheaper to maintain (Galbreath 2002). Further, according to Reichheld (1996) there is a tremendous increase in profits resulting from a small increase in customer retention (Winer 2001). Consequently, a previous survey revealed that most CEOs are giving more attention to managing customer relationship now than ever before (Galbreath 2002).

Apart from the specific CRM technology, e-commerce is also argued to foster the development of closer customer relationship (Pires and Aisbett, 2003). This is corroborated by Lancioni et al. (2002), who asserted that among the benefits of e-business is the ability of firms to develop higher levels of customer retention and loyalty. Consequently, they construed that the motive for CRM adoption is to improve customer service and improve customer retention.

2.2.3 Conclusion

This section provides the justification for developing the new construct called technology motivation. The argument for its existence centres around Rogers' (1983) innovation attributes of relative advantage or perceived benefits. The section has discussed numerous reasons why the current use of perceived benefits as a constructs is not adequate and

relatively put firms in an awkward position, especially in the current scenario where there are many technology options.

Subsequently, the section illustrates numerous examples in linking technology motivation with technology adoption. Although literature on firm motivation of technology adoption is scarce, the inference was drawn from reviewing the literature that the perceived benefits of a respective technology are seen as providing 'cues' for organisations in looking for a compatible solution.

Finally, the section ends by reviewing various motives of new technology adoption by firms. Among the most commonly held e-business motives are to improve the efficiency and effectiveness of the business process transaction. In line with these motives, improving competitiveness is also the result of the former motives. The motive of market growth is also noted with e-business technology. Concomitant with these technologies are improved customer service and customer retention, depicted as motives for e-business adoption.

2.3 Antecedents of Technology Motivation

Studies on organisational technology adoption have identified various factors that influence firm propensity to adopt new technology (Gopalakrishnan and Damanpour, 2000; Kimberly and Evanisko, 1981; Meyer and Goes, 1988; Ramamurthy et al., 1999). Rogers (1983) and Damanpour (1991) identified these sets of variables as organisational characteristics, technology characteristics and firm business environment. Various researchers have repeatedly tested these sets of variables in their research models to study the probability of a firm adopting new technology (Kurnia and Johnston, 2000). However, the specific construct representing the set of variables differ from one study to another, as do the number of variables studied. The organisational characteristics that have been widely studied include size, competition, centralization, specialization, functional differentiation, external integration management support, management education level and

management awareness of the technology (Chengalur-Smith and Duchessi, 1999; Premkumar and Roberts, 1999; Thong and Yap, 1995; Wu, Mahajan and Balasubramanian, 2003). The technology characteristics consist of Rogers' (1983) innovation attributes, which are relative advantage, compatibility, complexity, observability and trialability. Meanwhile, firm business environment includes the nature of the business environment and the intensity of competition (Kuan and Chau, 2001; Raymond, 2001). Table 2.1 contains a summary of selected research on organisational technology adoption utilising the organisation-technology-environment constructs as their predictors. The studies show that the adopted organisation-technology-environment constructs provide a valid theoretical framework.

Consistent with previous research, we posited that the antecedents of firm technology adoption are influenced by three sets of variables, namely organisational characteristics, technology characteristics, and firm business environment. Nevertheless, our construct representing organisational characteristics differs from previous research, as it is represented by firm corporate culture, which comprises market orientation, organisational learning and innovativeness. Zmud (1982) suggested that it is not the structure of the organisation that "triggers" innovation; rather, innovation emerges from the organisational "climate" within which members recognize the desirability of innovation, and within which opportunities for innovation arise and efforts toward innovation are supported. Our technology characteristics are represented by firm technology motivation. Meanwhile, we argue that top management support and external pressure moderates the relationship between firm technology motivation and e-business technology adoption. Finally, firm business environment comprises environmental uncertainty, environmental hostility and environmental heterogeneity. The following sections provide a review of the constructs in our study.

Table 2.1: Summaries of Technology-Organization Environment Factors Influencing the Adoption of New Technologies in Firms

Source	Determinants	Moderator	Significance	Technology	Performance
Kuan and Chau (2001)	Technology: Perceived Benefits	None		EDI	Not tested.
	- Direct		Significant		
	- Indirect		Not significant		
	Organization: Organizational Readiness				
	- Financial		Significant		
	- Technical		Significant		
	Environment: External Pressure				
	- Industry		Significant		
	- Government		Significant		
Sández and Pérez (2003)	Technology: Perceived Benefits	Inter-organizational Cooperation (Significant)		EDI	Coordination in supply chain
	- Operational		Significant		
	- Strategic		Not Significant		
	Organization: Resources				
	- Cost difficulties		Significant		
	- Technical difficulties		Significant		
	- Organizational difficulties		Significant		
	Environment: External Pressure				
	- Supply dependence		Significant		
	- Mutual understanding		Not Significant		
	- Experience of EDI		Significant		

Source	Determinants	Moderator	Significance	Technology	Performance
Premkumar and Robarts (1999)	Technology: Perceived Benefits - Cost - Complexity - Compatibility Organization: - Top Management - Size - IT Exposure Environment: - Competitive Pressure - External Support - Vertical Linkages	None	Significant Not Significant Not Significant Not Significant Significant Significant Not Significant Significant Not Significant Not Significant	Email, EDI, internet, online database access	Not tested.
Lertwongsatien and Wongpinunwatana (2003)	Technology: - Perceived Benefits - Compatibility Organization: - Size - Management Support - Existence of IT Department Environment: - Competitiveness	None	Significant Significant Significant Significant Significant Significant	E-commerce	Not tested.

Source	Determinants	Moderator	Significance	Technology	Performance
Wu, Mahajan and Balasubramaniam (2003)	Technology		NA	E-business	Yes (Significant)
	Organization: - Management Support	1. Market-uncertainty	Significant		
	- Organizational learning		Significant		
	- Customer orientation	2. Technology - uncertainty	Significant		
	- Customer orientation		Not Significant		
	Environment: - Customer power		Significant		
	- Normative pressure		Significant		
Raymond (2001)	Technology : - Benefits	None	Not Significant	E-commerce	Not tested.
	- Attributes		Not Significant		
	Organization: - Ownership		Significant		
	- Business nature		Significant		
	- Marketing strategy		Significant (weak)		
	- Managerial context		Not significant		
	Environment :- Uncertainty		Significant		
	- Competitive pressure		Significant		

Source	Determinants	Moderator	Significance	Technology	Performance
Petroni and Rizzi (2001)	Technology: - Benefits - Feasibility Organization: - Organizational willingness - Awareness Environment: - Customer power - Normative pressure	Evaluations (Significant)	Significant Not Significant Significant Not Significant Significant Significant	MRP (Materials Requirements Planning)	Not tested.
Chengalur-Smith and Duchessi (1999)	Technology : - Scale of technology - Scope of technology - Cost of technology Organization: - Structure - Size - Migration strategy Environment: - Firm market position	Initiation motives (Significant)	Significant Significant Significant Not Significant Not Significant Significant Significant	Client Server	Not tested.
Joo and Kim (2004)	Technology: - Perceived advantage Organisation: - Slack resources - Size Environmenet: - External pressure - Buying power	None	Not significant Not significant Significant Significant Not significant	e-Market place	Not tested.

Source	Determinants	Moderator	Significance	Technology	Performance
Scupola (2003)	Technology: - Benefits - Barrier Organization: - Project Champion - Financial Resources Environment: - Government - Public Administration - External pressure - Access to EC resources	None	Qualitative	E-commerce	Not tested.
Mehrtens, Cragg and Mills (2001)	Technology: - Perceived Benefits Organization: - Organisation readiness - IT Knowledge - IT used in organisation Environment: - External Pressure	None	Qualitative	Internet	Not tested.

Source	Determinants	Moderator	Significance	Technology	Performance
Kurnia and Johnston (2000)	Technology: - Innovation attributes Organization: - Top Management support -Vision - Education - Communication - IT structure Environment: - Government - Public Administration - External pressure - Access to EC resources	None	Qualitative	Inter-organisational systems/ e-commerce	Not tested.
Waarts et al. (2002)	Technology: - Perceived Benefits - Compatibility Organization: - Attitude - IT resources - IT intensity - IT integration Environment: - Dependence on parent com. - Industry competitiveness - Supply side competition	None	Qualitative	ERP	Not tested.

2.3.1 Organisational Culture

There has been a stream of research linking organisational culture to innovation. While we acknowledge that the relationship between organisational culture and technology adoption is reflexive in that technology can influence organisational culture as well as be affected by it (Robey and Azedo, 1994), we have taken culture to be the antecedent variable. The link between organisational culture and technology adoption is not new. Cooper (1994) has provided support for assuming cultural antecedence in terms of IT implementation. Kitchell (1995) has demonstrated empirically that corporate culture determines technology adoption strategies. Meanwhile Semler (1997), Tushman and O'Reilly III (1996) and Vestal et al. (1997) have provided an additional support in relating cultural antecedence in the culture-strategy relationship. Finally, Bates et al. (1995) demonstrated empirical support for linking manufacturing strategy to organisational culture.

Deshpandé and Webster (1989) defined organisational culture as "the pattern of shared values and beliefs that help individuals understand organisational functioning and provide norms for behaviour in the organisation". This is consistent with Cooke and Lafferty's (1983) definition, in which the authors described organisational culture as a reflection of shared values and beliefs that guide the thinking and behaviours of members. Barney (1986) and Schein (1985) agreed that the theoretical argument about culture is that it is a complex system of norms and values that is shaped over time and affects the types and variance of organisational processes and behaviours. Thus, culture includes all the institutionalised ways in which implicit beliefs, norms, values and premises which underline and govern behaviour. While there is a broad agreement amongst culture researchers, they nonetheless emphasize different elements (Kanungo et al., 2001). Roosseau (1990) stated that it is not the definitions of culture that vary so widely across organisational researchers but the type of data researchers collect.

Our rationale for proposing organisational culture as a determinant of firm technology motivation is in support of Webster's (1994, p. 14) assertion that "Management must

develop a broader concept of organisational culture that focuses the firm *outward* on its customers and competitors and creates an overwhelming predisposition toward entrepreneurial and innovative responses to a changing market". Similarly, Slater and Narver (1995) stated that "successful innovations occur when entrepreneurs recognise a gap between what the market needs and what is offered and successfully direct resources toward filling that need".

Hence, our notion of firm organisational culture is along the line indicated by the works of Hult and Ketchen (2001) and Hult et al. (2002). These authors conceptually developed a rationale from the resource-based view of the firm (Barney, 1991 and Wernerfelt, 1984) and market-driven organisations (e.g. Day, 1994; Day and Wensley, 1988) that market orientation, organisational learning and innovativeness collectively contribute in creating a unique resource they labelled as "sustainable competitive advantage" (cultural competitiveness). We concur with Hult and Ketchen (2001) and Hult et al. (2002) that the three cultural components represent the firm's outward corporate culture because of their inherent values and beliefs targeted at detecting and filling gaps between what the market desires and what is currently offered.

The position taken in this study is that the cultural manifestations of market orientation, organisational learning and innovativeness influence firm technology motivation in selecting and adopting e-business technology. Although previous research has discussed and empirically examined relationships involving market orientation, organisational learning and innovativeness separately, or in some combination using two of the constructs, an ambiguity remains about the interrelationships or perhaps distinctiveness of the three factors. This is an important point, in that no studies to date have examined the effect of the three culturally-based organisational characteristics influencing firm propensity to adopt new technology. The subsequent sections discuss the definitions and studies relating the adopted constructs of firm corporate culture in relation to organisational technology adoption.

2.3.2 Market Orientation

For more than a decade, the study of market orientation has continued to appear in leading journals, where the concept has been recognised to reflect a philosophy of doing business that can be considered a central ingredient of a successful organisation's culture (Baker et al., 1994; Houston, 1986; Hunt and Morgan, 1995; Lusch and Laczniak, 1987; Slater and Narver, 1995; Wong and Saunders, 1993). While much of the research on market orientation was developed in the USA, the importance of this concept has been addressed in other countries (Ennew et al., 1993; Hooley et al., 1990; Marinov et al., 1993).

Many of these market orientation studies have been conducted in single countries or cultures, such as Eastern European countries (Bulgaria, Hungary, Poland, and Slovenia) (Cox et al., 1998; Marinov et al., 1993), developing economies (Gray et al., 1998), the United Kingdom (Greenley, 1995), Nigeria (Mitchell, 1984), Scandinavia (Selnes et al., 1996), Australia (Caruana et al., 1999) and notably the USA (e.g. Kohli and Jaworski, 1990; Narver and Slater, 1990). In general, there appears to be a consensus from those countries focusing on market orientation in business, indicating that market orientation is perceived as a philosophy that permeates the organisation (Hooley et al., 1990).

Numerous perspectives have been proposed as researchers endeavour to conceptualise the market orientation construct (Lafferty and Hult, 2001). The question whether market orientation is a specific set of values or a set of behaviours has not been clearly resolved (Day, 1994). Nevertheless, it is not the purpose of this study to discuss the ongoing debate on the market orientation construct. The two main conceptualisations of market orientation are the behavioural perspective by Kohli and Jaworski (1990) and the cultural perspective by Narver and Slater (1990). The following paragraphs discuss the conceptualisations of market orientation from the two perspectives.

Kohli and Jaworski (1990) describe market orientation as the "organisation-wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organisation-wide responsiveness to it". According to the definition proposed by Kohli and Jaworski (1990),

the first key element in market orientation is the generation of market intelligence. This relies on formal and informal mechanisms such as customer surveys, meetings and discussions with customers and trade partners, analysis of sales reports, formal market research and so on. An important part of this element is that intelligence generation is not the exclusive responsibility of the marketing department (Kohli and Jaworski, 1990). All functional departments in the company such as R&D, manufacturing, and finance obtain information that is relevant regarding customers and competitors. Mechanisms, therefore, should be in place to ensure that this information is disseminated effectively to all departments.

This leads to the second key element described by Kohli and Jaworski (1990), intelligence dissemination. Part of the organisation's ability to adapt to market needs is how effectively it communicates and disseminates market intelligence among the functional areas. This dissemination of market intelligence is important because it provides a shared basis for concerted actions by the different departments (Kohli and Jaworski, 1990).

The third key element of a market orientation is responsiveness to market intelligence. The first two elements have no value if the organisation is not able to respond to market intelligence and the market needs. According to Kohli and Jaworski (1990), all departments need to be responsive and this can take the form of selecting the appropriate target markets, designing, producing, promoting and distributing products that meet current and anticipated needs.

Meanwhile, the culturally based behavioural perspective defines market orientation as "the organisational culture that most effectively and efficiently creates the necessary behaviours for the creation of superior value for buyers and, thus, continues superior performance for the business (Narver and Slater, 1990)." Almost concurrently with Kohli and Jaworski (1990), Narver and Slater (1990) also proposed a conceptualisation of market orientation that presented a different approach to the construct. Narver and Slater (1990) inferred that market orientation consists of three behavioural elements which are customer orientation, competitor orientation and interfunctional coordination. According to Narver and Slater (1990), the customer orientation element requires a sufficient

understanding of the customer in order to create products or services of superior value for them. This creation of value is accomplished by increasing benefits to the buyers or customers while decreasing their costs. To develop this level of understanding necessitates acquiring information about the customers or buyers and comprehending the nature of the economic and political constraints that face them. This helps to ensure that the company will be cognizant of the needs of its present and future buyers and can work to satisfy those needs.

The competitor orientation described by Narver and Slater (1990) means that the organisation understands the strengths and weaknesses of its current and possible future competitors, as well as their long-term capabilities and strategies. The competitor orientation parallels the customer orientation in information gathering and includes a thorough analysis of the competitors' technological capabilities in order to assess their ability to satisfy the same buyers.

The third behavioural component cited by Narver and Slater (1990) is interfunctional coordination, which is the coordinated utilisation of the company's resources in creating superior value for its customers. Thus, anyone in the organisation can potentially create value for the buyer. This coordinated integration of business resources is closely linked to the customer and competitor orientations. It draws on the information generated and through the coordinated use of company resources, disseminates the information throughout the organisation. If interfunctional coordination does not exist, then Narver and Slater (1990) suggest that this must be cultivated by stressing the advantages inherent to the different areas in cooperating closely with each other. To be effective, all departments must be sensitive to the needs of all the other departments in the organisation.

In synthesising the two conceptualisations of market orientation, the central focus is the emphasis on the organisation's customers. Since market orientation is the operationalisation and implementation of the marketing concept (McCarthy and Perreault, 1990), it makes sense that the fundamental premise of satisfying the needs and wants of a firm's customers should be inherent in the conceptualisation of market orientation. As such, the need for companies to understand their customers (Shapiro, 1988), meet their

needs (Ruekert, 1992) now and in the future (Kohli and Jaworski, 1990) and create value for them (Narver and Slater, 1990) is the basic premise of the market orientation definition.

A second element that defines market orientation is the importance of information within the organisation. This information has its focus on the customer. Kohli and Jaworski (1990) refer to the need to generate information, which they discuss within the broader framework of market intelligence. Narver and Slater (1990) indicate that in order to create value for customers, a level of understanding is required which necessitates acquiring information on all the constraints that face them. Having the necessary and precise information enables firms to make appropriate judgements on matters affecting their customers. Any changes in customer needs or preferences can be detected and acted upon by the firm.

Finally, the common denominator of the two conceptualisation of market orientation refers to the interfunctional coordination or dissemination of information in the organisation. Kohli and Jaworski (1990) specifically address intelligence dissemination interdepartmentally and the necessity of this step to ensure concerted action by the different departments. Narver and Slater (1990) single out interfunctional coordination as a key element in the conceptualization of market orientation and indicate that it is an equally important element as customer and competitor orientation. This is because the creation of superior customer value entails an organisation-wide commitment to continuous information gathering and coordination of customers' needs, competitors' capabilities, and the provisions of other significant market agents (Slater and Narver, 1994a). The result is an integrated effort on the part of employees and across departments in an organisation, which gives rise to superior performance (Kohli and Jaworski, 1990).

The relationship between market orientation and innovation has been discussed and noted by various researchers (Atuahene-Gima, 1996; Hurley and Hult, 1998). This issue can be dated back as early as Drucker's (1954) suggestion that marketing and innovation are two basic functions of a firm. Thus, as argued by Atuahene-Gima (1996), it is obvious that Kohli and Jaworski (1990) made innovations a central theme in their definition of market

orientation. Surprisingly, however, the noted relationship has been merely intuitive and remains anecdotal, due to limited empirical evidence (Han et al., 1998; Hurley and Hult, 1998; Lukas and Ferrell, 2000).

The conceptual foundation of the relationship between market orientation and innovation has been put forward by various researchers. In Slater and Narver's (1994a) conceptual work, they propose innovation as one of the 'core value-creating capabilities' that drives the market orientation-performance relationship. This proposition is consistent with Zaltman, Duncan and Holbek (1973) protocol of implementing innovations after appropriate intelligence gathering and decision making have taken place. Quinn (1986) for instance observed a strong market orientation in innovative businesses.

Despande, Farley, and Webster (1993) suggested that the success of a firm's innovation is probably the excellent visible manifestation of its market orientation, along with the success of the firm. The researchers, after finding firm's performance to be linked to both market orientation and innovation, speculate on a causal relationship of market orientation, innovation, and performance. Reiterating the earlier statement of Deshpandé, Farley, and Webster (1993), Slater and Narver (1994) reason, "Innovation and new product success are more likely to result from being market-driven".

Jaworski and Kohli (1993) have suggested that because a "market orientation essentially involves doing something new or different in response to market conditions, it may be viewed as a form of innovative behaviour". Although Jaworski and Kohli (1993) do not deal with innovation explicitly in their model, their subsequent work (Jaworski and Kohli, 1996) suggests that market orientation is an antecedent to innovation. Slater (1997) briefly comments on the idea that "successful innovation is the product of a market orientated culture coupled with entrepreneurial values". In addition, Jaworski and Kohli (1996) have recognised that innovation has been inappropriately absent in models of market orientation. Thus, Han et al. (1998) in their study responded to the above arguments by providing a systematic framework for testing the market orientation-innovation-performance relationship, using Narver and Slater's (1990) market orientation framework.

They provided empirical evidence that market orientation facilitates an organisation's innovativeness (adoption).

In this study, we have taken the view that the market orientation and innovation relationship is mediated by technology motivation. Our rationale is based on Hurley and Hult's (1998) argument that market orientation is a source of new ideas and motivation to respond to the environment. The motivation to respond to the environment may consist of a balanced mix of the components of market orientation (Narver and Slater, 1994) or there may be an emphasis on one of the components. Deshpandé, Farley, and Webster (1993), for instance argued that customer orientation is the most fundamental aspect of a corporate culture. Thus, although a firm is market-oriented, their motivation in responding towards the environment depends on their perspective and emphasis.

2.3.3 Innovativeness

For firms to survive in a volatile environment, they must be innovative (Johnson et al., 1997). Innovative firms are more receptive to change and are more likely to be successful in using technology to achieve competitive advantage (Gatian et al., 1995). Allen (1977) and Rothwell (1992) asserted that innovative organisations would exploit information systems not just for routine operations but also for spotting opportunities for innovation. Nevertheless, although innovativeness is an important feature of successful organisations, studies has mainly concentrated on the behavioural aspects of innovativeness or taken it as a dependent variable of innovation adoption (Rogers 1983).

As innovativeness in organisations began to be link with competitive advantage (Gatian et al., 1995), the subject has attracted various researchers seeking to identify the characteristics of innovative organisations. However, based on the literature of innovation, firm innovativeness can be conceptualised from various perspectives. According to the first view, it is a behavioural variable, which is the rate of adoption of innovations by the firm (Damanpour and Childers, 1985; Damanpour and Evan, 1984; Damanpour and Evan,

1990). Rogers defines innovativeness as "the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system (Rogers, 1983, p. 252). This measure regards adopters of innovations as innovative firms and non-adopters as non-innovative firms. The definition reflects the magnitude of innovation, for instance, the number of innovations the organisation adopts within a given period. It is assumed that organisations with a high adoption rate adopt innovation more frequently and more consistently. A vast number of studies in the innovation literature have adopted the behavioural view of innovativeness. A possible reason for this could be the researchers' view that organisations should aspire to greater organisation-wide innovativeness. This orientation has been called the 'pro-innovation bias (Rogers, 1983)'.

Rogers (1983) uses simple statistical definitions to segment the distribution of adopters' innovativeness scores, or time of adoption, into adopter groups. An individual's adopter group is assigned on the basis of standard deviations from the mean innovativeness score. Rogers then creates a profile for each adopter group based on demographics, personality and communication characteristics. The classic Rogers model defines five adopter groups. However, in industrial marketing studies, it is common to reduce this to a two-group model (Bumgardner and Romig, 1998; West and Sinclair, 1992). A two-group model defines innovators as those with innovativeness scores greater than one standard deviation from the mean; all other respondents are defined as non-innovators.

However, this measure of innovativeness has several shortcomings. The first is the "recall problem". This measure relies on the ability of individuals to remember the exact time they adopted an innovation. This may be simple when adoption is recent, but as the event moves further into the past, the recall of events and exact times gets less precise (Rogers, 1983). The second problem arises from using only one product to generate the innovativeness scores, which then become product-specific and may not be broadly applicable (Midgley and Dowling, 1978). A measure of innovativeness that uses just one occurrence of adoption may be very sensitive to situational factors. For example, a firm that is generally late in adopting new products may happen to adopt the product under study early, and therefore would be classified as an early adopter for all products. Finally,

because this method relies on time of adoption, non-adopters are not considered in the analysis (Rogers and Shoemaker, 1971).

An alternative view of innovativeness is as a cultural variable that is an organisation's willingness to change (Hurt et al., 1977). Hurley and Hult (1998) define firm innovativeness as openness or receptiveness to new ideas as an aspect of firm's culture. Receptiveness to change or ideas, like many other organisational variables, is in large part a product of corporate culture, defined as the "assumption and beliefs shared by members of the organisation" (Johnson, 1992). This illustrates that the firm is receptive to new ways that can improve its current business process. Consequently, innovativeness encourages firms to explore more opportunities and centre their strategies on technological innovation. Hurley and Hult's (1998) cultural definition of innovativeness concurs with Deshpandé, Farley, and Webster (1993), who they defined organisational innovativeness as the degree to which a firm deviates from existing practices in creating new products and/or processes.

Innovativeness or receptiveness to change is an important characteristic for organisations to succeed in a turbulent environment. Innovativeness foster risk taking and managers in these firms are normally willing to experiment with new ideas and technologies. Zmud (1984) noted that organisations' receptiveness to change has been found to be a significant factor for achieving success in technical innovations. We argue that innovativeness as a corporate culture facilitates and motivates innovative behaviours and outcomes through the perception that the organisation is receptive to change and new ideas. This corresponds to Hurley and Hult's (1998) assertion that innovativeness is present when the implementation of new ideas, products or processes is encouraged. In addition, Van de Ven and Polley (1992) argued that innovativeness complements firms' other cultural attributes, such as market orientation. They elaborated that a firm is unlikely to enjoy long-term success if it is not innovative in meeting the desires of market.

Finally, a recent view of organisational innovativeness regarded the construct as an organisational capability. Srinivasan, Lilien and Rangaswamy (2002) extended the

theoretical developments in the resource-based view of the firm (Wernerfelt 1984) by investigating why some firms would proactively adopt radical technologies whereas others do not. The researchers argued that "technology-response capability" as an element of organisational innovativeness is an organisation's willingness and ability to respond to the new technologies it senses in its environment that may affect the organisation.

A firm responds to a radical technology may decide to ignore or adopt the technology within the firm. An organisation may decide not to respond to the new technology because such technologies can cannibalise existing products, markets, and organisational relationships and result in switching costs (Chandy and Tellis 1998). However, an organisation that possesses organisational innovativeness would have the ability to reengineer its business strategies to exploit the opportunities or stave off the threats posed by new technologies (Srinivasan, Lilien and Rangaswamy, 2002). As the focus of our research was on the degree to which the SBU's encourages the introduction of new ideas and processes in their organisation, we adopted the cultural definition of organisational innovativeness where cultural values and beliefs of organisational innovativeness are formed and acted upon to achieve strong long term performance (Hurley and Hult, 1998).

2.3.4 Organisational Learning

There seems to be a wide agreement that organisational learning is closely related to innovation. The apparent connection between organisational learning and innovation derives from the closeness of organisational learning and innovation definitions by various authors. Slater and Narver (1995), for instance, defined organisational learning as the "development of new knowledge or insights that have the potential to influence behaviour". The organisational learning process includes information generation, information dissemination, and shared interpretation. These definitions "overlap" with Thompson (1965) definition of innovation as the generation, acceptance, and implementation of new ideas, processes, products, or services. Meanwhile, Lukas et al. (1996, p. 234) argued that "the process of understanding and gaining new insights is at the

core of organisational learning". Thus, new idea or practice would be put into use by the organisation. Calantone, Cavusgil and Zhao (2002) argued that this overlap with Zaltman, Duncan and Holbek's (1973) and Rogers' (1983) definition of innovation as "an idea, practice, or material artefact perceived as new by the relevant unit of adoption". More recently, the overlap between organisational learning and innovation was found in Amabile et al. (1996), who defined of innovation as the "successful implementation of creative ideas within an organisation.

A plausible explanation for this overlap could be that the innovation process involves the acquisition, dissemination, and use of new knowledge (Damanpour, 1991; Johnson et al., 1997; Moorman and Miner, 1998; Verona, 1999). Thus, there seems to be wide agreement that organisational learning and firm innovation (adoption) are highly correlated. Nevertheless, the role of organisational learning and firm innovation adoption remains unclear (Capon et al., 1992). Many authors have called for an examination of how they are linked (Damanpour, 1991; Goes and Park, 1997; Hurley and Hult, 1998; Sinkula, Baker and Noordewier, 1997). Hurley and Hult (1998) propose an antecedent role, but the relationship remains anecdotal.

Although the definitions of organisational learning and innovation are argued to overlap, they are two different distinct constructs (Hurley and Hult, 1998). The origins and theoretical foundations of organisational learning can be traced back to the work of Cyert and March (1963). The term "organisational learning" appears to have been used first in 1963 by Cyert and March in their seminal study of the behavioural aspects of organisational decision making. However, the topic of organisational learning did not gain much further attention from researchers until the late 1970s when it started to become a focus of activity for a few organisational theorists (e.g., Argyris, 1977; Argyris and Schön, 1978). Though research activity increased in the 1980s, it was not until the 1990s that the topic became a central one in a variety of management disciplines such as strategy, and production management (Easterby-Smith, 1997).

It is commonly agreed that organisation learning is a complex and multidimensional concept that has been examined from a variety of disciplinary perspectives (Easterby-

Smith, 1997). Due to this multidisciplinary interest, it is reasonable that a widely accepted definition of organisational learning has yet to emerge. In marketing, and based on the management literature (e.g., Fiol and Lyles, 1985), a variety of definitions have been put forward. For example, Sinkula (1994) defines organisational learning as "the means by which knowledge is preserved so that it can be used by individuals other than its progenitor." On the other hand, Slater and Narver (1995) propose that "organisational learning is the development of new knowledge or insights that have the potential to influence behaviour." Finally, Huber (1991) described organisational learning by saying that "an entity learns if, through its processing of information, the range of its potential behaviours is changed ... or an organisation learns if any of its units acquires knowledge that it recognises as potentially useful to the organisation".

Though these definitions do differ, as pointed out by Tsang (1997), almost all definitions contain both "cognitive" and "behavioural" changes. With respect to the cognitive aspect, most researchers agree that this is concerned with gaining knowledge, understanding, and new insights. This correlates with Hurley and Hurt's (1998) assertion that the deepest manifestations of organisational learning are at the cultural level, where over time, stories, reinforcement of behaviours, and the creation of organisational processes produce a basic assumption among employees that customers and learning are important (Schein, 1985). Consequently, a firm's organisational learning culture would instigate efforts to gain knowledge of the internal and external environments. Galer and Heijdens (1992) argue that a culture amenable to learning is a prerequisite to a firm's ability to improve its understanding of its environment over time.

Meanwhile, Argyris and Schon (1978) stated that organisational learning occurs when the organisation detects a mismatch between its outcomes and expectation, which disconfirms the firm's current theory in use. When this happens, the firm would focus on correction efforts that revolve around its organisational norms (which guide the firm's behaviour). If the correction does not involve a change to the organisational norms, adaptive learning is said to occur. However, if the correction leads to a change in the organisation norms, then the learning is said to be generative (Argyris and Schon, 1978; Bateson, 1972; Sinkula, 1994). Senge (1990) described adaptive learning as coping and dealing with the current

environment in new and better ways, whereas generative learning is moving beyond adaptation and developing new ways of looking at the world.

Various authors have commented on the two qualitatively different types of organisational learning. Adaptive learning (Senge 1990; also referred to as single-loop learning by Argyris 1977) is the most basic form of learning which occurs within a set of recognised and unrecognised constraints that reflect the organisation's assumptions about its environment and itself. For example, Prahalad and Bettis (1986) argue that businesses can be managed effectively using a dominant general management logic that focuses the conceptualization of the business and guides the development of core capabilities. The resulting learning boundary constrains organisational learning to the adaptive variety, which usually is sequential, incremental, and focused on issues or opportunities that are within the traditional scope of the organisation's activities. Meanwhile, generative learning (Senge 1990; double-loop learning in Argyris 1977) occurs when the organisation is willing to question long-held assumptions about its mission, customers, capabilities, or strategy. It requires the development of a new way of looking at the world based on an understanding of the systems and relationships that link key issues and events.

An organisation committed to learning seeks a full understanding of its environment, including customers, competitors, and emerging technology. Senge (1990) has commented upon the importance of organisations being able to respond to changing external environments by exploiting new knowledge to evolve innovative work practices, perspectives and frameworks. Calantone, Cavusgil and Zhao (2002) showed that firms which adopted a higher-level learning orientation can be expected to exhibit higher competencies across the areas of measuring customer expectations, identifying quality variance, implementing quality improvements, using information to optimise information, create control systems, identify market change and use technology to acquire data. Their results are supportive of the views proposed by Jaworski and Kohli (1996), Slater and Narver (1995) and Morgan et al. (1998) who believe that the effective acquisition of new knowledge can benefit organisations in terms of being able to acquire and analyse information relevant to better understanding customer needs. As such, an organisation

committed to learning is likely to possess state-of-the-art technology (Gatignon and Xuereb, 1997).

We argue that the relationship between organisational learning and innovation adoption is mediated by technology motivation. This is based on Slater and Narver's (1995) argument that an organisational learning process that focuses on understanding and satisfying the expressed and latent needs of customers, creating new products, services and ways of doing business should lead firms to superior outcomes. These could be in terms of new product success, customer retention, growth and/or profitability (Day 1994; Sinkula 1994). Similarly, Jaworski and Kohli (1996) and Morgan et al. (1998) have conducted studies to examine how the effective acquisition of knowledge can benefit organisations in terms of being able to acquire and analyse information relevant to understanding customer needs. Thus, the motivation of organisational learning in understanding expressed and latent customer needs through effective acquisition and analysis of information is to build a closer customer relationship that would lead to customer retention, new product success, market growth or profitability. It is this motivation and intention that lead firms to take innovative process or actions through the adoption of new technology to deliver those values to the customers.

2.3.5 Firm Business Environment

Numerous studies in organisational innovation adoption have examined a variety of environmental factors on the decision to adopt new technologies (Grover, 1993; Premkumar et al., 1997; Gatignon and Robertson, 1989). Kwon and Zmud (1987) claim that studies on the influence of organisational environments are generally undertaken from two different perspectives: as a source of information or as a stock of resource. When viewed as a source of information, factors such as environmental heterogeneity and environmental uncertainty are major attributes. When viewed as a stock of resource, factors such as competition in the adopter industry play an important role. Our study views organisational environment as a source of information, which is consistent with one of the

earlier assumptions of this study, that technology adoptions are organisational responses to changes in the firm business environment.

The ability of an organisation to adapt to changing environmental circumstances is the key to organisational survival (Lawrence, 1981; Yasai-Ardekani and Nystrom, 1996) and the effectiveness of the adaptive response is dependent on aligning the response to the environmental circumstances faced by the organisation (Hambrick, 1983, Lee and Miller, 1986; Miles and Snow, 1978). The firm's response to the environment could be hypothesised from a contingency theory (Donaldson, 2001; Kast, 1973) or strategic choice perspective (Child, 1972). The contingency theory postulates that the effectiveness of the organisation depends on the congruence between elements of the organisation subsystem and the demands of the environment, while the strategic choice perspective suggests that through choices made, key decision-makers have considerable influence over an organisation's future direction. We argue that whatever perspective is adopted, the firm's response to the environment is "channelled" through technology motivation, where the adopted technology is a manifestation of firm's analysis of the environment and its taken course of action. Hence the variables included in the firm business environment are environmental uncertainty, environmental hostility and environmental heterogeneity.

There have been many studies looking at the effect of the firm's business environment on its market orientation, innovation adoption, strategic planning etc. In these studies, the business environment was conceptualised as having various dimensions. Bluedorn (1993), for instance, commented that environmental uncertainty and its dimensions of hostility and heterogeneity have received extensive coverage in the organisational theory literature. Luo and Tan (2002) elaborated that the environment is composed of environmental heterogeneity, dynamism and hostility. These three dimensions make up key factors affecting environmental uncertainty (Lawrence and Lorsch, 1967). They influence managerial perceptions of contextual uncertainty, which in turn impacts such strategic decision characteristics such as propensity for risk-taking, futurity and proactiveness or defensiveness.

2.3.5 (i) Environmental Uncertainty

Environmental uncertainty is characterised by the rate of change of innovation in the industry as well as the uncertainty or unpredictability of the actions of competitors and customers (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Miller and Friesen, 1983). More specifically, it is the "amount and unpredictability of change in customer tastes, production or service technologies, and the modes of competition in the firm's principal industries" (Miller and Friesen, 1978). It is possible to equate uncertainty with unpredictability, which is the inability to foretell future events. Whatever occurs in the environment is likely to affect the degree of uncertainty experienced by its members. Uncertainty is regarded as the "cutting edge" of organisational analysis and, thus, coping with uncertainty is the essence of the administrative process (Thompson, 1967).

A principal source of uncertainty is the variability or instability of resources and/or influences in the environment (Child, 1972). Thus, the more environments move away from being homogeneous, the more uncertainty can be expected to increase (Achrol et al., 1983). Environmental uncertainty influences the structuring and strategies of organisations. Greater uncertainty increases the chance of change in technology, demand, and/or competitive strategy (Lawrence and Lorsch, 1967; Miller and Friesen, 1983). It has been suggested in the literature that organisations may pursue more proactive, more aggressive strategies favouring bolder actions as uncertainty increases (Lawrence and Lorsch, 1967). Increased uncertainty in the environment provides the incentive for market segmentation strategies which require greater emphasis on innovation (Miller and Friesen, 1983). Further, a greater threat of external change may require an incumbent firm to protect its market position through product and process innovation (Bourgeois and Eisenhard, 1988; Utterback, 1979; Utterback and Abernathy, 1975).

It should be noted that uncertainty might not provide an incentive for innovation by itself. As environmental uncertainty is posited to be characterized by unpredictable changes in customer demand, unreliability of supplier quantities and quality, volatile price fluctuations, unpredictable competitor actions, rapid shifts in production processes, and/or brief product life cycles (Droge and Germain, 1998), organisations may institute a variety

of mechanisms to "promote, advance, and strengthen coordination" between organisational subunits and partners (Truman, 2000, p. 213) or innovate in order to survive and flourish (Grover, 1993) to overcome imperfect information and uncertainty.

Ahmad and Schroeder (2001) argue that an uncertain environment requires more frequent exchange of information between business partners so that activities can be prioritized as changes occur and delivery expectations met. In that manner, previous research has shown that higher levels of uncertainty relate positively with a greater need for changing technology and faster adoption rates (Ettlie, 1983). Demand uncertainty is also positively related to technology adoption (Robertson and Gatignon, 1986) as well as EDI adoption (Williams, 1994). Therefore, we argue that in responding to an uncertain environment, firms would adopt e-business technology with a particular technology motivation.

2.3.5 (ii) Environmental Hostility

Miller and Friesen (1983) defined environmental hostility as an unfavourable business climate, featuring intense competition for limited resources or market opportunities. This environment intensifies challenges to the firm and often complicates firm challenges (Miller and Friesen, 1983). Environmental hostility represents the perceived frequency of change and turnover in the marketing forces of the external/task environment (Aldrich, 1979). In addition to rapid continuous change, sudden discontinuous changes are also prevalent (Sutton et al., 1986). Changes in technology, customer preferences and competitive action are some examples of environmental hostility. Uncontrollable changes in the market evolution, technological evolution, or changes in the value-added system can bring about dynamic, turbulent environmental conditions (Bourgeois and Eisenhardt, 1988; Utterback, 1979). This construct has also been referred to as environmental dynamism, variability or volatility (Child, 1972), and is considered a dimension of environmental uncertainty (Scott, 1992).

Hostile environments represent "precarious industry setting, intense competition, harsh, overwhelming business climates, and the relative lack of exploitable opportunities" (Covin

and Slevin, 1989). As such, the failure rate of companies in hostile environments tends to be high; a competitive intensity is often severe and exacerbated by price wars and minimal customer loyalty (Hall, 1980). Under this market conditions, profit margins are characteristically low among firms in these environments (Potter, 1994). Therefore, survival rather than competitive excellence is often viewed as a noteworthy accomplishment (Covin, Slevin and Heeley, 2000). In addition, in a hostile environment, strategic decision making can be particularly difficult, as it is hard to predict the likely importance of these changes as they occur (Sutton et al., 1986). There are clear risks with being too aggressive in the face of environmental hostility. A firm can commit to technologies, production resources, and markets that ultimately do not become dominant or significant. Such investments in wrong technologies are very costly.

On the other hand, if a firm possesses the distinctive competences needed to succeed in the changing market, waiting too long to enter may result in missing a strategic window (Abell, 1978; Day, 1986). Therefore, prospector strategies are common in hostile environments (Miles and Snow, 1978). It would seem that firms which are more likely to exploit product and/or market opportunities to establish a strong position early in the rapidly developing environment are the most likely to survive. Hence, as argued by Zahra (1993), when "Rivalry is fierce, companies must innovate in both products and processes, explore new markets, find novel ways to compete, and examine how they will differentiate themselves from competitors".

Miller and Friesen's (1983) study of a sample of 88 U.S. firms found a significantly more positive correlation between hostility and the competitive dimension of proactiveness in the more rapidly growing subsample of firms, relative to the less rapidly growing subsample of firms. However, their replication of the former study in a sample of 40 Canadian firms showed an opposite result. Consequently, the authors stated that "hostility does not have any simple relationship to innovation" and that "much more research is needed on the subject". We believe that linking environmental hostility with organisation technology motivation would provide some explanations of firm decision making in adopting a particular technology.

2.3.5 (iii) Environmental Heterogeneity

Environmental heterogeneity is the extent to which the entities in the business environment are perceived to be different from one another (Aldrich, 1979). Environmental heterogeneity is also a dimension of environmental uncertainty. Other labels for this construct are environmental complexity, diversity and segmentation (Dill, 1958; Thompson, 1967). A similar definition is given by Tan and Litschert (1994), who defined environmental heterogeneity as the degree of diversity of markets and customers. A highly heterogeneous business environment would mean that the environment is highly segmented or differentiated. As such, companies that operate in a heterogeneous environment could face greater diversity in customer needs and preferences. Such an environment increases the need to process information and manage coordinate sub-tasks (Hambrick, 1983). Environmental heterogeneity can drive up the cost of product differentiation and the expense of customer responsiveness, because the market is more segmented and heterogeneous (Tan and Litschert, 1994).

Therefore, as noted in relation to a hostile environment, firms' motivation in responding to a heterogeneous environment varies. As firms in a heterogeneous environment could face greater diversity in customer needs and preferences, an 'internal focus' strategy would deliberately ignore the differences by selecting a stable and narrowly defined market domain, which enables the organisation to emphasise operating efficiency. This strategy searches for market stability and offers and seeks to protect a limited product line for a narrow segment of the potential market. Companies responding in this fashion try to carve out and maintain market niche within industries where competitors find it difficult to penetrate. To maintain competitiveness, organisations concentrate on operating efficiencies and tight control of costs.

Meanwhile, firms could also aggressively seek growth opportunities through product, market development and innovation. Whilst improving efficiency, firm cautiously penetrate new markets through intensified product/market innovation. By responding to the customer differences and segments of the markets, firms in such an environment seek to improve their market growth while retaining efficiency. Although this strategy seems

more risky than the former, the returns would likely be much higher. In addition, a firm in this environment could research and communicate with the market to determine the needs. This "assurance" is implied from Child (1972) and Hambrick's (1983) observation that while a hostile, rapidly-changing environment creates environmental uncertainty, it does not influence a heterogeneous environment. Therefore, firms could also jointly find satisfying solutions to divergent expectations together with their trading partners.

2.3.6 Conclusion

This section has reviewed the literature on innovation, strategic management and technology adoption, to provide support for the proposed theoretical framework of organisational technology adoption. The literature review demonstrates that numerous researchers have used the organisation-technology-environment construct as their theoretical framework. Nevertheless, although the framework has shown to be valid, the attributes representing each construct differs between studies, as do the number of variables represented. This study proposed organisational culture which comprises of market orientation, organisational learning and innovativeness to represent organisation characteristics. Technology characteristics are represented by firm technology motivation. Finally, firm business environment comprises environmental uncertainty, environmental hostility and environmental heterogeneity.

Although the three organisational characteristics; market orientation, innovativeness and organisational learning can be defined from various perspectives, there is extensive debate in the literature that supports the cultural perspective. However, while there have been studies linking organisational culture to innovation, the author has yet to find any study that examined the effect of the three culturally-based organisational characteristics influencing firm propensity to adopt new technology. The decision to study the three organisational cultures of market orientation, innovativeness and organisational learning in tandem was made based on various reasons implicitly argued in the section.

Initially, the focus on the present three organisational cultures was made because of their deep roots in past studies (Hult and Ketchen, 2001). There have been many arguments that the constructs tend to "overlap" or "cause" each other. The definitions of organisational learning, for instance, are argued to overlap with innovation (Lukas et al., 1996; Slater and Narver, 1995; Thompson, 1965) while market orientation is argued to cause organisational learning and vice-versa (Baker and Sinkula, 1999; Farrell and Oczkowski, 2002; Slater and Narver, 1995). Meanwhile, Jaworski and Kohli (1996) regard innovation as an outcome of market orientation, although they failed to recognise that innovativeness can be an aspect of a group's culture, just as market orientation can be manifested in culture (Hurley and Hult, 1998). While the debates between the constructs are still ongoing, we would like to emphasise that we do not intend to engage in the discussion.

The decision to include organisational culture representing organisational characteristics was also based on Webster's (1994, p. 14) assertion that "Management must develop a broader concept of organisational culture that focuses the firm *outward* - on its customers and competitors – and creates an overwhelming predisposition toward entrepreneurial and innovative responses to a changing market". The three elements of organisational culture adopted in this study have been recognised as an outward culture that detects and fill gaps between what the market desires and what is currently offered (Hult et al., 2002). Hurley and Hult (1998) asserted that researchers interested in proactivity and responsiveness to markets should view culture as a complex system of beliefs that affect organisational behaviour. As such, we concur with Barney (1986) and Schein (1985) that culture is a complex system of norms and values that is shaped over time and affects the types and variance of organisational processes and behaviours.

To recap the definition of the respective organisational culture constructs adopted in this study, market orientation is the organisational culture that most effectively and efficiently creates the necessary behaviours for the creation of superior value for buyers and, thus, continues superior performance for the business (Narver and Slater, 1990). A culture characterised by innovativeness encourages the introduction of new processes, products, and ideas to the organisation (Hurley and Hult, 1998). Finally, a culture focused on

organisational learning emphasises the development of new insights that have the potential to change the organisation's behaviour (March, 1991; Sinkula, 1994 and Hurley and Hult, 1998). The three cultural constructs have been known to promote receptivity to new ideas and innovation as part of an organisational culture (Hult, 2002).

Finally, another important element in the proposed theoretical framework is the organisational environment. The inclusion of the construct is pertinent, considering the assumption that technology adoption is an organisational response to changes in the firm's business environment (contingency theory) and/ or firm actions to influence the future direction (strategic choice). Hence, numerous studies in organisational innovation adoption have examined a variety of environmental factors on the decision to adopt new technologies (Grover, 1993; Premkumar et al., 1997; Gatignon and Robertson, 1989). As the organisational environment is conceptualised as having various dimensions, environmental uncertainty and its dimensions of hostility and heterogeneity were selected to represent the organisational environment construct, due to extensive coverage in the organisational theory literature. In addition, the selected dimensions of organisational environment are highly relevant to the manufacturing industry.

In conclusion, the section has provided sufficient theoretical justifications for selecting and linking the constructs toward the development of a theoretical framework of organisational technology adoption. Nevertheless, as explained in the various sections of the chapter, some of the arguments in the literature are quite anecdotal, with some studies producing equivocal results. Hence, it is important that an empirical study is carried out to fill the gap in the current literature and provide more insights into the proposed relationships.

2.4 Moderators

Our review of previous studies shows that few researchers included the effect of moderators in their proposed relationship. We argue that top management support and

external pressure (commonly used as determinant variables) could moderate the technology motivation and e-business adoption relationship. The possibility of a moderating effect is consistent with the tradition of support for contingency theory that an "influencing factor" moderates a proposed relationship. Hence, we have included top management support and external pressure in determining whether the constructs influence the strength of the relationship between technology motivation and e-business adoption.

2.4.1 Top Management Support

Top management support generally exists when the proposed changes are perceived as positive for the organisation (Premkumar and Ramamurthy, 1995). Based on an extensive meta-analysis of seventy-five innovation studies, the variable has been found to be one of the most important internal determinants of innovation (Tornatzky and Klein, 1982). There is evidence in the innovation literature that suggests top management support is positively related to the adoption of new technologies in organisations (Gatignon and Robertson, 1989; Tornatzky and Klein, 1982). Similarly, in the information system (IS) implementation literature, positive relationships have been identified between top management support and IS implementation success (Ives and Olson, 1984; Kwon and Zmud, 1987; Sanders and Courtney, 1985).

A relationship between top management support and the adoption of new technology in firms appears logical. As the investment of new technology in firm requires a substantial amount of firm resources, top management commitment to the innovation is essential to get adequate resources and support to implement the innovation. Top management's commitment ensures adequate resources for implementing the innovation (Delone, 1988; Grover and Goslar, 1993). Several studies have found top management support to be critical for creating a supportive climate and providing adequate resources for the adoption of new technologies (Grover and Goslar, 1993; Kwon and Zmud, 1987). This is consistent with Verhage et al. (1981) who argue that companies may also experience an unsupportive

organisational climate for adopting new technology or development tools. For this reason, Ahmed (1998) pointed out that among the characteristics that distinguish highly innovative firms against less innovative firms are when top management commits both financial and emotional support to innovation, and this is done through champions (Meyer and Goes, 1998) and advocates for innovation.

Delone (1988) found that top management commitment is critical to the success of small business systems. The greater the top management support is, the much easier it is for an organisation to overcome the difficulty and complexity encountered in the adoption of information technology. In addition, the support from top management would ensure less resistance from employees in adopting the new technology in their daily operations. Their support is said to be more critical for communication technologies, since the use of these technologies requires the cooperation of the trading partners (Premkumar and Ramamurthy, 1995).

In the field of e-business adoption, Eder and Igbaria (2001) found that management support has a strong influence in the diffusion and infusion of intranet systems in firms. In the adoption of e-commerce technology, Poon and Swatman (1999) found direct management involvement was common among small business. This ranges from hands-on technical development to actively initiating e-commerce projects. Thus, in general top management support and commitment is important for firm adoption of new technology. In this study, we argue that this support further reinforces firm technology motivation to adopt e-business technology.

2.4.2 External Pressure

An inter-organisational factor that may influence adoption of new technology in firms is external pressure from trading partners (Premkumar et al., 1997). It is acknowledged that the bargaining power of trading partners is an important influence in driving the adoption of inter-organisational systems technology (like e-business) in small firms (Hart and

Saunders, 1998). However, much of the research examining the impact of trading partners on technology adoption has been focused on electronic data interchange (EDI) (Premkumar and Ramamurthy, 1995; Truman, 2000). Pressure from business partners and/or customers has been found to be an important factor in EDI adoption (Hart and Saunders, 1998; Premkumar and Ramamurthy, 1995). In certain cases, a company may adopt a technology due to influences exerted by its business partners and/or its customers and the decision has nothing to do with the technology and the organisation per se.

The pressure exercised by trading partners is a function of two factors: the potential power of the imposing partner and its chosen influence strategy (Provan, 1980). Not surprisingly, requests from powerful partners to adopt the technology are expected to be more influential in the adoption decision of firms than similar requests from less powerful partners. A powerful trading partner may also pursue three different strategies to induce firms to adopt new technology. In the first type of strategy-recommendations, large firms use information to alter their smaller trading partners' general perceptions of how their organisations might more effectively operate via the use of the new technology. In contrast, the other two strategies require compliance from the smaller firms. Promises include all tactics that suggest that the larger firm will provide the smaller partner with a specified reward (such as discounts, subsidized adoption and usage, etc.) if it adopts the new technology. Threats, on the other hand, refer to actions that convey the larger firm's intentions to apply negative sanction (such as discontinuance of the partnership) should the smaller company fail to comply. Large retail organisations such as K-mart and Wal-Mart have pressured suppliers to adopt EDI using threats of loss of business (Premkumar et al., 1997). Industry associations in the auto and grocery industries have also taken the lead in establishing EDI standards and then coerced organisations to adopt EDI in an effort to enhance communications, coordination and productivity through standardisation of data formats between organisations of the supply chain (Iacovou and Benbasat, 1995; Premkumar and Ramamurthy, 1995; Riggins and Mukhopadhyay, 1994).

In general, external pressure plays a significant role in the adoption of inter-organisational technologies (e.g. EDI, SCM) since these are interdependent technologies whose utility increases only if the firm's trading partners use them (Markus, 1987). In web-based

technologies for instance, external pressure from customers or potential customers is evident for firm to adopt this technology. There is an 'expectation' that the organisation has an e-mail address and a web site. Moreover, there is an expectation that the organisation will be active on the Internet, including regular browsing and being as up to date as clients. Mertens et al. (2001) provide support for statements made by Klein and McCollum (1997) that customers would begin to demand organisations to be on the Internet. Therefore, similar to top management support, we argue that the external pressure by trading partners and customers reinforces firm technology motivation to adopt e-business technology.

2.4.3 Conclusion

This section discusses the possible influence of moderators in the proposed technology motivation and technology adoption relationship. The two constructs, top management support and external pressure, have been found to be important determinants in organisational technology adoption. Firm decisions to adopt a new technology would arguably be 'painless' if the top management in the organisation supports the adoption of the respective technology. This is because the adoption of new technology in a firm requires a substantial amount of the firm's resources and top management commitment ensures adequate resources are allocated (Delone, 1988; Grover and Goslar, 1993). While top management support acts as an "internal pressure", firm trading partners and/or customers have been identified as sources of external pressure.

External pressure from firm business partners and/or customers has been found to be an important factor in the 'inter-organisational systems technology' adoption. As the utility of this technology is argued to increase only if trading partners use it, the inclusion of external pressure as one of the moderators in the technology motivation and technology adoption relationship is justified (Markus, 1987). In the current industry scenario depicted by threats to the very survival and growth of the firm, powerful trading partners are expected to impose systems that would improve their operations efficiency and

effectiveness. This pressure could range from recommendations to coercion, to ensure that their trading partners adopt similar systems or technology.

2.5 Technology Adoption and Firm Performance Relationship

More and more organisations have invested heavily in new technologies in order to stay competitive in their given industries. This increased investment makes the investigation of technology adoption and firm performance relationship particularly interesting. Given the financial stakes involved, determining the impacts of technology investments on organisational performance has been and continues to be an important research concern for both academics and practitioners (Sriram, Stump, and Banerjee, 1997).

However, while past research has explored the factors that are related to the adoption of technological innovation by organisations (Kimberly and Evanisko, 1981; Meyer and Goes, 1988), there is a lack of empirical research examining the relationship of organisational technological adoption on firm performance (Irwin, Hoffman and Lamont, 1998; Subramanian and Nilakanta, 1996). There appears to be an implicit assumption in much of the literature that the adoption of innovations is intended to contribute to the performance of the adopting organisation (Damanpour, 1991; Rogers, 1983). Rogers (1983) described this as a "pro-innovation" bias, which is the assumption that adoption of a given innovation will produce only beneficial results for its adopters. Thus, although this relationship has generally not been tested, the "pro-innovation" bias has resulted in research being concentrated on the actual adoption of innovations rather than the consequences of these adoptions.

The "pro-innovation" researchers' main argument is that technological innovations are adopted to achieve competitive advantage (Utterback, 1982; Porter, 1983). The IT literature, for instance, has shown that firms' main purpose in investing in IT is to achieve competitive advantages and better firm performance (Gupta and Capen, 1996; Palvia and Palvia, 1992; Ragowskyet et al., 1996). Maidique and Patch (1988) argue that

technology's presence is a critical force in the competitive environment of the firm. Stacey and Ashton (1990) claim "an increasing amount of evidence points to the vital role that advanced technology plays in long term corporate profitability". Hence, technology as a source of competitive advantage is an idea that has been widely accepted in the management and economics literature. This partially explains the widespread interest among researchers to study the adoption of technological innovations in organisations rather than the consequences of these adoptions.

Another theory that may explain the belief that technological adoption increases organisational performance is put forth by Barney (1991), Conner and Prahalad (1996) and Wernerfelt (1984). They argued on the basis of a firm resource-based theory of competitive advantage. The theory holds that firm resources are key determinants of its competitive advantage and financial performance. This competitive advantage offers the possibility of increased prices allowed through the adoption of technological innovations (Utterback, 1982) and thus better financial performance. Based on this literature, there appears to be reasonable conceptual support for the existence of a relationship between organisation adoption of technological innovations and performance.

Hence, various studies by Rada (1982), Ebel (1990), Ayres (1991), Carlsson (1996) and many other scholars have looked at the consequences of technology adoption for firm performance. However, the results from empirical studies on the impact of these investments on firm performance are quite equivocal (Sriram, Stump, and Banerjee, 1997). In the IT literature, the inconsistencies in findings on the relationship between technology adoption and performance contributed to what is known as the 'IT productivity paradox' (Barua et al., 1995; Brynjolfsson, 1993).

Loveman (1994) stated that corporate IT investments had no impact on firms' productivity. Kauffman and Weill's (1989) review of IT performance studies revealed that, in general, there is very little evidence of the value contributed by IT investments at either the micro or macro level. Meanwhile, other researchers reported a positive relationship of firm's performance and IT investments (Banker et al., 1990; Barua et al., 1995; Brown et al, 1995; Brynjolfsson and Hitt, 1996; Mahmood and Mann, 1993).

For that reason, the assertion the new technologies such as e-business and its technology components promise many great benefits should be studied. For instance, e-business is claimed to reduce operational costs since electronic information tends to be more accurate, timely and easily available. Another benefit claimed by e-business is the higher efficiency obtained in business transactions due to a fast and accurate processing of information (Lal, 2002). Web-enabled services are likely to strengthen the competitiveness of firms as these technologies may change the relationship with customers by creating a stronger link between firms and its clients. These claims are supported by several scholars (Stiglitz, 1989 and Evans and Wurster, 1997) who emphasise that technology plays an important role in exchanging information, knowledge, and product designs between manufacturers and suppliers of technology.

Nevertheless, despite the positive assertions of e-business technologies on firm performance, firms' responses towards these claims have been rather cautious. This is manifested in the slow adoption rate and the "wait-and-see" approach adopted by various firms, despite the asserted benefits and the wide publicity of the technology. A plausible explanation of this phenomenon could be the "productivity paradox" issue (Barua et al., 1995; Brynjolfsson, 1993) or that firms are basically looking for 'successful' firms that have reaped the promised benefits. This situation justifies looking at the e-business adoption and firm performance relationship.

With respect to e-business, the benefits of the technology have been touted extensively as the foundation of a radically new business model for a 'new economy' (Cohen et al., 2000, Cross, 2000; Fingar, 2000). These applications range from those primarily focused on cost reduction (e.g., online purchases of parts, online customer support) to those primarily focused on revenue generation (e.g., online advertising, online order taking). The recent failures of numerous dot.coms, however, suggest flaws in this view of the Internet's transformational impact. (Porter, 2001) suggests that the Internet does not engender a radically new approach to business, which "renders old rules about...competition obsolete," but instead offers a set of tools that can complement traditional ways of competing and "buttress existing advantages" (Porter, 2001, pp. 63–

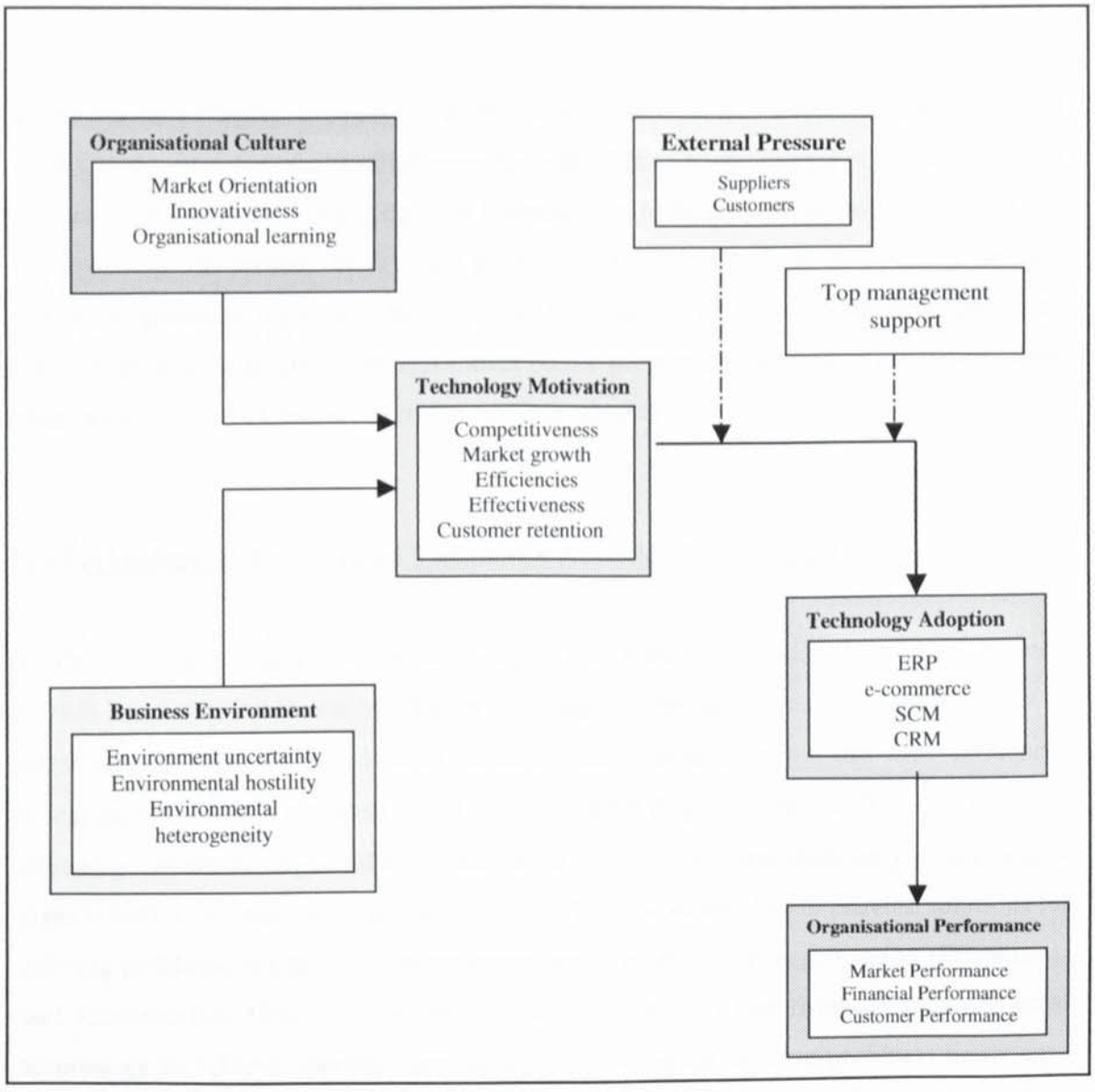
64). Hence, based on the following literature, there appears to be an imperative justification for an empirical examination on the propose relationship of e-business adoption and firm performance as the current assertion of e-business benefits have been anecdotal in the marketing literature.

2.5.1 Conclusion

This section has discussed the relationship between organisational technology adoption and firm performance. The author argued that while there is vast interest in studying the factors that influence the adoption of technological innovation by organisations, there is a lack of research studying the former relationship. A factor contributing to this phenomenon is the "pro-innovation" bias which is the assumption that adoption of a given innovation will produce only beneficial results for its adopters. In addition, the firm resource-based theory holds that firm resources (technology adoption) are key determinants of competitive advantage through increased prices allowed (Utterback, 1982) and thus better financial performance.

Hence, there is a pressing need that the relationship is studied, given that the current literature on the subject matter remains anecdotal and equivocal. Past results from empirical studies of organisational technology adoption on firm performance showed inconsistent findings which contributed to what is known as the 'IT productivity paradox' (Barua et al., 1995; Brynjolfsson, 1993). Therefore, apart from providing more insights into the current relationship, the findings of this study are pertinent for firms in determining whether their adopted technology accomplishes the intended motive(s). Finally, to recapitulate the proposed relationships in this study, figure 2.2 illustrates the theoretical framework representing the antecedents and consequences of firm technology adoption.

Figure 2.2: Theoretical Framework of Firm Technology Adoption



CHAPTER THREE: DEVELOPMENT OF HYPOTHESES

In the previous chapter, relevant literature was discussed on the related constructs adopted in this study. Based on the detailed arguments in relation to the related constructs, there is a reasonable justification for a through investigation to be carried out to identify and test the proposed relationship. Hence, the purpose of this chapter is to discuss and develop various hypotheses regarding the proposed relationship of the constructs in this study based from past literatures. The hypotheses on the proposed relationships are based on the theoretical framework presented in the previous chapter.

3.1 Technology Motivation and Technology Adoption Relationship

In the preceding chapter, we acknowledged that numerous studies have used Rogers' (1983) innovation attributes of relative advantage or perceived benefits as a predictor in organisational innovation adoption studies. The prevailing argument that influences researchers to use this construct could be drawn from Rogers' (1983) definition of relative advantage where he argues that organisations adopt new innovation only if it provides significantly better benefits than existing ones. The innovation has to provide solutions for existing problems or open up new opportunities to motivate the organisation (Premkumar and Ramamurthy, 1995). Hence, an implied assumption is that firms adopt a particular technology to achieve specific purpose, either to solve an existing problems or to seize new opportunities observed by the firm. In addition, as the adoption of new technology is considered as firm response in dealing with change of the organisational environment, the motives for such a response would also be particularly relevant in this context.

The information technology (IT) literature has shown that firm investments in IT are driven by operational or strategic considerations (Sriram and Stump, 2004). In pursuing specific motives, firms critically evaluate the various choices of available technologies that could fulfil their needs or intention. Rogers (1983) stated that not all innovations are

relevant to an organisation. Mohamed (1995) elaborated that innovation is "the process of matching organisation and environmental means and needs since the products of the successful matching of the two items are the innovation outputs in the form of new ideas (products, processes, services, techniques etc.) to be adopted by the organisation. Hence, although e-business technologies attempt to link firms with strategic and operational considerations, firms have to select the "appropriate" technology. This is because different e-business applications fulfil different adoption motives. Therefore, compatibility with firm needs is a critical variable in determining the specific e-business application that would be adopted (Sarrina Li, 2003).

As reiterated earlier, firm motivation in technology investment can be operational and/ or strategic (Sriram and Stump, 2004). Firms that are driven by operational motives are mainly interested to improve their operating efficiency and effectiveness. In achieving this objective, various activities are carried out such as automating routine tasks like purchasing/procurement activities, customer service, productivity schedule and sales inquiries. Increasing the efficiency and effectiveness of these activities could result in increased productivity and ultimately reduced operating costs. These would improve the organisation's performance.

Meanwhile, firms that are driven by strategic motives are mainly interested to create or sustain their competitive advantage. Primarily, there are three strategies firms use to create competitive advantage which are overall cost leadership, differentiation, and focus (Porter, 1980). Each strategy is uniquely implemented to overcome forces affecting competitive strategy, including threats from substitute products and new market entrants, bargaining power of suppliers and buyers, and rivalry among existing competitors.
An overall cost leadership strategy attempts to offer the lowest cost product or service to customers relative to a firm's rivals. This low-cost position is contingent on the efficient management of the entire value chain. Thus, costs must be rigorously controlled from raw material purchases to distribution channel delivery. Meanwhile, a differentiation strategy positions a company to compete on the uniqueness and value of its products or services.

Reliable and good customer service, product customization, quality products and services are the characteristics of a differentiation strategy. As the gains in image, reputation, and quality come at a cost, the consumers pay a premium price compared to overall cost leadership products and services. Finally, a focus strategy is used by companies to position themselves in a market niche. They make no attempt to be all things to all consumers, but rather concentrate on a narrow market segment. Within their particular niche, they create competitive advantages over rivals through either cost leadership or differentiation tactics. The example given here illustrates the various different motives of firm using technology adoption as means of changing an organisation. The mechanism adopted by firms can be either a response to the changes in the business environment or as a preemptive action to influence the business environment. Therefore, we argue that there is a relationship between firm technology motivation and technology adoption. Consequently, this leads to our central hypothesis:

Hypothesis 1: There is a positive relationship between firm technology motivation and e-business technology adoption.

In selecting the technology that is compatible with the intended motives, an analysis of the "tasks" involved in the firm response mechanism in conjunction with the perceived benefits of a given technology is essential. This would determine the compatibility of the firm motives with the technology application and benefits. In identifying key value-adding processes that could be made more effective using e-business technology, Porters' (1980) value chain analysis is commonly used as an impact model (Pires and Aisbett, 2002). Wu, Mahajan and Balasubramanian (2003) in their study of e-business adoption among firms found that e-business technologies centred on the business value chain activities. The framework suggests that value creation within a business unit can be traced through three distinct stages – beginning with the inbound interface (where supplier-related processes are concentrated), through the business itself, and culminating at the outbound interface (customer-related processes are concentrated). For the purpose of clarity and consistency with the definition of e-business adopted in this study, this framework will be used to

develop hypotheses regarding the technology motivation and e-business technology adoption relationship.

To begin with, the inbound interface consists of activities which normally deal with suppliers like the procurement process, logistics, inventory management such as order and payment processing, vendor evaluation, and communications with suppliers (Edwards, 1997). One of the objectives of the implementation of e-business technology in this area would be to manage the existing supply chains better (Morrell and Ezingeard, 2002). Specifically, firms would pursue operational motives that tend to focus on improving the efficiency and effectiveness of the supply chain operation. Supply chain management (SCM) technology is constantly at the centre of many strategic and operational changes in large and small organisations alike, and effective supply-chain management has been shown to have a significant impact on overall business performance (Tan et al., 1999).

Hence, the traditional objectives of SCM have been efficiency driven, aiming to pass the product through the chain in the shortest time with the lowest cost (Morrell and Ezingeard, 2002). However, effectiveness and competitive advantage are now at the centre of many supply chain improvement initiatives. By effectively managing the supply chain, companies hope to achieve a variety of benefits, including reduced transaction costs, improved customer service and increased customer retention. As argued by Wild (1995), by managing the supply chain, organisations can improve the integration and operation of the complete materials management function, thereby achieving better customer service and resource utilisation.

Based on the explanation of the e-business developments, it is evident that the importance of e-business technology has "evolve" to more wide-ranging activities which include operational and strategic motivations. By improving the efficiencies and effectiveness of firm operational activities, firms would improve its competitiveness which ultimately improves its market growth and customer retention. Hence, given the argument of firm motivation in adopting SCM technology, the related hypotheses would be:

Hypothesis 1(i): There is a positive relationship between the adoption of SCM technology and firm technology motivation to improve (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

Within the business processes itself, enterprise resource planning (ERP) is implemented by firms that aim to integrate business processes through the support of an integrated computer information system (O'Brien, 1999). ERP, when successfully implemented, links all areas of a company such as order management, manufacturing, human resources, financial systems, and distribution with external suppliers and customers into a tightly integrated system with shared data and visibility (Chen, 2001). Yusuf et al. (2004) stated that companies that use ERP could gain a competitive advantage from the way they implement the system and then exploit the resulting data. Initially, firm objectives when adopting ERP systems have focused primarily on improving transaction handling through the standardization of business processes and integration of operations and data (Cooke and Peterson, 1998; Davenport, 2000). However, it is now a general industry view that ERP will take companies to new heights of efficiency by enabling them to move financial and other data speedily from one department to another (Holt, 1999).

A study by the Market Data Group of twenty three ERP managers found that the important perceived benefits of ERP adoption were standardizing or improving business processes, lowering costs, solving problems of legacy systems, and accommodating corporate growth or market demand (Connolly, 1999). Meanwhile, sources of cash benefits included reduction in people focused on transaction processing, operational efficiency, reductions in training and technical support staff, better inventory management, and fewer people needed to support sales growth. The intangible benefits were better compliance with customer requirements resulting to customer satisfaction and retention, improved system reliability, higher data quality, and greater agility in implementing new businesses.

Rajagopal (2002) corroborated the findings of the Market Data Group by looking at the motives of adoption among six manufacturing firms implementing various versions of ERP technology. The study found that the main motives for ERP adoption were

competitive motives, which were the expected growth in sales and competitive pressures. Similarly for the efficiency motives, the salient items were the need to reduce cycle times and cost. Significant items for technical motives were also included, such as the need to change from mainframe to client–server type IT architecture, to alleviate incompatibility among various database types and to provide uniform systems across the organisation.

Some of the salient items for operational motives were empowering users, re-engineering the business processes and enhancing organisational flexibility. Finally, strategic motives issues such as standardizing company processes, supporting globalisation strategy, operationalising the vision of the CEO and reducing the time to market scored highly. The author argued that the motives that influenced organisations to implement ERP reflected the salient characteristics of an implemented ERP system, which are integrated IT, compatible database types, cross functional coordination, end-to-end connectivity and uniform systems in organisation.

Therefore, it is visible from the findings of previous studies that the motivation for ERP technology adoption consists of operational and strategic motives. ERP is claimed to improve transactional handling that enables firm to improve its efficiencies and effectiveness of its business process and integration of operations (Davenport, 2000). Consequently, the improved business process would enable the firm to accommodate market demand (Connolly, 1999) and compliance with customer requirements resulting to customer satisfaction. Hence, given the argument of firm motivation in adopting ERP, we propose the following hypothesis:

Hypothesis 1(ii): There is a positive relationship between the adoption of ERP technology and firm technology motivation to improve (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

Finally, the outbound interface consists of tasks that deal with selling and customer service activities. These processes are customer-related, where operational and strategic considerations are of prime importance to companies adopting e-business technologies.

The e-business component that deals with web selling is e-commerce, while customer relationship management (CRM) technology deals with customer service activities.

Pires and Aisbett (2002) defined e-commerce as "the use of electronic means and technologies to conduct commerce". There are many stories of firms adopting e-commerce as their selling medium that are considered as revolutionary (implying strategic motives) whilst improving their transactional or operational efficiencies and effectiveness (e.g. Dell Computer Corporation). It is obvious that the motives for e-commerce adoption in firms are strategic and operational. It has been suggested that e-commerce reduces costs, improves product quality, helps in reaching new customers or suppliers, and creates new ways of selling existing products (Schneider and Perry, 2000; Napier et al. 2001; Chaudhury and Kuilboer, 2002; Saloner and Spence, 2002). Hunter et al. (2004) in their study on the reasons for e-commerce adoption among firms found that the goal of reducing order cycle time, which has a direct bearing on reducing costs, was among the important reasons for firm adoption. Kardaras and Papathanassiou (2000) even suggested that companies should re-engineer their business processes in the light of new e-commerce opportunities, in order to enter the global electronic marketplace from which they can expect improvements in terms of profit and efficiency (Applegate et al., 1996). Poon and Swatman (1999) stated that in the long term, indirect benefit such as new opportunity (e.g. an unexpected customer inquiry, forming a new business network or discover something that can positively/negatively affect their business) is the key motive for ongoing e-commerce activities. These benefits are being achieved in both developed and developing countries (Huff et al., 2000).

Another area that influences the adoption of e-commerce is improved customer relations and customer satisfaction. In addition to ironing out problems, e-commerce enables customers to find information that they need via an extranet. Therefore, while decreasing order processing costs, e-commerce helps firms to increase their customer satisfaction. Kalakota and Whinston (1997, p. 9) added that "in order to be competitive, marketing executives must employ technology to develop low-cost customer-prospecting methods, establish close relationships with customers, and develop customer loyalty." Kardaras and

Papathanassiou (2000) concurred, stating that an increasing number of business organisations are attempting to build customer loyalty and attract new customers through e-commerce applications (Dutta et al., 1997). Hence, if firms perceive e-commerce as encapsulating the opportunities afforded by better technology, e-commerce adoption may surge, as it is seen as necessary for development and/or maintenance of competitive advantage.

Based from the preceding discussions, it is obvious that the motives for e-commerce technology adoption in firms are both operational and strategic. By efficiently improving its transactional activities, firms reduce its overall order cycle time. The improved transactional activities would in turn improve customer experience that leads to better customer retention. The capabilities of the e-commerce technology to enter the global marketplace would enable the firm to improve its market growth. The outcome of this would lead to improve firm's performance. Therefore, this leads to the following hypothesis:

Hypothesis 1(iii): There is a positive relationship between the adoption of e-commerce technology and firm technology motivation to improve (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

Finally, CRM explores an approach to maximise customer value through differentiating the management of customer relationships. By adopting a differentiation strategy of customer relationship, the goal is to improve the customer's experience of how they interact with the company, which in turn, creates more satisfaction, yields more loyalty and ultimately more sales of products (Rust, Zeithaml and Lemon, 2000). Tapscott et al., (2000) for instance emphasises that the wealth embedded in customer relationship management is astonishingly valuable if compared to other tangible assets. As the competition and the business environment become immensely intense, companies are facing difficulties in distinguishing themselves and in acquiring new customers. As a result, companies are continuously rethinking of new ways to generate sales and increase

profits. These efforts include, among others, strategising the relationship marketing through CRM (Gronroos, 1994; McKenna, 1991; Morgan and Hunt, 1994; Zineldin, 2000).

The evidence of the value of having superior customer relationships is overwhelming (Heskett et al., 1994; Reichheld, 1996; Schwaiger and Locarek-Junge, 1998). The link between customer satisfaction and customer loyalty has been established by Oliver and Swan (1989), Fornell (1992), Anderson and Sullivan (1993) and Boulding et al (1993). These studies highlight that high levels of customer satisfaction are associated with increased retention of customers. The findings suggested that it costs much more to attract a new customer than it does to retain an existing customer; and that existing customers are more profitable. A knock-on effect is that the longer customers are retained, the greater is the opportunity for cross-selling (Peppard, 2000).

Nevertheless, CRM requires a customer-centric business philosophy and culture to support effective marketing, sales, and service processes (Ingram et al., 2002). CRM applications can enable effective customer relationship management, provided that an enterprise has the right leadership, management, and culture (Thompson, 2001). In executing the task, companies adopting CRM utilise their understanding of the drivers of current and future customer profitability to allocate resources appropriately across all areas that affect customer relationships, including communications, customer service, billing and collections, product development and pricing strategies.

CRM enables customer satisfaction and retention through solving customer problems efficiently and effectively. The management of people and materials within the organisation is smoothly integrated. Shankar, Smith and Rangaswamy (2003) argued that by effectively attending to customers' queries and problems, firms would be able to increase customer satisfaction. Meanwhile, through CRM, the shared relationships with the respective firm based on specific business history and preferences would be strengthened. In addition, call centres can efficiently help desk support's quality to improve. Support and service costs are decreased when customer satisfaction is increased

by extending web-based support functionality directly to the customers. All customer contact from sales, support, field service and marketing are centralised.

Finally, the relationship behaviour in CRM enables firms to anticipate customer demands. By engaging in an interactive dialogue, customer preferences can be determined. Studies on relationship marketing predominantly have been on the influence of technology on facilitating more meaningful relationship between channels (McGowan et al., 2001). The interactivity (Walsh and Godfrey, 2000) and the ability to capture useful information provided by e-business technology have spurred interests in the feasibility of delivering personalised services. Galbreath (2002) illustrates that processed information is used to create better user experience such as personalization, which in turn can lead to building trust and loyalty.

Therefore, it is evident that the motives for the adoption of CRM technology are operational as well as strategic. In the process of improving customer experience, firm utilises the customer information to offer "suitable" products/services that fit the needs and wants of the consumer. By effectively managing the product line/breadth that "fits" the customer, "unnecessary" products can be drop which optimizes and improves firm efficiencies and effectiveness. This would lead to improve customer experience and thus, greater customer retention. Hence, the following hypothesis follows:

Hypothesis 1(iv): There is a positive relationship between the adoption of CRM technology and firm technology motivation to improve (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

3.2 Organisational Culture and Technology Motivation Relationship

In chapter two, we provided the rationale for using organisational culture as the construct representing the organisational characteristics that influence firm probability of adopting e-business technology. The construct of organisational culture in this study is represented by firm market orientation culture, organisational learning culture and innovativeness culture. Although previous research has provided empirical evidence that corporate culture determines technology adoption strategies (Kitchell, 1995), we would like to reiterate that no studies to date have examined the effect of the three culturally-based organisational characteristics influencing firm propensity to adopt new technology or e-business specifically.

The emergence of new technology in the business industry has been heralded as the panacea for solving and improving firms' operational and strategic considerations. In embracing these new technologies, firms that possess the "appropriate" corporate culture would excel in "accommodating" the new technology culture and lead the industry by being the pioneer of adopting these technologies. Studies of innovation adoption showed that although firms could be "technically successful" in adopting new technology, the adoption could "fail organisationally", meaning that people would not actually use it (Grayson, 1973; Keen, 1981; Urban, 1974). Behaviour-related problems (Biggart, 1977; Markus, 1983) are commonly recognised as the reasons why the "appropriate" organisational culture is pertinent in accommodating new technology. This is corroborated by Cravens, Piercy and Low (2002), who asserted that the assessment of innovation success in organisations often point to the importance of delivering a culture committed to innovation.

E-business technology components such as e-commerce, ERP, SCM and CRM, for instance, are contingent on having a culture that fosters cross-functional sharing of information (Ingram et al., 2002; Thompson, 2001). Our argument is consistent with Schein's (1985) definition of corporate culture as "a set of basic assumptions - invented, discovered, or developed by a given group as it learns to cope with its problems of

external adaptation and internal integration - that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems". Hence, organisational culture can also be conceived as a solution to a managerial problem. Therefore, there is appropriate justification to argue that organisational culture influences the probability of a firm's adopting new technology. Nevertheless, with reference to our earlier hypothesis, firm adoption of a particular technology is influenced by a specific motivation or intention. Consequently, our general hypothesis regarding organisational culture is:

Hypothesis 2: There is a positive relationship between firm's organisational culture and firm's technology motivation.

3.2.1 Market Orientation and Technology Motivation Relationship

In analysing the relationship of market orientation and technology motivation, reference is made to the two main conceptualisations of market orientation by Kohli and Jaworski (1990) and Narver and Slater (1990). Based on the synthesis of the two conceptualisation of market orientation, the central focus is the emphasis on the organisation's customers. A second element that defines market orientation is the importance of information within the organisation. A similar weight of importance is attached to the competitor's orientation. Kohli and Jaworski (1990) refer to the need to generate information, which they discuss within the broader framework of market intelligence. Finally, the common denominator of the two conceptualisations of market orientation is their focus on the interfunctional coordination or dissemination of information in the organisation. Kohli and Jaworski (1990) specifically address intelligence dissemination interdepartmentally and the necessity of this step to ensure concerted action by the different departments (Narver and Slater, 1990). These elements are our basis for proposing a relationship between market orientation and the specific aspects of technology motivation.

Customer orientation reflects a firm's understanding of its target buyers in order to continuously create superior value for them. By stressing the evaluation of customer value and the accumulation of customer preferences, a firm can build a knowledge base of customer preferences. The customer knowledge as an intangible asset that is difficult to be imitated by competitors would create a strategic advantage for firms by raising the entry barriers. By leveraging customer knowledge, a firm can avoid competing on price and thus provide differential pricing based on customers' own demand curve. This eventually leads to higher average prices (Forbis and Mehta, 1981; Roberts, 2000). The ability to respond to customer needs or problems because of the disseminated customer information should produce greater loyalty, profitability, and sales.

Meanwhile, a competitor orientation can be defined as the ability and will to identify, analyse, and respond to competitors' actions. The emphasis is on beating the competition and having the ability to make product offerings that are comparable with those of rivals. Competitor-driven firms watch costs closely, quickly match the marketing initiatives of competitors, and look for their sustainable edge in technology. Such firms keep a close watch on market share and contracts won or lost to detect changes in competitive position (Day and Wensley, 1988). Jaworski and Kohli (1993) and Slater and Narver (1994b; 2000a) suggest that anticipating competitor actions (e.g., price cuts or marketing campaigns targeted at the company's customers) and responding to those actions can reduce the impact of a competitor's actions on the company's customers.

Finally, an equally important element as customer and competitor orientation is interfunctional coordination. Cross-functional sharing of information and coordination of activities disburses market information throughout the organisation. This dissemination of information also communicates the firm's central focus on adapting to and satisfying the market's needs (Narver and Slater, 1990). The information dissemination process educates all areas in the organisation regarding the market's needs and competitor activities so that as opportunities, problems, or threats arise, the organisation is primed to respond. Companies with more customer-oriented information tend to be more responsive to their customers because they tend to share market-related information cross-functionally (Martin and Grbac, 2003). In addition, cross-functional sharing of information appears to

be an effective way of improving firm performance because it allows firms to respond to customers' problems and needs better than firms that have little cross-functional sharing of information. Our literature review also showed that the cross-functional sharing of information is the essence of e-business technologies as it serves to integrate the whole organisation.

Therefore, it is evident from our literature review that a market orientation culture is prevalent in organisations that would engage in "innovative" solutions. The motives for market oriented firms engaging in new technology adoption (e.g. e-business) are both operational and strategic. Many e-business technologies are particularly suited to supporting a market orientation by providing a responsive and interactive medium through which an organisation can gain and respond to in-depth knowledge with respect to competitors' and customers' profiles (Peterson et al., 1997). Customer information could also be used to predict or assess customer demand where firms could tailor their products to meet the unique needs of their customer. Finally, e-business could also be used to detect competitor's initiatives, and thus, keep abreast of their rival's market profiles. Hence, this leads to our subsequent hypotheses:

Hypothesis 2a (i): There is a positive relationship between a firm's market orientation and its technology motivation.

Hypothesis 2b (i): There is a positive relationship between a firm's market orientation and its motivation of improving (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

3.2.2 Innovativeness and Technology Motivation Relationship

The assessment of the characteristics of "innovative firms" has created a particular field of research within innovation adoption (Avlonitis et al., 1994). As elaborated in the previous chapter, the growth of interest in defining innovative organisations has resulted in various conceptualisations of innovativeness. To clarify the definition adopted in this study, we defined organisational innovativeness as openness to new ideas as an aspect of firm's culture (Hurley and Hult, 1998). Innovativeness fosters risk-taking and managers in these firms are normally willing to experiment with new ideas and technologies. We argue that innovativeness as a corporate culture facilitates and motivates innovative behaviours and outcomes through the perception that the organisation is receptive to change and new ideas.

The decision to adopt new technology is often difficult because of the associated uncertainties, the possibility that prior investments may be rendered obsolete, and high switching costs in adopting new technologies (Chandy and Tellis 1998). However, if a new technology is promising, it will create attractive market opportunities. Just as consumer innovativeness can affect behaviour in a variety of contexts (e.g., innovation adoption, creativity, variety-seeking behaviour), firms that possess an organisational innovativeness culture could also respond in several ways to new technologies. An innovative firm would perceive technology developments as potential sources of growth for the firm and would respond proactively to adopt and "manipulate" the technology for its benefits.

On the other hand, a firm without an innovative culture would perceive a new technology as a possible event that would cannibalise its existing products and disrupt current business processes. However, on a myopic view, a non-innovative firm would "underutilise" a technology that it adopts. For instance, a casual review of the business press suggests that some organisations adopt e-business technology merely for supporting functions such as communications, while the innovative firms would proactively adopt e-business to transform their business models (Srinivasan, Lilien and Rangaswamy, 2002).

Hence, we argued that innovativeness of the culture is a measure of the organisation's orientation toward innovation. Innovativeness is related to other aspects of a group's culture that lead to the perception that the organisation is receptive to new ideas. This relational view of culture is consistent with that of scholars who have conceptualized culture as a system of beliefs in which actors internalise some meaningful order with respect to the organisation (Barney 1986).

Joyce and Slocum (1990) argue that organisational climates cannot be separated from the strategic context in which a firm operates, and that the management of firms with the most innovative climates have a good deal of discretion in selecting strategies for achieving competitive advantage. Thus, the innovative climate of an organisation directly affects the investment strategies selected. In innovative firms, little formal control is exercised over organisational members, allowing decision makers more freedom in selecting solutions to problems (Joyce and Slocum, 1990).

Innovativeness in the organisation's culture, when adequate resources are present, facilitates the implementation of innovations (Hurley and Hult, 1998). Furthermore, organisations stressing innovativeness, coupled with an appropriate orientation, would be more successful in taking advantage of new capabilities that may lead to a competitive advantage. This notion is best characterised by Deshpande et al., (1993, p. 28), who stated that "a firm needs to be innovative to gain a competitive edge in order to survive and grow." Deshpande et al., (1993) also found that innovativeness manifested in the firm's culture has a positive effect on business performance.

Innovative firms are more receptive to change, and are thus more likely to be successful in using technology to achieve a competitive advantage. Allen (1977) and Rothwell (1992) asserted that innovative organisations would exploit information systems not just for routine operations but also for spotting opportunities for innovation. As such, firms with an innovative culture would capitalise on the various applications available in e-business technology to achieve various motivations. E-business technologies, if utilised appropriately, are argued to provide various operational and strategic advantage to the

adopting firm. Among the most commonly held e-business motives are to increase the efficiency and effectiveness of the firm's business transaction (Chang et al., 2002; Drew, 2003; El Sawy et al., 1999; Mehrtens et al., 2001). SCM, ERP, e-commerce and CRM technology has been noted to improve efficiency and effectiveness in supply-chain management, data management, sales processes and customer service in firms (Cooke and Peterson, 1998; Connolly, 1999; Davenport, 2000; Holt, 1999; Pires and Aisbett, 2002; Tan et al., 1999).

Another motive commonly noted in e-business technology is competitiveness (Lal, 2002). E-business technologies such SCM produce a competitive advantage that positively impacts the performance of the firm (Lambert and Cooper, 2000). Meanwhile, Yusuf et al. (2004) stated that companies that use ERP could gain a competitive advantage from the way they implement the system and then exploit the resulting data. Finally, another motivation of e-business technology is better customer service and improves market growth. By improving service response time and faster problem resolution, e-commerce, SCM and CRM are widely noted for their significance in improving better customer service, which leads to loyal customers. As loyal customers tend to be less price-sensitive and are cheaper to maintain (Galbreath 2002), there would be an increase in profits resulting from a small increase in customer retention (Reichheld, 1996; Winer 2001). A knock-on effect is that the longer customers are retained, the greater is the opportunity for cross selling (Peppard, 2000). Therefore, our elaborated arguments of organisational innovativeness lead us to the following hypotheses.

Hypothesis 2a (ii): There is a positive relationship between a firm's innovativeness and its technology motivation.

Hypothesis 2b (ii): There is a positive relationship between a firm's innovativeness and its motivation of improving (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

3.2.3 Organisational Learning and Technology Motivation Relationship

Organisational learning as a corporate culture has been noted by various strategic scholars as an important determinant of successful firms (Hurley, 2002). An important feature exhibited by this firm is the ability to respond to identified changes in market or customer behaviour. As emphasised in the definition of organisational learning, it refers to organisation-wide activity of creating and using knowledge to enhance competitive advantage. This includes obtaining and sharing information about customer needs, market changes, and competitor actions, as well as development of new technologies to create new products that are superior to those of competitors (Hurley and Hult, 1998; Moorman and Miner, 1998; Mone et al., 1998). Learning orientation influences what kind of information is gathered (Dixon, 1992) and how it is interpreted (Argyris and Schon, 1978), evaluated (Sinkula, Baker and Noordewier, 1997) and shared (Moorman and Miner, 1998). Calantone, Cavusgil and Zhao's (2002) argument correlates well with the view of Senge (1990) regarding the importance of organisations being able to respond to changing external environments by exploiting new knowledge to evolve innovative work practices, perspectives and frameworks.

In responding to the external changes in the environment, firm motivations of organisational learning are apparently strategic and/ or operational considerations. Dawes (2003) stated that organisational learning from a managerial perspective may be seen as the development or acquisition of new knowledge or skills in response to internal or external stimuli that leads to a more or less permanent change in collective behaviour, enhancing organisational effectiveness. A number of studies have also argued that organisations provide superior value to customers, reflecting a more substantive customer orientation, when their organisational culture fosters learning behaviour that leads to improvements in effectiveness or efficiency (e.g. Hult, 1998; Slater and Narver, 1995).

With respect to the two qualitatively different types of organisational learning, an implied assumption can be made on the types of learning and its emphasis or motive. Adaptive learning, for instance, involves the purposeful detection and correction of errors in existing theories in use (Baker and Sinkula, 2002). The nature of this learning is a 'gradual learning' where firms improve past decision outcomes and make them better through small-scale adjustments (Stacey, 1996). The motives for adaptive learning are clearly-defined and immediate targets; to improve short-run efficiency; to reduce slack; and to increase the reliability, accuracy, and precision of, and control over core processes and activities (March 1995, p. 431). As the challenges and threats continue to vary in accordance with the corresponding change in external environment, the effort of arriving at effectiveness is not to be conceived as an end stage but an on-going motive for ensuring that the organisation will continue to strive for excellence in performance, so that it will maintain a comfortable edge against its competitors (Hurley, 2002). As such, the motive of adaptive learning is generally on efficiency and effectiveness.

Meanwhile, generative learning occurs when the organisation is willing to question long-held assumptions about its mission, customers, capabilities, or strategy. Generative learning requires new ways of looking at the world, whether in understanding customers or in understanding how to better managed a business (Senge, 1990). Generative learning is risky and firms would mostly encounter resistance in the company. However, firms that are willing to take this risk aspire to strategic returns through the introduction of innovative products or process. Hult (1998) asserted that this type of learning has been linked to a number of outcomes, including relationship commitment and customer satisfaction (Slater and Narver, 1995). Hult, Ketchen and Slater (2002) in their study of supply chain organisations stated that organisational learning serves as a strategic resource which in turn improves firm competitiveness in the market place. Hence, based on the arguments of organisational learning and firm motivation in responding to the changes in the organisational environment, this leads to our following hypotheses:

Hypothesis 2a (iii): There is a positive relationship between a firm's organisational learning and its technology motivation.

Hypothesis 2b (iii): There is a positive relationship between a firm's organisational learning and its motivation of improving (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

3.3 Business Environment and Technology Motivation Relationship

Organisational environment is a fundamental concept in strategic management (Boyd, Dess and Rasheed, 1993). It serves as a great source of strategic information (Daft et al., 1988; Duncan, 1972). Proponents of "contingency theory", for example, posit that performance is a function of matching organisational elements to environment. Hence, firm strategy is in response to the changes in the environment and it should align with the elements in the environment (Ansoff, 1965; Zahra, 1987). The alignment of an organisation's strategic orientation to its environment is of paramount importance to business success (Morrison and Roth, 1992). The match allows the firm to capitalise on the opportunities in the environment, while averting threats.

Meanwhile, a contrary view is offered by the "strategic choice" paradigm (Child, 1972), which argues that managers often have considerable latitude in making strategic choices. The strategic choice perspective suggests that firm's competitive advantage can be sought through either organisational adaptability or rigidity (Miles and Snow, 1978; Miller and Friesen, 1983). Organisational adaptability correspond to an innovative, future-oriented, risk-taking, proactive strategy (Miles and Snow, 1978; Miller and Friesen, 1983). Organisational rigidity corresponds to a non-adaptive, defensive and risk aversive strategy (McKee et al., 1989). Hence, various empirical studies (e.g., Hansen and Wernerfelt, 1989) have also brought into question the extent of industry environment influence on managerial decisions.

It is apparent from the various theoretical perspectives that organisational environment serves as a great source of information for organisation's strategic action (Daft et al., 1988; Duncan, 1972). There have been numerous studies on the relationship of firm business environment and the chosen strategic options (Covin and Slevin, 1989; Dess and Beard, 1984; Miller, 1988). The organisational environment has been shown to influence firms' motivation in responding to external changes, in terms of pursuing specific strategies (Miles and Snow, 1982; Porter, 1980), adopting new technology (Pfeffer and Leblebici, 1977; Lederer and Mendelow, 1990) or being innovative (Grover and Goslar, 1993; Schroeder and Benbasat, 1975). Therefore, we argue that the business environment influences firm motivation in responding to the perceived changes either reactively or proactively. Hence, this leads to our general hypothesis that:

Hypothesis 3: There is a positive relationship between a firm's business environment and its technology motivation.

As the business environment is conceptualised to include various dimensions, an investigation on the influence of those dimensions on firm technology motivation is deemed essential. A common environmental dimension that has received extensive coverage in the organisational theory literature is environmental uncertainty (Bluedorn, 1993). Additionally, environmental uncertainty constitutes other dimensions that are environmental heterogeneity and hostility (Lawrence and Lorsch, 1967; Luo and Tan, 2002). Hence, the following paragraphs discuss the possible relationship between the specific environmental dimensions and firm technology motivation.

Environmental uncertainty is characterised by the "amount and unpredictability of change in customer tastes, production or service technologies, and the modes of competition in the firm's principal industries" (Miller and Friesen, 1978). Child (1972) stated that a principal source of uncertainty is the variability or instability of resources and/or influences in the environment. Hence, the more environments move away from being homogeneous, the more uncertainty can be expected to increase (Achrol et al., 1983). In overcoming environmental uncertainty, firm actions have been noted to vary.

Greater environmental uncertainty increases the chance of change in technology, demand, and/or competitive strategy (Lawrence and Lorsch, 1967; Miller and Friesen, 1983). The change could have a detrimental effect on the organisation's performance. Hence, organisations institute various mechanisms with the hope of "safeguarding" their competitive positioning. It has been suggested in the literature that organisations may pursue more proactive, aggressive strategies favouring bolder actions as uncertainty increases (Lawrence and Lorsch, 1967). Further, a greater threat of external change may require an incumbent firm to protect its market position through product and process innovation (Bourgeois and Eisenhard, 1988; Utterback, 1979; Utterback and Abernathy, 1975).

Increased uncertainty in the environment provides the incentive for differentiation strategies which require greater emphasis on innovation (Miller and Friesen, 1983). Miller's (1988) analysis of correlations indicates that more successful firms in uncertain environments tended to employ marketing differentiation strategy; whereas successful firms in more certain environments tended to use conservative cost leadership. By focusing on product or marketing differentiation strategy, firms hope to attract new customers while retaining the existing customer base. Porter (1980) elaborated that the differentiation strategy hopes to create a unique product/service, customer loyalty, price-inelasticity, competitive barriers, and finally higher margins.

Meanwhile, an alternative strategy would be to improve firms' operational efficiencies and effectiveness. In order to overcome imperfect information and uncertainty, organisations may institute a variety of mechanisms to "promote, advance, and strengthen coordination" between organisational subunits and partners (Truman, 2000, p. 213) or innovate in order to survive and flourish (Grover, 1993). Ahmad and Schroeder (2001) argued that an uncertain environment requires more frequent exchange of information between business partners so that activities can be prioritized as changes occur and delivery expectations met.

In that manner, demand uncertainty has been found to be positively related to technology adoption (Robertson and Gatignon, 1986) such as EDI adoption (Williams, 1994). It is well known that the purpose of organisations in engaging in supply chain technologies is to improve operational efficiency and effectiveness to overcome the various effects associated with uncertainty. Consequently, this leads to our following hypotheses:

Hypothesis 3a (i): A firm's technology motivation is likely to be greater, the less certain the business environment.

Hypothesis 3b (i): The more uncertain the firm's business environment the greater the motivation to improve (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

While related, environmental uncertainty and hostility are separate constructs. Environmental uncertainty captures external changes to which the firm must adjust while environmental hostility is essentially concerned with threats to the very survival and growth of the firm. Miller and Friesen (1982) defined environmental hostility as an unfavourable business climate, featuring intense competition for limited resources or market opportunities. Hostile environments represent a "precarious industry setting, intense competition, harsh, overwhelming business climates, and the relative lack of exploitable opportunities" (Covin and Slevin, 1989). Similar to the case in environmental uncertainty, firm's motivation in responding to environmental hostility has also been noted to vary. Covin and Slevin's (1989) small-firm study found that the interaction between environmental hostility and competitive posture was significant.

In dealing with competition in hostile environments, firms have been observed to follow two primary paths. First, firms sometimes try to distinguish themselves from competitors using a strategy of market differentiation. Miller (1987) in his study of 161 firms found that firms adopt market differentiation strategies to avoid direct competition. By having a differentiated market offering, firms in hostile environments were able to rise above the price wars and use their relative high price and as means for creating and sustaining

distinctiveness. E-business technologies such as e-commerce and CRM enable firm to exercise market differentiation strategies by offering customise and quality products, innovative solutions and high customer service.

A second approach to competing in hostile environments was observed by Parker (1990) in her study of 106 firms in the textile industry. Parker (1990) found that "efficiency" strategies, characterized by efforts to control costs were common responses to the intense hostility of the textiles industry. Firms in such an environment recognised its price sensitive nature and, therefore, having low cost structures is often viewed as a critical component to success. Low costs structures enable firms to profitably sustain low-price strategies and thereby, effectively compete on the basis of price in hostile environments (Porter, 1980). In addition, as hostility intensifies, the profits to be gained might decline if a firm focuses on building a strong market position, establishing its brand name recognition, and developing customer loyalty. As such, to maintain a level of cost parity or proximity relative to competitors, firms must reduce costs in areas that do not affect differentiation. The two examples of firm strategic option correspond to Porter's (1980) generic strategies, differentiation strategy and low-cost strategy. The success of these strategies may be contingent on general industry environment characteristics studied by Dess and Beard (1984), Keats and Hitt (1988), and Miller (1988). Among these general characteristics is environmental hostility.

Further, to the extent that long-term efficiencies achieved outweigh short-term acquisition costs, the relative use of process technologies can be expected to support a low cost structure. In Hall's (1980) study of "survival strategies" among 64 large manufacturing firms in eight hostile industries for instance, effective cost leadership strategies were characteristically observed to be supported by investments in modern, automated process technology. Hall's (1980) findings are corroborated by Edelstein's (1992) study among 44 firms in 12 hostile industries, where the researcher found that firms with modern technology are more efficient with growing sales compared with firms with obsolete machinery which are inefficient and losing sales.

Another finding of Edelstein's (1992) study was that the relative product line is a discriminator of more and less successful firms in hostile environments. The study found that rapidly growing firms in hostile environments had narrow product lines relative to those of their less successful counterparts. His explanation of these findings was that hostile environments demand a particular "tight fit" between products and markets, implying that narrow product lines result when effective hostile environment firms limit their product lines in an attempt to offer only those products with the greatest market success. Again, e-business technologies such as e-commerce and CRM enable firms to determine the "best product fit" by tracking the sales information of the related products and customers. In addition, product customisations through on-line systems that match customer specifications enable firms to decrease costs while enhancing product offerings (Lumpkin, Droege and Dess, 2002). A notable example of an organisation benefiting from such a system is Dell Computer Corporation.

Finally, market breadth – that is, the geographic range of the served market, is likely to correlate with competitiveness in hostile environments. In an environment where economies of scale exist, firms that are not subject to geographical market constraints may be able to reduce costs structures through volume production and compete effectively on a price basis. Edelstein (1992) corroborates the argument that serving broad geographical markets is important under hostile conditions. Therefore, we argue that firm motivation in responding to the hostile environment may comprise operational and strategic considerations. Hence, the following hypotheses are:

Hypothesis 3a (ii): A firm's technology motivation is likely to be greater, the more hostile the business environment.

Hypothesis 3b (ii): The more hostile the firm's business environment, the greater the motivation to improve (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

Finally, another dimension of organisational environment is environmental heterogeneity which is also a dimension of environmental uncertainty. Environmental heterogeneity is

an important dimension of industrial markets where there are various unique customers and specialised products (Aldrich and Pfeffer, 1976; Sheth, 1985). As such, companies that operate in a heterogeneous environment could face greater diversity in customer needs and preferences. However, environmental heterogeneity can drive up the cost of product differentiation and the expense of customer responsiveness because the market is more segmented and heterogeneous (Tan and Litschert, 1994). As with environmental uncertainty and hostility, firm motivation in responding to heterogeneous environment has been noted to vary.

Studies of organisational strategy-environment relationship using Miles and Snow's (1978) strategy typologies noted that a firm's response to the environment varies according to whether its motivation is internally or outwardly focused. Internally-focused strategy would deliberately ignore differences by selecting a stable and narrowly defined market domain, which enables the organisation to emphasise operating efficiencies and effectiveness. This strategy searches for market stability that offers and seeks to protect a limited product line for a narrow segment of the potential market. Companies responding in this fashion try to carve out and maintain market niche within industries where competitors find it difficult to penetrate. To maintain competitiveness, organisations concentrate on operating efficiencies and tight control of costs. Therefore, firms operating in environmental heterogeneity have to focus on various cost control strategies.

Meanwhile, firms could also aggressively seek growth opportunities through product, market development and innovation. Whilst improving efficiency, firms cautiously penetrate new markets through intensified product/market innovation. Environmental heterogeneity has been found to be a facilitator of innovation (Grover and Goslar, 1993; Schroeder and Benbasat, 1975). By responding to customer differences and market segments, firms in such an environment seek to improve their market growth while retaining efficiencies. Offering the products that tailor the needs of the customer increases customer satisfaction, which eventually leads to customer loyalty and retention. Although this strategy seems more risky than the former, the returns would likely be much higher. Hence, this leads to our final hypotheses regarding organisational environment.

Hypothesis 3a (iii): A firm's technology motivation is likely to be greater, the more heterogeneous the business environment.

Hypothesis 3b (iii): The more heterogeneous the firm's business environment, the greater the motivation to improve (a) efficiency (b) effectiveness (c) competitiveness (d) market growth (e) customer retention.

3.4 Top Management Support and Technology Motivation Relationship

There have been numerous studies confirming the role of top management support in the acquisition and diffusion of innovation (Kimberly and Evanisko, 1981; Meyer and Goes, 1988; Rai and Patnayakuni, 1996; Welsh and White, 1981). Top management can stimulate change by communicating and reinforcing values through an articulated vision for the organisation (Thong, 1999). Moreover, top management can ensure that resources and capabilities required for adopting and implementing innovation will be readily available when they are needed (Rai and Patnayakuni, 1996). Meanwhile, Srinivasan, Lilien and Rangaswamy (2002) argued that the top management role is important because new technologies may entail the destruction of existing assets for which management's approval will be required. Croteau and Li (2003) elaborated that the dimension is important in situations where a redesign of work processes and functional activities is likely to occur. This is particularly relevant in the case of ERP implementations, for instance, which always require business process reengineering, because of the need to adapt the organisational processes to match the capabilities of the software (Kwasi and Salam, 2004).

Meanwhile, researchers argue that the lack of top management support is a serious handicap to innovation adoption (Cooper and Kleinschmidt, 1987; 1988; Gupta and. Wilemon, 1990). Top management support has been characterised as the force that pulls different functional groups together (Zirger and Maidique, 1990). Development personnel, for instance, who sense a high level of management commitment and priority, are more

likely to become more interested in the project, take greater ownership, and be more willing to take risks (Swink, 2000). A high level of visible support for a project generates enthusiasm and commitment from staff. Consequently, top level managers are more willing to fight for resources needed for the project. Thus, perceived high-priority projects are likely to include more safeguards and controls.

It is evident that adopting and implementing e-business technology requires extensive resources that are forthcoming only with the active support of top management. In addition, top management support for e-business would also send a strong signal to get line management to participate actively in proposing and developing e-business initiatives. Empirical studies in IT innovation suggested a positive effect of leadership support on innovation adoption. Rai and Patnayakuni (1996), for example, found that top management support has a positive effect on case tools adoption behaviour in information system departments. Poon and Swatman's (1999) study found that direct management involvement was common for e-commerce firms. The management not only knows about but also sometimes assumes a hands-on role in e-commerce activities. In addition, Barker et al. (1997) and Runge and Earl (1988) described similar pattern in their studies. Hence, our above arguments lead us to the following hypotheses:

Hypothesis 4: The positive relationship between firm's technology motivation and firm's e-business technology adoption will be further strengthened in the presence of favourable top management support.

3.5 External Pressure and Technology Motivation Relationship

An inter-organisational factor that may influence adoption of new technology in firms is external pressure from trading partners (Premkumar et al., 1997). It is acknowledged that the bargaining power of trading partners is an important influence in driving the adoption of inter-organisational systems technology (like e-business) in small firms (Hart and Saunders, 1998). However, much of the research examining the impact of trading partners

on technology adoption has been focused on electronic data interchange (EDI) (Premkumar and Ramamurthy, 1995; Truman, 2000). Pressure from business partners and/or customers has been found to be an important factor in EDI adoption (Hart and Saunders, 1998; Premkumar and Ramamurthy, 1995). In certain cases, a company may adopt a technology due to influences exerted by its business partners and/or its customers and the decision has nothing to do with the technology and the organisation per se.

The pressure exercised by trading partners is a function of two factors: the potential power of the imposing partner and its chosen influence strategy (Provan, 1980). Not surprisingly, requests from powerful partners (e.g., ones that consume a large proportion of sales or generate a large portion of the firm's profits) to adopt a technology are expected to be more influential in the adoption decision of firms than similar requests from less powerful partners.

A powerful trading partner may also pursue three different strategies to induce firms to adopt new technology. In the first type of strategy-recommendations, large firms use information to alter their smaller trading partners' general perceptions of how their organisations might more effectively operate via the use of the new technology. In contrast, the other two strategies require compliance from the smaller firms. Promises include all tactics that suggest that the larger firm will provide the smaller partner with a specified reward (such as discounts, subsidized adoption and usage, etc.) if it adopts the new technology.

Threats, on the other hand, refer to actions that convey the larger firm's intentions to apply negative sanction (such as discontinuance of the partnership) should the smaller company fail to comply. Large retail organisations such as K-mart and Wal-Mart have pressured suppliers to adopt EDI using threats of loss of business (Premkumar et al., 1997). Industry associations in the auto and grocery industries have also taken the lead in establishing EDI standards and then coerced organisations to adopt EDI in an effort to enhance communications, coordination and productivity through standardised data formats between organisations of the supply chain (Riggins and Mukhopadhyay, 1994; Premkumar and Ramamurthy, 1995; Iacovou and Benbasat, 1995). The imitation or forced

adoption of the operational and functional strategies of their larger and more profitable competitors proved untenable and ultimately disastrous for many "small box" and regional retail chains (Hunter, 2004).

In general, the external pressure plays a significant role in the adoption of inter-organisational technologies (e.g. EDI, SCM) since these are interdependent technologies whose utility increases only if the firm's trading partners use them (Markus, 1987). In web-based technologies, for instance, external pressure from customers or potential customers for firms to adopt this technology is evident. There is an "expectation" that an organisation will have an e-mail address and a web site. Moreover, there is an expectation that the organisation is active on the Internet, including regular browsing and being as up to date as clients. Mehrtens, Cragg and Mills' (2001) study provides support for statements made by Klein and McCollum (1997) that customers would begin to demand organisations to be on the Internet. These factors are generally consistent with those identified in prior studies of Internet channel development such as in the UK (Doherty et al., 1999) and Denmark (Mols, 2002). For example, both Doherty et al. (1999) and Mols (2002) found competitor or peer pressure to be a significant driver in Internet channel development. Therefore, similar with management support, we argue that the external pressure by trading partners and customers reinforce firm technology motivation to adopt e-business technology.

Hypothesis 5: The positive relationship between firm's technology motivation and firm's e-business technology adoption will be further strengthened in the presence of external pressure.

3.6 Technology Adoption and Organisational Performance Relationship

In response to the changes in the business environment and the quest for competitive advantage, firms have attempted to capitalise on the capabilities of new technologies such as e-business by integrating it into a broad spectrum of activities in their firm. These

applications range from those primarily focused on cost reduction (e.g. online purchases of parts) to those focused on revenue generation (e.g. online order taking). However, the potential benefits of e-business have been described rather anecdotally in the marketing literature, and few researchers have attempted to examine empirically the consequences of e-business adoptions in firms. An empirical study of the relationship is deemed important as the decision to adopt an innovation when its advantage is not yet obvious tends to be more crucial for the success of winning competition than if the technological innovation were instantly viewed as superior and necessary by all firms (Boeker and Huo, 1998).

In reflecting the traditional perspective of e-business from the IT literature, the technology is viewed as the engine that drives performance and productivity. From this perspective, the expectation is that e-business adoption, per se, should foster higher performance. This is considered to be possible because of its productivity-enhancing qualities (e.g. automatic ordering processes, cost reduction) and its role as an "enabler" which makes possible the enactment of various initiatives that rely on the generation, manipulation, and dissemination of vast amounts of information.

Second, an emerging view in the IT, marketing, and purchasing literatures is that e-business can foster improved inter-firm relationships (Hammer and Mangurian, 1987; Stump and Sriram, 1997; Taylor, 1997; Wen, et al., 1998). Wen et al. (1998) posit that IT's benefits are "qualitative, indirect, and diffuse" and thus suggest that IT's ultimate impact on performance may also occur through the relational outcomes they influence. For example, the adoption of extranet (SCM) by Fujifilm in Canada not only allows the firm to provide a wider range of information to dealers and resellers but also enables the company's salespeople to build online relationships with their intermediaries (Gilbert, 2002). This is likely to strengthen the competitiveness of firms, as creating a stronger link between a firm and its clients foster greater customer loyalty, which in turn improves customer retention.

With respect to the supply chain activities, e-business can improve many elements of operations management due to its effective time, resource and cost reduction. This is mainly achieved through improved communication and dissemination of information.

Lal's (2002) study of e-business adoption among firms in India found that all the sample firms that had adopted portal based e-business reported that the impact of efficiency in transactions was evident. Such operational improvements provide opportunities for e-business to further increase economic efficiencies by matching buyers and sellers and facilitating the exchange of information and goods.

Finally, e-business can play the role of a catalyst in achieving better performance, along with other factors such as quality of products, after sales support, and innovative capabilities of firms. E-business technologies promise numerous benefits such as better customer relation management, improved supply chain management, reduction in errors and costs, optimisation of resource use, searching new markets, efficiency in business transaction, and augmentation in the competitiveness (Hunter et al., 2004). Based on this literature, there appears to be reasonable support for the existence of a relationship between the adoption of e-business and organisational performance. Hence, this leads to our general hypothesis of the proposed relationship.

Hypothesis 6: There is a positive relationship between e-business adoption and organisational performance.

ERPs are designed to help organisations manage their resources in an integrated manner. Hence, the primary benefits that are expected to result from firm implementation of ERP are closely related to the level of integration that is promoted across functions in an enterprise. The expectations for improved business performance after ERP adoption may consist of both operational and strategic benefits (Irving, 1999; Jenson and Johnson, 1999). Initially, a major advantage of ERP systems over traditional functional systems is the integrated, centralized database that "dramatically streamlines flow of information throughout a business" (Davenport, 1998). Therefore, the potential benefits that could arise from such integration are drastic declines in inventory, breakthrough reductions in working capital, abundant information about customer wants and needs, along with the ability to view and manage the extended enterprise of suppliers, alliances and customers as an integrated whole (Escalle et al., 1999).

Holsapple and Sena (2003), in their study of ERP adopters, asserted that in addition to the operational benefits, the next two most highly rated benefits mentioned by the adopters are improvement of competitiveness and reduction in decision costs. The findings are shared by Rajagopal (2002) where the author found that among the salient consequences of an ERP implementation are information diffusion, enhanced manufacturing performance, customer satisfaction, and information availability for fast decision-making and organisational integration. On the other hand, in the Benchmarking Partners (1998) study, the findings showed that the companies that adopted ERP systems were not able to improve their profitability, or lower personnel, inventories, or system maintenance costs as much as they had hoped. However, the respondents noted better-than-expected results in overall productivity and in order-management cycle time, as well as procurement, on-time delivery, and the ability to close financial cycles. Likewise, in the Conference Board study (Peterson et al., 2001), responding companies reported anticipating similar types of tangible and intangible benefits, although it was evident that the realisation of those benefits required more time than expected. Hence, given the arguments of ERP adoption and firm performance, we have come to the following hypotheses:

Hypothesis 6a (i): There is a positive relationship between adoption of ERP technology and organisational performance.

Hypothesis 6b (i): There is a positive relationship between adoption of ERP technology and market performance.

Hypothesis 6c (i): There is a positive relationship between adoption of ERP technology and financial performance.

Hypothesis 6d (i): There is a positive relationship between adoption of ERP technology and customer performance.

Many e-business applications provide a new front end for the purchasing/selling process. E-commerce, for instance, replaces the conventional phone ordering using paper catalogues with online transactions (Porter, 2001). It is claimed that the reductions in paper handling and other time-consuming purchasing transactions often result in cost reductions (Kalakota and Robinson, 1999). Online procurement promises to lower the costs of communicating, gathering information, and accomplishing transactions (Porter, 2001). In short, e-commerce offers efficiency gains and enables human activity to be redirected to higher value-added areas (Kalakota and Robinson, 1999; Porter, 2001). Firms like Dell Computer are using the Internet to provide a "cohesive service framework," which serves as a significant differentiator (Kalakota and Robinson, 1999). Dell's e-commerce facilities enable customers to update their own shipping and billing profiles, place orders, view order status, and access online support from customer service representatives through e-mail response management and chat (Kalakota and Robinson, 1999; Lancioni et al., 2000; Lee et al., 1999; Porter, 2001). By "empowering customers" with the selling process, the system seeks to improve customer satisfaction which in turn increases its customer retention.

The e-commerce application aids the sales and marketing process by saving time as well as improves sales force productivity. E-commerce provides cheaper, faster, and easier access to customers (Brodsky, 2001). Customers can access brochures through the company web sites, eliminating the time and money spent on distribution by mail and fax. As such, e-mail can be sent any time during the day or night to reduce time-wasting "phone tag" (Brodsky, 2001). Nevertheless, this does not mean that sales personnel are no longer needed. Rather, a well-designed "site can make the sales force more productive by automating the exchange of routine information and serving as an efficient new conduit for leads" (Porter, 2001).

Online product catalogues, product configurations as well as computerised pricing tools, inventory availability information, quote submission, and order entry can save sales representatives enough time to substantially increase value-added selling activities (Porter, 2001). E-commerce can contribute to lower purchase costs, reduced inventory, enhanced efficiency of logistics, as well as to increased sales and lower the marketing costs (Baron

et al., 2000). From the purchasing company's point of view, e-commerce facilitates procurement innovations to result in reduced purchase price, reduced cycle time, and improved supplier sourcing (Turban et al., 2000). The cost savings and efficiencies associated with e-commerce would result in reduced operating costs, which in turn result in better financial performance.

The benefits of e-commerce technology are also reflected in the use of the extended information exchange networks to create organisational value. Because of the addressability and responsiveness (Deighton, 1997) that characterise the system, e-commerce could increase an organisation's ability to sense and respond to the market needs by collecting and disseminating market information throughout the organisation. With that information, the organisation could accurately assess or stimulate market demand and search for new markets. Making the right decision would in turn have a strategic impact that could change the relationship of the organisation with its business rivals and customers. As such, this could also lead to improved customer retention and subsequently better financial performance. The preceding arguments lead us to the following hypotheses:

Hypothesis 6a (ii): There is a positive relationship between adoption of e-commerce technology and organisational performance.

Hypothesis 6b (ii): There is a positive relationship between adoption of e-commerce technology and market performance.

Hypothesis 6c (ii): There is a positive relationship between adoption of e-commerce technology and financial performance.

Hypothesis 6d (ii): There is a positive relationship between adoption of e-commerce technology and customer performance.

Improving customer service and satisfaction, by and large, is driven by internal coordination of value-creating activities. Customer relationship management (CRM) is the integration of technology and process to understand customers from a "multifaceted perspective" (Kalakota and Robinson, 1999). The data collection and dissemination capabilities of Web-based business applications allow easier database construction and initiation of CRM because transaction and contact information is routinised (Winer, 2001). Efficiency of data collection and their effective use throughout the organisation are critical steps in developing a true customer orientation. As Rigby et al. (2002) note, CRM activities cannot be confined to "customer facing" activities. The data-generating potential of e-business can be a high-value contribution to the firm if used well.

The speed, interactivity, continuity, and customization capabilities of the Internet enable marketers to manage customers as strategic assets. Customer service and support functions can be significantly strengthened. Web sites and e-mail systems are being used to answer customers' queries about products, availability, upgrades, and repairs, as well as to show customers new products and gather their ideas. With the help of the technology, marketers can take their customer service into a different league and change the nature of the relationship with customers from one of reactiveness to one of involvement and dialogue (Kalakota and Whinston 1997, p. 331). The Internet and the Web provide marketers potent tools to practice relationship marketing with customers and strengthen customer loyalty. Hence, this leads to our following hypotheses:

Hypothesis 6a (iii): There is a positive relationship between adoption of customer relationship management technology (CRM) and organisational performance.

Hypothesis 6b (iii): There is a positive relationship between adoption of CRM technology and market performance.

Hypothesis 6c (iii): There is a positive relationship between adoption of CRM technology and financial performance.

Hypothesis 6d (iii): There is a positive relationship between adoption of CRM technology and customer performance.

Finally, supply chain management (SCM) encompasses "the coordination of order generation, order taking and order fulfilment /distribution of products, services, or information" (Kalakota and Whinston, 1997). It is argued that SCM produces a competitive advantage that positively impacts the performance of the firm (Araujo et al., 1999; Lambert and Cooper, 2000; Larson and Kulchitsky, 1998). To create a competitive advantage, SCM is increasingly emphasising intrafunctional, cross-functional, and interorganisational coordination of activities (Ballou et al., 2000; Sheth and Sharma, 1997). The SCM applications, for instance, enable improvements in the supply value chain by speeding the exchange of real-time information (Porter, 2001). By making information widely available, the information exchange promises substantial improvements to operational effectiveness and effective demand management. Supply chain partners can use the technology to share production schedules and inventory levels in real time, providing clear visibility of demand. With reduced supply uncertainty, all firms in the supply chain can safely lower inventory levels and thus costs without fear of stock-outs (Lee et al., 1999; Kalakota and Robinson, 1999; Kalakota and Whinston, 1997; Strader et al., 1999).

Instituting e-procurement strategy through SCM enables firms to reduce administrative costs. Digitally integrating suppliers with buyers helps simplify routine transactions, reduce paper handling, and eliminate delays caused by excessive handoffs, allowing all supply chain participants to increase efficiencies, lower costs, and save time (Kalakota and Robinson, 1999; Kalakota and Whinston, 1997). Electronic communication eliminates the time-consuming processing and routing of paper-based purchase orders, delivery schedules, and payments; ordering directly from preferred vendors' online catalogues is typically less time consuming than a paper-based process. Robert Bosch, for instance, reduces costs by allowing employees to order directly from an internal online catalogues that integrates all available material requirement products from approved vendors (Avery, 2000). Such strategies save time that would traditionally have been spent completing,

routing, and approving forms, shortening product lead time. Moreover, restricting supply sources and available items serves to maximise volume savings and efficiencies.

The competitive advantage created by SCM through the creation of efficiencies in the supply chain is oriented toward providing better customer value than competitors (Lambert and Cooper, 2000). The enhancement of supply chain efficiency provide benefits to the firm by providing real-time information regarding product availability, inventory level, shipment status, and production requirements (e.g., Radstaak and Ketelaar, 1998). Meanwhile, the collaborative planning among supply chain partners by sharing information on demand forecasts and production schedules dictate supply chain activities (Karoway, 1997). In addition, the effective linkage of customer demand information to upstream supply chain functions, such as sourcing, while subsequently facilitating "pull" (demand-driven) supply chain operations (Kalakota and Whinston, 1997).

Finally, effective SCM can improve a firm's performance through several other means such as building strong supplier relationships that enhance a firm's ability to respond to its customers more effectively. Hence, based on the SCM literature, it can be concluded that customer value is created through two mechanisms, which are reducing costs and increasing responsiveness to customers' needs (Araujo et al., 1999). The creation of customer value through SCM results in a positive impact on the firm's profitability and customer loyalty (Tan et al., 1998). Consequently, this leads to our final hypotheses:

Hypothesis 6a (iv): There is a positive relationship between adoption of supplier chain management technology (SCM) and organisational performance.

Hypothesis 6b (iv): There is a positive relationship between adoption of SCM technology and market performance.

Hypothesis 6c (iv): There is a positive relationship between adoption of SCM technology and financial performance.

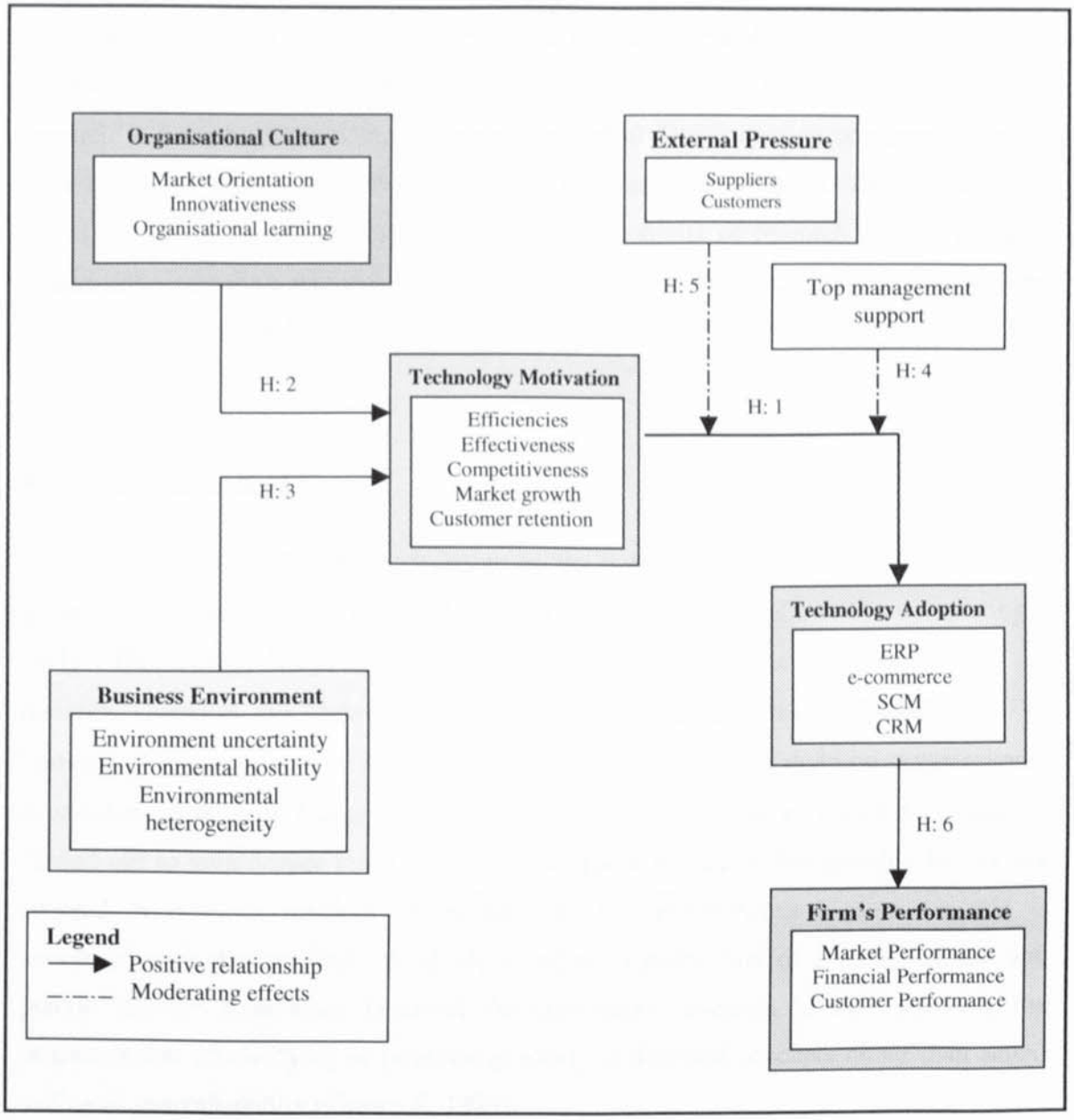
Hypothesis 6d (iv): There is a positive relationship between a firm's adoption of SCM technology and its customer performance.

3.7 Conclusion

This chapter has discussed and developed the relevant hypotheses regarding the proposed relationships of the various constructs previously identified in chapter two. In proposing and developing the hypotheses, relevant literature in the information technology, information system, strategic management/marketing and innovation adoption/diffusion fields was used to support our argument. In the process, we found that although some of the proposed relationships have been much touted in the academic literature, the claims were mainly anecdotal and lacked of empirical support. In some instances, the literature showed equivocal findings on the suggested relationships. In addition, we also found that the literature on some of the proposed relationships was sparse. We highlighted that the probable reasons to this situation could be the "earlier influence" of research focus, conventional assumptions and "pro-innovation bias".

Therefore, our "initial" findings strengthened our earlier justification that an empirical study ought to be carried out to provide more information on the proposed relationships. This study, which utilises the "organisation-technology-environment" theoretical framework, includes a new construct called technology motivation. In addition, the organisational characteristics were also represented by three culturally-based constructs, namely, market orientation, innovativeness and organisational learning. Figure 3.1 illustrates the proposed relationships of the various constructs adopted in this study representing the antecedents and consequences of firm technology adoption.

Figure 3.1: Proposed Relationships of Constructs



CHAPTER 4: METHODOLOGY AND SCALE DEVELOPMENT

This study attempts to examine the antecedents of firms' technology adoption specifically in e-business technologies and its effect on firms' performance. The methodology for this research is quantitative in nature, although the initial data collection conducted through semi-structured interviews provided valuable qualitative information. This chapter will discuss in detail the chosen methodology, which consists of research design, research instruments, sampling methods, measurement and data analysis. These issues will be examined individually.

4.1 Research Design

Churchill (1979) described research design as 'the framework or plan for a study used as a guide in collecting and analysing data. It is a blueprint that is followed in completing a study". The research design adopted in this thesis is pertinent to the nature and aims of the research. Therefore, this chapter is structured following the guidelines of Churchill (1979). Looking at the nature of the problem, there has been little study done on organisational innovation adoption in Malaysia. Therefore, it is important that an exploratory study is carried out to gain deeper insights, and to determine whether other possible factors not covered in previous research are significant. A suitable research approach that is concerned with the development of ideas and the construction of a more definite and precise research hypotheses is called the exploratory research. In this approach, the process is one of clarifying or prioritising poorly understood concepts rather than actual testing of generalisability (Churchill, 1979).

Therefore, to complement the issue of generalisability, an empirical research approach is taken where the theory developed is validated and tested. In this approach, a descriptive research design is taken. This research design requires a clear specification of the problem and focus on providing explanations to the related variables. This approach presupposes much prior knowledge about the phenomenon studied. It rest on one or more specific

hypotheses. These conjectural statements guide the research in specific directions. (Churchill and Iacobucci, 2002).

Thus, in order to achieve the research objectives of this study, a two-stage research design was employed. The first phase, which was intended for theory generation, adopted the exploratory research approach, where qualitative data were collected and the initial assumptions were refined and used as hypotheses for the following stage. The latter stage adopted the descriptive research approach. In this stage, empirical data in the form of survey research were gathered and used for validating and testing the developed theory. The following paragraphs explain the strength and weaknesses of each data collection method and conclude by stating the reason for choosing the stated method.

4.1.1 The Exploratory Phase

The first phase of the research design sought to explore or search through a problem or situation to provide insights and understanding. Exploratory research is often characterised as the most flexible research design and frequently used as a preliminary phase of research. The goal in this phase was to identify the key issues and determine whether other possible factors not covered in previous research exist in the context discussed. Specifically, one of the objectives was to investigate firms' understanding of e-business applications and their reasons (or possible reasons) for e-business adoption. The findings in this investigation were then used to construct and 'strengthen' the research hypotheses and research design, and to develop the survey questionnaire. In this phase, the choices for data collection were personal interviews and focus groups.

4.1.1.1. Personal Interviews

Within the personal interviews, there are unstructured (in-depth), semi-structured and structured interviews.

a) Unstructured (In-depth) Interview

Both qualitative and quantitative researchers hold interview as the basic method of data gathering, whether the purpose is to obtain a rich, in-depth experiential account of an event, or an episode in the life of the respondent. There is inherent faith that the results are trustworthy and accurate (Atkinson and Silverman, 1997). Thus, the interview as a means of data gathering is considered as a universal mode of systematic inquiry (Holstein and Gubrium, 1995).

Unstructured or in-depth interview is used when it is important to explore a subject in detail or probe for latent attitudes and feelings. In-depth interview, which is usually conducted in person, is described as an informal conversation with a purpose (Marshall and Rossman, 1995). Meanwhile, Kvale (1983) defines in-depth interview as "an interview whose purpose is to gather descriptions of the life-world of the interviewee with respect to interpretation of the meaning of the described phenomena". The interview process is audio taped and may even be videotaped (with the approval of the respondent) to facilitate record keeping. Thus, with the combination of observation, in-depth interviews allow the researcher to understand the meaning people hold for their everyday activities. In this technique, the interviewer has significant freedom to encourage the interviewee to elaborate or explain the answers or probing deeper. It is even possible for the interviewer to digress from the outline topic, if the situation demands. However, to do this, the interviewer must be experienced since it is critical that the interviewer and the respondent establish a rapport, and the interviewer must adapt quickly to the personality of the person being interviewed because this will elicit more truthful answers. To receive full cooperation from the respondent, the interviewer must also be knowledgeable about the topic and used the respondents' own terms in phrasing the questions.

Due to the nature of in-depth interview process, this method is time consuming to conduct, expensive, and it is difficult to analyse the data, since quantifying and extrapolating the information requires great skill and may be quite subjective. Thus, only a limited number of people can be interviewed. In addition, the process requires the utmost cooperation

from the respondent. In the case of respondents being high profile, holding managerial posts, access to these people is very difficult or has various other constraints.

b) Semi-Structured Interview

Semi-structured interview on the other hand, typically refers to a context in which the interviewer has a series of questions that are in the general form of an interview schedule (interview guide) but is able to vary the sequence of questions. The questions are frequently somewhat more general in their frame of reference from those typically found in the structured interview schedule. However, unlike unstructured interviews where the interviewer may digress from the outline topic, in semi-structured interviews relevant topics to the subject under study are initially identified and the possible relationships between these topics and the specific issues become the basis for more specific questions. This method is less intrusive to those being interviewed as it encourages two-way communication.

The advantage of the interview guide approach used in semi-structured interview is that it makes interviewing of a number of different persons more systematic and comprehensive by delimiting the issues to be taken up in the interview. Logical gaps in the data collected can be anticipated and closed, while the interviews remain fairly conversational and situational. This method enables one to confirm what is already known but also provides opportunity for learning. Semi-structured interview is widely used in exploratory study as a prelude to quantitative study where certain categories of interest cannot be predefined. The weakness of this approach is that it does not permit the interviewer to pursue topics or issues of interest that were not anticipated when the interview guide was elaborated. Also, interviewer flexibility in wording and sequencing questions may result in substantially different responses from different persons, thus reducing comparability.

c) Structured interview

A structured interview is an interview that has a specific format and addresses specific issues. The same questions are asked of all candidates. This approach is much more standardised, using a prearranged list of answers for the respondent to choose from. There

is little freedom for flexibility, due to the fixed question order. Each person is given the same questions (Wimmer and Dominick, 1997). This standardization ensures that interviewees are evaluated in a consistent manner. Due to the lack of flexibility in this approach, it means that there is "little room for unanticipated discoveries" (Breakwell et al., 1995). People may feel that their response does not fit any of the designated answers. Therefore, structured interviews which include closed-ended questions do not suit to the exploratory research approach, since they do not intend to gather any information not previously covered in other research.

4.1.1.2 Focus Group

This method consists of systematic questioning of a particular topic within a group of 8 to 10 participants of common demographics, attitudes or behavioural patterns simultaneously in a formal or informal setting by a group moderator (Greenbaum, 1998). Focus group has been extensively used in marketing research for gathering consumers' reaction towards certain products and services. In this technique, the interviewer/moderator directs the inquiry and the interaction among respondents in a structured or unstructured manner depending on the interviewer purpose. The purpose may be exploratory, to identify key informants, or pre-test the elements of a survey design such as questionnaire or measurement scales (Desvousges and Frey, 1989). It can also be used as a triangulation technique of data gathering. The group setting provides a synergistic effect where participants can expand on ideas brought up by others or discuss their disagreements over issues. It may also simulate the respondents, which aids the problem of recall. Thus, it often produces rich data that are cumulative and elaborative. Finally, data from focus groups are useful for grounding new concepts and theories for further research (Law and Partridge, 1999).

Nevertheless, there are various problems associated with this technique. Initially, the interviewer must keep any "coalition of persons" from dominating the group (Law and Partridge, 1999) or as Bryman (2001) puts it "those who hog the stage". This happens if a

group contains a minority of participants with a different opinion from the rest, who feel that they are left out in the discussion. As a result, the group would only focus on issues in which the "coalition" has a common interest. In addition, the outcome could be interfered by the "groupthink" phenomenon. Finally, in the context where the respondents are high profile, it is very difficult to get them all in one place at the same time.

4.1.1.3. The Approach Selected

Based on the discussion of the available data collection method in the exploratory research design, semi-structured interviews with senior managers was the most suitable approach in this phase. Initially, an interview guide which covered the specific topics was constructed. We used purposive sampling (Glaser and Strauss, 1967) to ensure that our field interviews included e-business, business strategy and senior managers from firms of different industries.

4.1.2 The Descriptive Phase

In the descriptive research design, the aims of the study were to verify and test the hypotheses concerning the proposed model. It was also expected that the developed theory would be generalisable to the respective disciplines. This would normally require empirical evidence derived from large samples that represent the population. Given the prohibitive financial and time constraints, it is apparent that mail survey is the best data collection method when compared with other available techniques. The following paragraphs discussed in great detail the strengths and weaknesses of using survey as the method of data collection.

4.1.2.1. Survey

Bryman (1989) defines survey research as the collection of quantitative data on a number of units and usually at a single juncture in time or cross-sectional, with a view to collecting systematically a body of quantifiable data in respect of a number of variables which are then examined to discern patterns of association. In general, survey research has three distinct characteristics. First, it involves collection of information by asking people for information in a structured format. Depending on the quality of information, data collection could range from using mail questionnaire, telephone interview, or face-to-face interview. The individuals surveyed could be representatives of themselves, their project, their expertise, or their organisation. Second, survey research provides a quantitative description in standardized information to define or describe variables, or to study relationships between variables. Third, information is gathered via a sample, which is a fraction of the population. Therefore, the application of standardized questions or structured interviews enables the researcher to draw a general conclusion on a wider range of distribution of peoples' characteristics, and of relationships between such characteristics (Fowler, 1988; Marsh, 1982; Robson, 1993).

Survey has several advantages. As explained earlier, survey allows generalisation of the results from a sample representative of the population. When it is executed in a cross-sectional design, a large volume of information can be gathered within a short period of time in an economical manner, unlike other qualitative methods. Survey results could highlight broader and more general patterns and relationships. This would provide the researcher with a basis for the formulation of explanations and theories. In addition, self-administered survey is the easiest way of retrieving past information from a large set of people. Survey which allows anonymity of respondents can also encourage frankness when sensitivity is involved. Meanwhile, interview survey is another alternative where the researcher can clarify questions during the session. It is also a fact that the presence of the interviewer encourages participation and involvement that would enable the interviewer to judge the seriousness of the exercise (Robson, 1993).

Finally, research results through survey are convincingly used for various purposes and in many competitive decision making situations. Zeisel (1984), for instance, points out that the 'apparent exactness and rigorousness of statistical analysis of survey data, is a useful device to win arguments with people who do not understand the value of qualitative knowledge in scientific research'. Thus, researches conducted through survey in high reliability manner seize the attention of any reader. Lindblom and Cohen (1979) corroborated by stating that survey is most influential compared to other methods carried out by professionals. Hakim (1987) supported survey's 'credibility' in stating that the main attraction of the method is its transparency or accountability. In other words, the survey process can be shown and is accessible to other parties for assessment.

Nevertheless, survey has several disadvantages. Due to the 'socially acceptable impression factor', respondents have the tendency to exaggerate or understate their responses by giving favourable responses. Biased responses could arise directly as a result of the possible influence of the perceived purpose of the survey and/ or the researchers' personal characteristics. Thus, if this occurs, it would affect the research accuracy and precision. Another weakness charged at survey is that it is inherently superficial. Proponents of interpretive research such as Blumer (1956), for instance, argue that studies that aim to bring out the relationships between variables omit "the process of interpretation or definition that goes on in human groups". Thus, research done through survey may miss subtle differences in behaviour or views between different respondents, and the respondents' answers may not represent their action.

Finally, one of the limitations of mail surveys among an industrial population is low response rate (Harzing, 1997). For regular mail surveys without a telephone follow-up, response rates typically vary between 6% and 16%. In a study conducted by Harzing (1997) on response rate based on nationality, Singapore (a neighbouring state of Malaysia) scored a low 4.8% response rate. Due to the ethnic similarity of the respondents of senior managers in the Malaysian manufacturing sector, an incentive strategy was implemented to increase the response rate.

4.2 Population and Sample

The importance of organisational technology adoption is well documented by the large number of studies conducted over the years. The samples among whom those studies were conducted varied from business firms (manufacturing and services) to public institutions. As elaborated in the earlier chapter of this thesis, there has been a dearth of research done in the developing countries (e.g. Malaysia) and with the emphasis placed by the government on the importance of modernisation of manufacturing facilities, manufacturing firms in Malaysia were chosen as the population from which the samples would be selected. Numerous studies on organisational innovation adoption have used manufacturing firms as samples in their studies (e.g. Lal, 2002; Wu et al., 2003; Swamidass and Kotha, 1998).

The consistency of samples used in this study would enable generalised comparison of results between the studies. It would also help to minimise the potential effects of inter-industry differences on the measurement of performance on each firm. We avoided pure "dot-coms" because by definition, a substantial part of their operations were built around the e-business context. Therefore, this allowed us to explain the variance in e-business adoption using theoretically relevant antecedents without being overly distracted by whether the nature of the organisation's business itself constituted the major source of variance.

As the constructs studied (organisational culture, technology adoption and performance) involved the norms and decision making of a group, the unit of analysis was Strategic Business Units (SBUs). This enabled us to analyse different types of organisations using data on the elements of organisational culture factors obtained from senior executives (e.g. Deshpandé and Webster, 1989; Hult et al., 2003). Numerous studies, for instance in the technology adoption research (Lal, 2002; Wu et al., 2003) or market orientation research (Hooley et al., 2000; Narver and Slater, 1990; Slater and Narver, 1994) have adopted similar approach in their unit of analysis.

4.2.1 Sampling Frame

The sampling frame for the semi-structured interviews in the exploratory phase was based from Malaysian Industrial Development Authority (MIDA) database. MIDA is a government agency that approves application for manufacturing activities in Malaysia either from local or foreign companies. The database provides information such as company name, address, telephone number and types of products manufactured by the company.

Meanwhile, the sampling frame for the mail survey was drawn from the 'Malaysian Industries Federation of Malaysian Manufacturers' (FMM) Year 2001 directory. The directory is officially the authoritative publication on manufacturers from the various industry sectors and service companies for the government and private sectors. In the directory, information about the background of the firms, such as year of incorporation, company address, fax number, email address, annual sales, number of employees, product manufactured and the names of top management such as CEO, Managing Director or General Manager, is displayed.

According to the directory, there are about 2958 companies listed under the manufacturing sections. The list in the section is arranged alphabetically regardless of the industry. From these sections, the companies are categorised under various sectors such as electrical and electronic industry, automotive and component parts, pharmaceutical and medical equipment, industrial and engineering products and many more. Each sector, for instance the electrical and electronics sector, represents several industries such, as telecommunication equipment, computer components and consumer electronics.

4.2.2 Sampling Design

In implementing the semi-structured interviews, simple random sampling was done to select thirty companies from MIDA database. Meanwhile, the sampling for the mail

survey was based on systematic sampling. Systematic sampling is a probability sampling technique in which the sample is chosen by selecting a random starting point and then picking every *i*th element in succession from the sampling frame. The sampling interval, *i* is determined by dividing the population size by the sample size and rounding to the nearest integer. Using this formula, the sampling interval was 2 as the total population of 2958 companies was divided by 1700 (the target sample size). Hence, the companies selected in this study were taken from an order of 1, 3, 5 and so on up to 2958, based on the sampling frame of the FMM year 2001 directory arranged in alphabetical order. This method is less costly and easier than simple random sampling, because random selection is done only once.

4.3 Data Collection

In carrying out the chosen research approach, the data were collected on a cross sectional design. Cross-sectional designs involve the collection of information from any given sample of population elements only once (Malhotra, 1999). Greenley (1995) points out that cross sectional designs are useful in the early stages of knowledge development, where empirical evidence is recent and incremental knowledge is necessary. It is visible that incremental knowledge in this area is increasing due to the vast contribution of published studies in the areas of innovation adoption (Kuan and Chau, 2001; Lal, 2002; Premkumar et al., 1995) and market orientation using cross sectional studies (e.g. Hooley et al., 2000; Narver and Slater, 1990). Therefore guided by the study aims, both the exploratory and descriptive research approaches were employed using cross sectional design.

4.3.1 Semi-structured Interviews

Before the interview takes place, a letter stating the purpose of the study was sent to the selected firms for their information and consent. It was then followed by a telephone call to confirm the acceptance of the letter, to ensure the correct individual had received it and to set the details of the interview such as venue, date and time. From the initial thirty

companies that were contacted either by mail, fax or telephone, twelve institutions agreed to participate. However, one of the interviews from a manufacturing firm was 'dropped' since the manager was unable to answer large sections of the questions, especially those related to the firm's strategic position. This the event, it confirmed our earlier identification of the key informant description. The manager admitted that he was 'relatively' new and was only in charge of daily operations. Thus, he was unable to answer 'strategic type' questions. In the end, Managing Directors or General Managers from nine manufacturing companies and two senior managers from Malaysian government agencies that were involved in the e-Business and manufacturing policies were interviewed. The reasons for the large number of non participating firms were either that the managers were too busy or company policy prevented participation.

The respondents in the interviews were senior managers within the individual companies. As noted by Hambrick (1981), general managers are typically the most knowledgeable persons regarding their companies' strategic processes and overall business situations. Meanwhile, other printed materials such as company's annual report, information leaflets, web sites and other secondary sources were used to triangulate and verify the information obtained in the interview (Hutt et al., 1988). Prior to the interview, the respondents from the manufacturing sector requested an interview guide. The interview guide was derived from previous studies where specific questions including open and close-ended questions were used to identify the pertinent constructs related to the subject under study. This enabled the respondents to have some idea of the subject matter of the meeting and prepare the necessary documents or answers. Thus, the interview guide was fax to the respective respondents before the interview. This improved the efficiency of the interviewing process and also reduced any doubts on the issue of the interview. Finally, before the interview started, a request was made to tape the interview sessions. However, all the respondents declined the request for reasons of 'legality' or 'company procedures'. In fact, the notion that they were making 'recorded statements' made all of the respondents uneasy. Thus, the author had to resort to note taking. On average, the interviews took about 60 to 90 minutes a session.

With the exception of one interview which was done in the respondent's room, all the other interviews were done in a closed meeting room where there were no interruptions. The interview that took place in the respondent's room experience occasional disturbances when the respondent answered telephone calls. At times, some of the questions had to be repeated and the interview 'momentum' was lost during the intermittent phone calls. All the interviewees were questioned in a similar fashion, with additional information gathered through the use of probing, follow up and other encouragement techniques.

As explained in the earlier section of this chapter, the general objective of exploratory research adopted in the first phase of this study was to gain insights and ideas. The findings from the semi-structured interview showed that it is particularly helpful to break broad, vague problem statements into smaller and more precise statements. The study also helped to clarify and operationalise the constructs under study, especially given the lack of any existing measure in the literature (i.e. technology motivation and e-business technology). In addition, the study ensured that no other possible factors, not covered in previous research, were neglected. In short, the first phase of the study helped ground the research, confirmed the variables of importance, and provided a practical perspective on e-business adoption.

4.3.2 Mail Surveys

As elaborated earlier in the above sections, the information from the interviews was used to construct the survey questionnaire. After piloting the questionnaire and making amendments to the layout and ordering, the main survey was administered by post to a sample of 1700 corporate managers. Based on the first phase of data collection and previous studies, it was identified that responses were required from key informants knowledgeable in a variety of tactical and strategic activities (Bowman and Ambrosini, 1997). Researchers such as Day and Nedungadi (1994) advise that responses from the most knowledgeable respondent can be more accurate than taking an average of several informants in an organisation. Thus all the questionnaires were addressed personally to the

most senior manager of the firm, such as the managing director, general manager or senior manager. All respondents received a package containing a letter explaining the purpose of the study, requesting their participation and promising confidentiality, the questionnaire and a postage-paid return envelope. Summarized findings of the research were offered to the respondents as an incentive for response. The questionnaire was written in English, since it is the common business language in business organisations in Malaysia.

4.3.3 Descriptive Results

From the 1700 questionnaires that were sent, 220 questionnaires were returned due to wrong address, cessation of operation and company relocation. The high number of returned questionnaires could be attributed to the global economic downturn and the slump in the information technology sector in 2001 that affected the country's economy. In 2001, Malaysia's GDP grew by only 0.5% due to an estimated 11% contraction in exports (Malaysian Economic Report, 2003). 160 completed questionnaires were received. 7 of those questionnaires were discarded because large sections of the questionnaires were incomplete including missing pages. This comprised an effective response rate of about 11%. Although the response rate looks 'average', when compared with the findings of Harzing (1997), it well surpassed its predicted response rate, based on nationality, of only 4.8% (Harzing, 1997).

The final usable sample contained 153 responses from various industries such as automotive and component parts, pharmaceutical and medical equipment, electrical and electronic parts, industrial and engineering products. In general, these industries are classified as high technology industries (MIDA, 2001). The firms represented a significant sample of industries that have been identified as the clusters of industries expected to enhance and strengthen the economic foundations of Malaysian industry (OECD, 2000). Based on the firms' description, over 40% of the sample came from the electrical and electronic industry. This is consistent with the industry population, as this sector represents the largest number of companies and contribution to Malaysia's manufacturing

output, employment and exports. The electrical and electronics products made up 52.9 per cent or RM 211.16 (US$55.57) billion of Malaysian exports in 2003 which is the largest among all sectors in the other manufacturing sector (Matrade, 2004).

In terms of firm size, the sample comprised a fairly mixed number of SMEs and large firms. According to the Malaysian Ministry of International Trade and Industry classification, firms with more than 150 employees are considered as large, while firms with 150 employees and below are considered as small and medium size. Another classification of firm size is through firm's turnover. Firms with turnover of RM 25 million and above are classified as large while those with below RM 25 million are considered as SMEs. Thus, based on the number of employees as the determinants of firm size, majority of the sample, 62.09 per cent, were large firms. However, when firm's turnover was used as the determinant of firm size, SMEs and large firms were fairly evenly distributed with 52.28% being SME's and 47.72% being large firms. This discrepancy could be explained by the labour intensiveness of Malaysian manufacturing industry and the subjective disclosure of firm's turnover by the respondent. It is likely that the respondent would underestimate the firm's actual turnover.

Finally, all respondents were key informants who were knowledgeable concerning their firm, industry and the phenomenon being studied. This is depicted in the sample composition, which comprised 5.2% owner/manager, 7.2% CEO/President, 20.9% managing director, 22.9% general manager and 43.8% senior manager/manager. The majority of the firms sampled had been established more than 10 years where only a mere 10% had been established for less than 5 years. Being in the market for more than 10 years means that these firms were well established with their own business strategy and organisational culture. Table 4.1 illustrates the demographic characteristics of the firms involved in this study.

Potential non response bias was assessed by comparing returned questionnaires on key variables (Armstrong and Overton, 1977). No significant differences were found between the early and late respondents (the first 25% of the respondents vs. the last 25% of the

respondents) on any of the key variables. We later tested the respondents into three separate groups (33.33% or n=51 in each group). Again, we found no significant differences in responses across the three groups. Thus, we are reasonably confident that non response bias would not pose a major problem.

Table 4.1: Firm Descriptive Statistics

Industry	Frequency	Percent
Automotive and component parts	20	13.06
Electrical and electronic parts	60	39.22
Industrial and engineering products	19	12.42
Pharmaceutical and medical equipment	5	3.3
Plastic resins and plastic products	7	4.6
Others	42	27.4
Total	153	100
Numbers of employees	**Frequency**	**Percent**
Less than 75	36	23.53
76 – 149	22	14.38
150 – 499	48	31.37
More than 500	47	30.72
Total	153	100
Turnover in Malaysian Currency (RM)	**Frequency**	**Percent**
Less than 25 million	80	52.28
25 to 50 million	17	11.11
50 to 75 million	13	8.5
75 to 100 million	11	7.2
More than 100 million	32	20.91
Total	153	100
Type of Organisation	**Frequency**	**Percent**
Owner/Manager	42	27.45
Composition of Individuals	50	32.68
Numerous shareholders	58	37.91
Missing	3	1.96
Total	153	100
Years of Establishment	**Frequency**	**Percent**
Less than 2 years	4	2.6
3 to 5 years	15	9.8
6 to 10 years	30	19.6
More than 10 years	104	68.0
Total	153	100

4.4 Measurement and Scale Purification

In this section, the sources and description of the measures used in this study are explained in detail. The survey instrument included psychometric scales to measure market orientation, organisational learning, organisational innovativeness, business environment, external pressure, management support, e-business adoption and firm's performance. Each of the multi-item measures was based on five-point Likert-type scales anchored as described within each measure. Most of the measures were adopted from previous studies where possible. However, some of the measures (i.e. technology motivation, e-business adoption) were newly developed for this study from a combination of previous studies and the results from the initial exploratory study. In establishing the scale development and validation procedure, the suggestions of Churchill (1979) and Gerbing and Anderson (1988) suggestions were followed. This will be explained in detailed in the next section.

a) Market Orientation

To measure the market orientation construct, we choose the fourteen item scale developed by Narver and Slater (1990). This scale was chosen over Kohli and Jaworski (1990) for the following reasons. First, Narver and Slater's (1990) scale incorporates the essential aspects of Kohli and Jaworski's constructs while accessing organizational cultural factors (Hooley et al., 2000; Hunt and Morgan, 1995). Second, researchers (Hooley et al., 2000) have noted that Kohli and Jaworski's (1990) construct more accurately reflects marketing orientation than market orientation. Third, some empirical studies, which attempt to develop parsimonious versions of a market orientation scale on the basis of synthesis of individual items from the two known scales as well as other scales, find that the synthesized versions draw more items from Narver and Slater's instrument (Despandé and Farley, 1998; Pelham, 1997). Finally, various researchers have chosen Narver and Slater's (1990) market orientation scales in their empirical studies linking market orientation and innovation or e-business technologies (Han et al., 1998; Chang et al., 2002).

For the purpose of consistency with the rest of the scales, the original 7-point Likert scale was rescaled to a five-point Likert scale ranging from strongly disagree (value 1) to strongly agree (value 5). Initially, the dimensionality of the measure was subjected to confirmatory factor analysis using LISREL which produced a low goodness-of-fit score. Several studies using the same scale has achieved similarly low goodness of fit scores (Pelham, 1997; Siguaw and Diamantopoulos, 1995). Sensing that the low score would affect the overall results of further analysis, we decided to improve the goodness-of-fit scores by subjecting the whole measure to exploratory factor analysis and confirmatory factor analysis. Other studies (Hooley et al., 2003) have also subjected Narver and Slater's (1990) market orientation scale to similar treatment. Eight items were dropped as a result of the exercise, leaving a market orientation measure of a six-item scale. The remaining items produced an internal consistency reliability (alpha) of 0.81.

b) Organisational Learning

Initially, a nine-item scale was used to measure organisational learning; this was validated by Badger et al. (1998) based on previous scale development work. The researchers evolved these nine statements through a detailed review of the literature followed by extensive testing of their scale in both large and small organizations. Respondents are asked to comment on a five-point Likert type scale ranging from strongly disagree (value 1) to strongly agree (value 5), on the degree to which each statement describes the current situation within their organization. The originators of the scale suggest that organizational learning style should be perceived as a continuum. At one end, virtually no new learning occurs because of reliance upon existing knowledge (i.e. lower-level/adaptive learning) and at the other, exploiting new sources of knowledge provides the basis for becoming ever more versatile and adaptive (i.e. higher-level/generative learning). After EFA and CFA was done on the measure, one item was deleted, leaving lower-level learning covered by a three item scale and higher-level learning on a five item scale. The internal consistency reliability (alpha) of the lower-level learning scale was 0.82 while the higher-level learning scale was 0.83. The overall organisational learning scale was 0.84.

c) Organisational Innovativeness

A six-item scale was initially used to measure firm's innovativeness. These items were drawn from Hurt et al. (1977), Hurt and Teigen (1977) and Hollenstein (1996) to designate the cultural representation of firm's innovativeness and well validated by many subsequent studies (Calantone et al., 2002). Respondents were asked to assess their firm's innovativeness by indicating their strength of agreement from strongly disagree (value 1) to strongly agree (value 5). These statements ask whether the firm tries out new ideas, new ways and creativity in its methods of operation. Respondents are also asked whether their firm is often the first to market with new products and whether their new product introduction has increased over the last five years. After EFA and CFA was done on the measure, one item was deleted leaving the measure with a five-item scale. The internal consistency reliability (alpha) of the scale as used in this study was 0.83.

d) Business Environment

Boyd et al.(1993) concluded that managers' perceptions of their environments are more critical than objective measures, especially in the context of interpreting information and decision making. The business environment measure in this study was adopted from previous researchers, and consisted of three constructs. The environmental hostility scale was adopted from Jaworski and Kohli (1993), the environmental uncertainty scale from Zahra (1996) and the environmental heterogeneity scale from Slater and Narver (1994) and Achrol and Stern (1988). Respondents were asked to assess their firm's business environment by indicating their strength of agreement from strongly disagree (value 1) to strongly agree (value 5).

In assessing environmental uncertainty, the respondents were initially asked in a four item scale their perceptions of their business environment with respect to change. After EFA and CFA were done, two items were deleted from the scale. Environmental hostility was initially assessed by asking the respondents in a five item scale the competitive intensity in the industry. Similar analyses were applied to the scale, reducing the number of items to

four. Finally, environmental heterogeneity was assessed by asking the respondents to relate their firm's products with the diversity of their customers and markets in a three item scale. The internal consistency reliability (alpha) of the scale for environmental hostility was 0.66, that for environmental uncertainty was 0.66 and that for environmental heterogeneity was 0.66. The whole business environment measure produced an internal consistency reliability of 0.67.

e) Top Management Support

Top management support assessed the level of top management commitment to the technologies using a four-item scale. These items were adopted from Premkumar et al. (1994) and had been tested and validated in subsequent studies involving firms' technology adoption (Premkumar and Roberts, 1999). Respondents were asked to indicate the degree to which they agreed that their owner, manager or top management supports and allocates adequate resources in the adoption of new technologies in their organization. Additionally, respondents were asked to indicate the degree to which they agreed that their top management is aware of the benefits of these new technologies and actively encourages employees to use the new technologies in their daily tasks. The scale range from strongly disagree (value 1) to strongly agree (value 5). The internal consistency reliability (alpha) of the scale as used in this study was 0.87.

f) External Pressure

External pressure was initially assessed by six items, adopted from Premkumar and Ramamurthy (1999) and Chwelos et al. (2001). These items measure the degree of imposition of new technology adoption from the firm's trading partners (suppliers) as well as customers. Respondents are asked to comment on a five-point Likert type scale ranging from strongly disagree (value 1) to strongly agree (value 5), the degree to which each statement describes the current situation within their organization. After EFA and CFA

were done on the measure, two items were deleted from the 'suppliers' pressure. The 'pressure' to adopt new technologies from the supplier consists of suppliers threatening the firm, to adopt the technology. External pressure from customers was gauged using a 3 item scale including customers' recommendation, request, and customers' threat. The internal consistency reliability (alpha) of the scale in this study was 0.85.

g) Technology Motivation

A fifteen-item scale of technology motivation was initially developed specifically for this study using 5-point Likert-type scale items. In this instance, the measure was developed in stages following the guidelines of Churchill (1979). Based on the review of the literature (Lal, 2002; Morrell and Ezingeard, 2002; Vlosky et al., 2000) and field interviews with managers, we generated a pool of items for the technology motivation constructs. We tried to tap the domain of the construct using the criteria of uniqueness and ability to convey different forms of meaning to informants (Churchill, 1979). It emerged from our exploratory study that firm's technology motivation consists of five components which are competitiveness, market growth, efficiency, effectiveness and customer service. We later tested each of these items with a number of academic experts, who critically evaluated the items for representativeness, item specificity and clarity of construction. We used the feedback we received in this stage to further refine the items.

Respondents were asked to assess the importance of their firm's motives, as they perceived them, in coming up with the decision to adopt e-business technologies. These motives were assessed on a continuum from not important (value 1) to critically important (value 5). Only six items were left representing effectiveness (three item scale) and customer service (three item scale) after EFA and CFA were applied to the measure. The internal consistency reliability (alpha) of the scale developed in this study was 0.93.

h) E-Business Adoption

A total of seventeen items were specifically developed for this study using 5-point Likert-type scale items. These items were developed based from a combination of previous studies of e-business technologies and from the exploratory. Consistent with the previous literature review, it emerged from our interviews that managers cognitively clustered e-business activities as pertaining to suppliers, the internal operations of the business and to customers. Similar steps were followed as in the development of technology motivation measure. Subsequently, EFA and CFA were done on the measure, which resulted in eleven items being deleted from the e-business construct.

E-business adoption in e-commerce activities was measured by a two-item sub-scale that assessed the firm's application in customer's online ordering and firm's participation in online business portals. E-business adoption in the supplier chain management (SCM) was measured with a two-item sub-scale that assessed online order placement with suppliers and participation in online supply side marketplaces. E-business adoption in customer relationship management (CRM) was measured with a two-item sub-scale that assessed the respondents view on their firm's application of email like facilities in communicating and responding to customers' enquiries and quotations. The two items to measure e-business adoption in internal administration processes were dropped due to poor internal consistency reliability ($\alpha = 0.44$) after EFA.

In summary, e-business adoption is a construct represented by e-commerce, supplier chain management and customer relationship management. The items in this measure were scaled as '1' indicating no (not adopted), '2' indicating under implementation, '3' indicating implemented 0 to 1 year, '4' indicating implemented 1 to 2 years and '5' indicating implemented over 2 years. The internal consistency reliability (alpha) of the sub-scale developed in this study for e-commerce was 0.89, SCM was 0.57 and CRM was 0.74. The reliability of the scale as a whole was 0.70.

i) Firm's Performance

Firm's performance was initially assessed by a twelve-item scale that consisted of three constructs, namely market, financial and customer performance. However, after the items were subjected to EFA and CFA, only five items remained. Financial performance consisted of a three-item sub-scale and customer performance was a two-item sub-scale. All measures of market performance were deleted due to overlap and poor item loadings. These items were based on a subjective approach where the respondents (executives) were asked to evaluate their firm's performance based on their perceptions. Numerous researchers (e.g. Covin et al., 1994; Venkatraman, 1990) have found consistency between executive perceptions of performance and objective measures. In addition, absolute performance figures such as ROI and profit levels are difficult to compare between firms of different sizes, operating in different markets, using different accounting standards, and defining their markets in different ways (Hooley et al., 2003).

The items in each measure of performance in this study were measured twice. Performance was judged relatively to major market competitors and performance judged relatively to their last financial year. The measures show whether firms are outperforming similar firms facing similar market conditions and the extent to which firms are improving within each year. Financial performance was measured with three items which are return on investment (compared to competitors and compared to last financial year) and profit margins attained (compared to last financial year). Finally, customer performance was measured by two items which are customer retention and customer satisfaction (as compared to last financial year). Respondents were asked to comment on a five-point Likert type scale ranging from much worse (value 1), worse (value 2), the same (value 3), better (value 4) to much better (value 5) the degree they evaluated their firm's performance on each item. The internal consistency reliability (alpha) of the scale for financial performance was 0.89 and customer performance was 0.60. The combined firm's performance was 0.82. Table 4.2 illustrates the descriptive statistics and correlations among the constructs.

Table 4.2 Descriptive Statistics and Correlations

	Variable	Mean	SD	n	1	2	3	4	5	6	7	8	9
1	Business Environment	3.60	0.50	153	1.00								
2	Market orientation	4.05	0.52	153	.21**	1.00							
3	Innovativeness	3.62	0.69	153	.19*	.45**	1.00						
4	Organisational learning	3.80	0.56	153	.10	.61**	.64**	1.00					
5	Technology motivation	3.90	0.80	153	.32**	.26**	.16*	.08	1.00				
6	Management support	3.86	0.68	153	.26**	.44**	.54**	.52**	.31**	1.00			
7	External pressure	2.72	0.78	153	.30**	.02	-.07	-.12	.24**	.01	1.00		
8	E-business adoption	2.34	0.82	153	.21**	.13	.23**	.06	.25**	.35**	.08	1.00	
9	Firm's performance	3.35	0.60	153	.04	.23**	.26**	.24**	-.01	.18*	.07	.04	1.00

**. Correlation is significant at the 0.01 level

*. Correlation is significant at the 0.05 level

4.4.1 Measurement Reliability and Validity

This section describes the measure development, purification of the scales and the general theory testing approach adopted. As explained earlier, most of the measures were adopted or adapted from established scales, with the exception of the technology motivation and e-business adoption measures, which were constructed from a combination of previous literature and the findings of the qualitative study. Nevertheless, all the scales were subjected to the same rigorous analysis, where the items were subjected to refinement and various aspects of reliability were evaluated prior to the data analysis (Churchill 1979, Gerbing and Anderson 1988). The subsequent paragraph elaborates how the measurements were assessed for their reliability, dimensionality and construct validity using established procedures.

4.4.2 Exploratory Factor Analysis (EFA)

Gerbing and Anderson (1988) assert that scale development must include an assessment of whether the multiple measures that define a scale can be acceptably regarded as alternative indicators of the same construct, i.e. that the scale is unidimensional. They argue that before the item is assessed for its reliability, the unidimensionality of the scale must be established. This is because the measure development procedure may not have created a set of unidimensional items.

Exploratory factor analysis is a useful scale development technique for reducing a large number of indicators to a more manageable set. It is particularly useful as a set of preliminary analysis in the absence of sufficiently detailed theory about the relations of the indicators to the underlying constructs. EFA is a useful tool to aid the researcher in recovering an underlying measurement model that can then be evaluated with Confirmatory Factor Analysis (CFA). Scales are formed by assigning to the same scale that the items load at least moderately onto the same factor.

Therefore, following the guidelines of Gerbing and Hamilton (1996), exploratory factor analysis (EFA) was implemented as a heuristic strategy for constructing multiple-indicator measurement models as a precursor to CFA procedures. Adopting the guidelines outlined by Hair et al. (1998) EFA using principal components analysis and varimax rotation was conducted (Greenley, 1995). Variables with low factor loadings (<0.3) were considered for deletion, as were variables loading significantly (>0.3) onto more than one factor. The communalities of the variables, representing the amount of variance accounted for the factor solution of each variable, were also examined. Factors with low communalities (<0.4) were also considered for deletion. Several other complementary methods were employed to obtain the most representative and parsimonious set of components such as eigenvalues more than 1 and scree plot.

4.4.3 Item Analysis

Once the relationship of the items representing the respective constructs had been verified, the reliability of the scales were examined. Reliability refers to the extent to which scales produces consistent results if measurements are made repeatedly. Reliability is assessed by determining the proportion of systematic variation in a scale. This is done by determining the association between scores obtained from different administrations of the scale. If the association is high, the scale yields consistent results and is therefore reliable. One of the methods widely used in measuring reliability as a measure of internal consistency is coefficient alpha (α). The coefficient varies from 0 to 1. Nunnally (1978) suggest that a value of 0.7 be used as the lowest acceptable value of alpha indicating adequate reliability although in exploratory research, the acceptable range for a reliability measure is usually lower (0.50) (Nunnally, 1967).

Overall, each item measuring the related dimension exhibits an acceptable level of internal reliability. With the exception of the business environment measures, all the other measures exceed the lowest acceptable value of alpha of 0.70 (Nunnally, 1978). Although the business environment measures score an internal reliability of 0.67, it exceeds Nunally's (1967) reliability measure of 0.50 for exploratory research.

4.4.4 Construct Validity

Construct validity concerns the degree of 'correspondence between a construct which is observable, conceptual level and a purported measure of it which is at an operational level' (Peter, 1981). The generation of internally consistent and unidimensional scales is necessary in the creation of measures which possess construct validity (Churchill, 1979). However, it is not sufficient for accepting construct validity (Peter, 1981). Several types of validity can be used to establish a scale's construct validity. The types that are used in this study are convergent and discriminant validity (Churchill, 1979).

4.4.5 Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is an appropriate method to test the measurement properties identified in the EFA and provides guidelines for further model re-specification (Babin, 1994). Anderson and Gerbing (1988) suggest that CFA is done after EFA to assess the convergent validity of the measurements. CFA extends the earlier method of EFA by providing a means for rigorously testing a model that must be specified a priori. Extending well beyond the simple specification of the number of factors, CFA requires a specification of the complete factor pattern, including the factor correlations. Specific values can be specified, or more commonly, only the relations are specified with the corresponding pattern values estimated by the algorithm.

Although simultaneous estimation of all parameters in model with LISREL is possible, the modelling process can be thought of as the analysis of two conceptually distinct models; measurement and structural (Jöreskog and Sörbom, 1999). The measurement model specifies the causal relations between the observed variables and the underlying latent variables or theoretical constructs, which are presumed to determine responses to the observed measures. The structural model specifies the causal relations among the theoretical constructs.

The reason for drawing a distinction between the measurement model and the structural model is that proper specification of the measurement model is necessary before meaning can be assigned to the analysis of the structural model. Good measurement of the latent variables is a prerequisite for the analysis of the causal relations among the latent variables. Each construct is measured by multiple indicators and each indicator measures only a single construct. Thus, the set of indicators defining each construct are unidimensional (Bagozzi, 1980). A prerequisite to the causal analysis of constructs is satisfactory measurement of the constructs themselves. The dual constraints of unidimensionality and reliability must be specified. Unidimensionality is defined by both internal and external consistency. Due to the sample size-parameter constraints, the

measurement models for the respective constructs involved in the study are estimated individually using LISREL 8.5 (Jöreskog and Sörbom, 2000).

Confirmatory factor analysis (CFA) was accomplished through maximum likelihood estimation (Jöreskog and Sörbom, 2000) to test the dimensionality of the scales (Babin, 1994). SIMPLIS language was used to specify the commands for LISREL analysis. SEM allows the researchers to choose the input matrix from two types of matrices: the variance-covariance matrix and the correlation matrix. We choose the correlation matrix as the input matrix, because we used a single sample and the correlation matrix has gained widespread use (e.g. Hult, Ketchen, and Slater, 2002; Mentzer et al., 2001). The goodness-of-fit indexes showed that the hypothesized construct is an acceptable representation. Table 4.3 shows the goodness-of-fit indexes and the convergent validity results which include composite reliabilities and average variance extracted scores for the whole constructs.

The fit indexes results for all the related constructs are quite good where all the indexes surpassed the recommended value of 0.90. In fact, with the exception of the business environment and market orientation constructs, the indexes all exceeded 0.95, which is considered as very good.

4.4.6 Convergent Validity

Convergent validity represents the degree to which measures designed to assess the same construct are related, with higher correlations indicating convergent validity. Convergent validity can be assessed from the measurement model by determining whether each indicator's estimated pattern coefficient on its posited underlying construct factor is significant (greater than twice its standard error) (Anderson and Gerbing, 1988). Further, composite reliabilities (ρ_x) and average variance extracted (AVE_X) scores of the constructs were calculated. Listed below are the formulas for calculating the scores.

Composite reliability: Let sl_i be the standardized loadings for the indicators for a particular latent variable. Let e_i be the corresponding error terms, where error is 1 minus the reliability of the indicator, which is the square of the indicator's standardized loading.

$$\rho_x = [(SUM(sl_i))^2]/[(SUM(sl_i))^2 + SUM(e_i))].$$

Average Variance Extracted: Its formula is a variation on construct reliability.

$$AVE_X = [(SUM(sl_i^2)]/[(SUM(sl_i^2) + SUM(e_i))].$$

Composite reliability assesses the reliability value for each latent variable. Bagozzi and Yi (1988) suggest that composite reliabilities of at least 0.5-0.6 are considered desirable. Hair et al. (1998) suggest that composite reliabilities of 0.70 are acceptable although they emphasize that this is not an absolute measure and values below this threshold are deemed acceptable if the research is exploratory in nature. AVE shows "the amount of variance that is captured by the construct in relation to the amount of variance due to measurement error" (Fornell and Larcker, 1981). AVE values less than 0.50 indicate that measurement error accounts for a greater amount of variance in the indicators than does the underlying latent variable (Diamantopoulos and Siguaw, 2001). The results of the composite reliabilities (ρ_x) of all the factors exceed the recommended standards of both Bagozzi and Yi (1988) and Hair et al. (1998). Finally, all the constructs exceed the more stringent measure of internal stability which is the average variance extracted (Fornell and Larcker, 1981) of at least 0.50 (Diamantopoulos and Siguaw, 2001). Table 4.3 illustrates the fit indexes of all the constructs.

Table 4.3 Fit Indexes of the Latent Constructs

Item	NFI	CFI	GFI	ξ^2 (d.f.)	Cp	AVE
Business environment	.87	.93	.94	48.13 (25)		
Environmental uncertainty					.78	.66
Environmental hostility					.71	.38
Environmental heterogeneity					.75	.55
Market Orientation	.92	.94	.93	33.16 (9)	.88	.55
Innovativeness	.96	.99	.98	7.3 (3)	.84	.53
Organisational Learning	.93	.94	.90	61.13 (13)		
Adaptive Learning					.91	.76
Generative Learning					.86	.61
Top Management Support	.98	.99	.98	7.07 (2)	.92	.73
External Pressure	.99	.99	.99	4.15 (2)	.64	.58
Technology Motivation	.99	.99	.98	9.7 (4)	.94	.76
E-Business Adoption	.98	.99	.98	7.29 (7)		
E-commerce adoption					.94	.89
CRM adoption					.80	.66
SCM adoption					.78	.65
Organisational Performance	.95	.96	.95	24.26 (5)		
Financial Performance					.93	.82
Customer Performance					.69	.53

4.4.7 Discriminant Validity

Discriminant validity is indicated when the measure has low correlation with other measures that are measuring different concept. Discriminant validity was verified using the procedure outlined by Anderson (1987). This procedure entails analysing all possible pairs of constructs in a series of CFA models. Each model was run twice, once constraining the phi coefficient (ø) to unity and once freeing the parameter. A chi-square difference test was then performed on the nested models to verify the chi-square (χ^2) values were significantly lower for the unconstrained models (Anderson and Gerbing, 1988). "A significantly lower chi-square (χ^2) value for the model in which the trait correlations are not constrained to unity would indicate that the traits are not perfectly correlated and that discriminant validity is achieved" (Bagozzi and Philips, 1982).

This test should be performed one pair of factors at a time, rather than as a simultaneous test of all pairs of interest. The χ^2 difference test is based on the notion that the difference between two χ^2 statistics is itself distributed as a χ^2. The test statistic is the mathematical difference between the χ^2 for the constrained and unconstrained models, with the degrees of freedom computed as the corresponding difference in the degrees of freedom of the two models. A complementary assessment of discriminant validity is to determine whether the confidence interval (± two standard errors) around the correlation estimate between the two factors includes 1.0.

The results of the χ^2 difference test for all the constructs were significantly lower for the unconstrained models. The critical value of the difference in chi-square ($\triangle\chi^2$) exceeded in all cases. The lowest $\triangle\chi^2$ was found in market orientation where the unconstrained model (U) resulted in a $\chi^2 = 33.16$, df = 9 while the constrained model (C) resulted in a $\chi^2 = 35.66$, df = 10. As such, $\triangle\chi^2 = 2.50$ when comparing the U and C models which is significantly above the critical value of $\triangle\chi^2 > 2.33$. All other constructs resulted in higher $\triangle\chi^2$. Table 4.4 illustrates the results of the discriminant validity test of the constructs. Therefore, all the measures were found to be reliable and valid.

Table 4.4: Discriminant Validity Test

	Construct	Constrained χ^2 (df)	Unconstrained χ^2 (df)	$\triangle\chi^2$	Critical Value	Results (p value)
1.	Business Environment	89.63 (28)	48.13 (25)	41.50	14.95	S < 0.05
2.	Market Orientation	35.66 (10)	33.16 (9)	2.50	2.33	S < 0.01
3.	Innovativeness	13.72 (4)	7.30 (3)	6.42	0.824	S < 0.10
4.	Organisational Learning	82.04 (14)	61.13 (13)	20.91	6.23	S < 0.05
5.	Top Management Support	9.85 (3)	7.07 (4)	2.78	0.23	S < 0.05
6.	External Pressure	18.14 (3)	4.15 (2)	13.99	0.40	S < 0.10
7.	Technology Motivation	17.32 (5)	9.70 (4)	7.62	0.93	S < 0.05
8.	E-business Adoption	36.56 (10)	7.29 (7)	29.27	3.05	S < 0.05
9.	Organisational Performance	60.62 (6)	24.26 (5)	36.36	0.713	S < 0.01

4.5 General Theory Testing Approach

The hypotheses presented in this research were examined and tested by two different types of analysis. Initially, the model was examined and tested in a multivariate regression model using SPSS Windows version 11.01 (2001). The moderated mediating effects were tested using the techniques suggested by Baron and Kenny (1986) using similar software. Although multiple regression is useful to examine the relationships between independent and dependent variables, it cannot directly propose potential relationships in a model that are justified and interpreted substantively by theories and at the same time, fit the data. In addition, a critical assumption underlying the use of regression analyses in calculating the coefficients is that the independent and dependent variables are measured without measurement errors (Cheng, 2001).

Thus, in the later analysis, the model was examined and tested by using Structural Equation Modelling (SEM) using LISREL 8.50 software (Jöreskog and Sörbom, 2000). SEM has been advocated because it can expand the explanatory ability and statistical efficiency for model testing with a single comprehensive method (Hair et al., 1998). SEM also attempts to account for measurement error. The dual analysis strategy (using multiple regression and SEM) has been advocated by previous researchers (e.g. Matear et al., 2002; Pelham 1997; Cheng 2001). Multiple regression was used to test the hypotheses while SEM was used to test the theoretical model. This is because SEM suffers from testing a large model with too many unexpected relationships and a large number of estimated parameters. Hence, the objectives of using two different types of analysis in this research were twofold:

(1) Due to the limitations of the sample-size-parameter constraints in SEM, some of the constructs were coalesced into a single construct. Therefore, some of the 'finer' hypotheses could not be tested using SEM. Multiple regression enabled these constructs to be tested with a smaller sample size.

(2) The theoretical model is quite complicated, with mediating and moderated mediation effects. Such analyses require excessive computational power in SEM and techniques for testing these models are relatively undeveloped. For instance, regarding testing moderating effects, Cortina et al. (2001) stated that they are unaware of any implementation of Kenny and Judd's (1984) original form of multiplicative effects method. They elaborated that although authors had provided the foundation for all the procedures developed since, the procedure in its original form was not used, as it was too complicated, required too deep an understanding of SEM and its assumptions and placed unreasonable demands on the design of the experiment (sample size) to be useful. Accordingly, multiple regression was chosen, using the techniques advocated by Baron and Kenny (1986) in determining mediating and moderated mediating effects.

(3) The two types of analysis were used in a complementary manner to compensate for the limitations of each method used in analysing and testing the complicated model. In the event that both types of analyses produce similar results, it would provide greater corroboration of the findings.

4.5.1 Multiple Regression

A series of regression analyses were conducted to determine the antecedents of firm's technology motivation, its influence on e-business technology adoption and the effect of e-business adoption on firm's performance. Scores for each dimension of the constructs were computed by taking the average score of the items included in the dimension. The scales were measured using the items described in the measurement section. The psychometric properties of these scales were earlier tested using exploratory factor analysis and confirmatory factor analysis and were found to be acceptable.

Multicollinearity diagnostics were computed using the criteria suggested by Kleinbaum et al. (1998). Tolerance values and their inverse, variance inflation factors (VIF) were

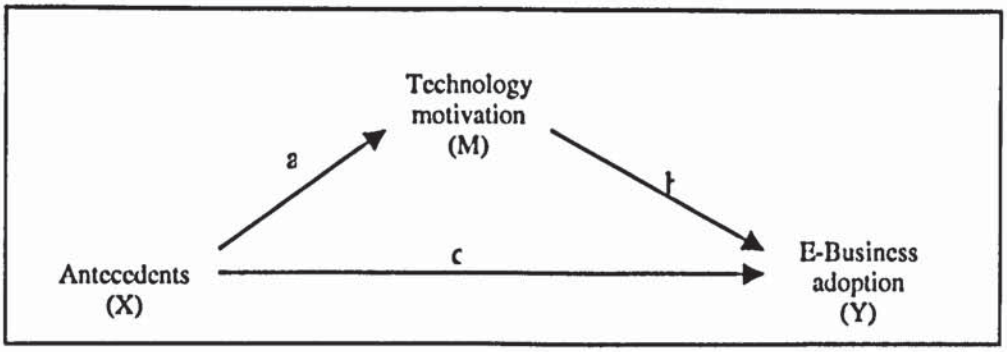
examined. All tolerance values were greater than 0.1 and all VIF were less than 4, suggesting that multicollinearity between any of the independent variables was not found to be an issue for any of the regression equations (Kleinbaum et al., 1998). Furthermore none of the tolerance values or VIFs approached these limits, suggesting the potential problems with following these heuristics as a test of multicollinearity are not a feature of these data (Hair et al., 1998).

In establishing our proposition that technology motivation mediates the antecedents and e-business technology adoption relationship, hypothesis 1 which states the relationship was first tested. Subsequently within the analyses, the hypotheses representing the antecedents of technology motivation were tested. Having established the mediating role of technology motivation, hypotheses 4 and 5 were tested to confirm the moderated mediation effects (Baron and Kenny, 1986). Finally, hypothesis 6 was tested to show the relationship between technology adoption and firm's performance.

a) Mediating Effects

In general, a given variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion. In this study, technology motivation may be considered as a mediator when it meets the following conditions: (a) variations in levels of the independent variable significantly account for variations in technology motivation (i.e. path a), (b) variations in technology motivation significantly account for variations in e-business technology adoption (i.e. path b), and (c) when paths a and b are controlled, a previously significant relation between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when path c is zero. Figure 4.1 illustrates the basic causal chain involved in mediation.

Figure 4.1: Mediation Relationship



According to Baron and Kenny (1986), the last condition (path c) may be envisaged as a continuum. When path c is reduced to zero, we have strong evidence for a single, dominant mediator. If the path c is not zero, this indicates the operation of multiple mediating factors. A more realistic goal may be to seek mediators that significantly decrease path c rather than eliminating the relation between the independent variable and dependent variables altogether. From a theoretical perspective, a significant reduction demonstrates that a given mediator is indeed potent, albeit neither a necessary nor a sufficient condition for an effect to occur (Baron and Kenny, 1986).

To test the hypotheses stated and displayed in Figure 4.1, regression analysis was used. A series of regression equations outlined by Baron and Kenny (1986) and Judd and Kenny (1981) was used to detect mediator effects. Baron and Kenny's (1986) techniques have been widely used in testing mediating effects (Matear et al., 2002; Ahmed et al, 2003; Rebecca Yen and Gwinner 2003). According to Baron and Kenny (1986) and Judd and Kenny (1981), the proper test for mediating effects is to establish three relationships. First, the independent variables (antecedents) must be a significant predictor of the dependent variable (e-business adoption). Second, the independent variable must be a significant predictor of the mediator variable (technology motivation), treating the mediator as if it was an outcome. Third, the dependent variable are regressed on both the independent variables and the mediator variables, hence providing control to the regression model, as the independent variables must be controlled to establish the effect of the mediator on the outcome variable. Finally, to establish that technology motivation completely mediates the

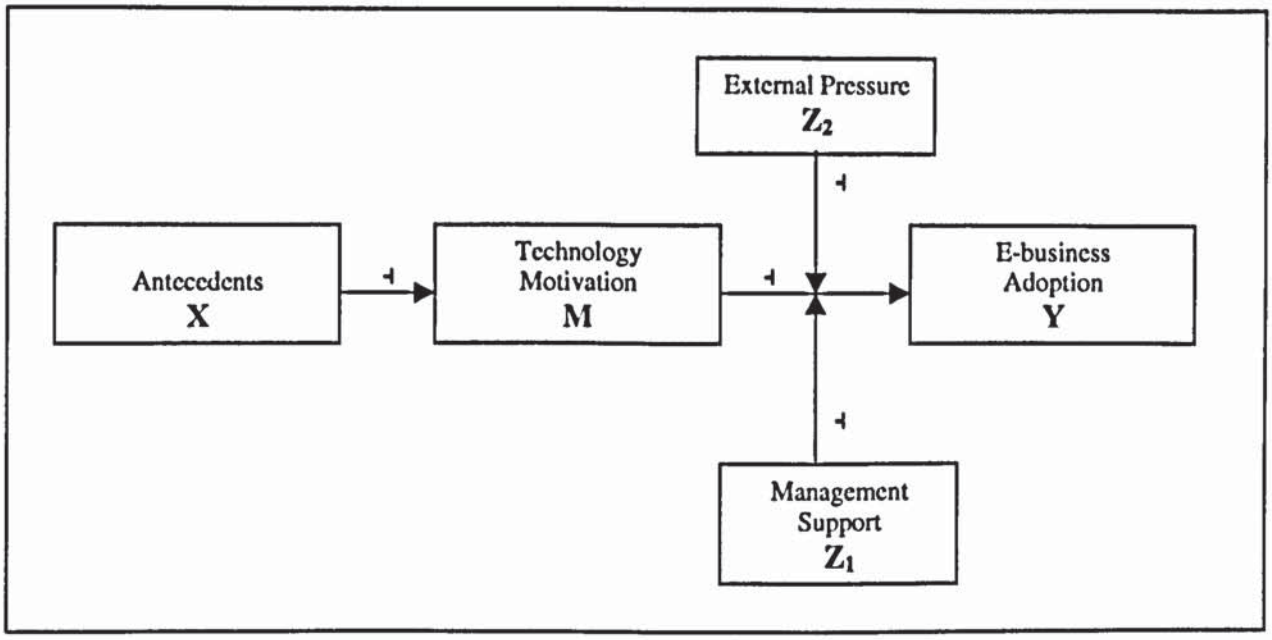
model relationship, the effect of the independent variables on the dependent variable controlling for the mediator must be zero. The effects in steps three and four are estimated in the same regression equation.

The purpose of steps one to three is to establish that zero-order relationships among the variables exist. If one or more of these relationships are non significant, researchers usually conclude that mediation is not possible or likely. If there are significant relationships from steps one to three, one proceeds to step four. In step four, some form of mediation is supported if the effect of technology motivation (M) remains significant after controlling for the antecedents (X). If the antecedents are no longer significant when technology motivation (M) is controlled, the finding supports *full mediation.* If the antecedents (X) is still significant (i.e., both X and M significantly predict Y), the finding supports *partial mediation.*

b) Moderated Mediation Effects

A moderated mediation effect (Baron and Kenny, 1986) occurs when a variable (M) mediates the X – Y relationship, but a fourth variable (Z) moderates the M – Y relationship. In our study, technology motivation mediates the relationship of the antecedent factors and e-business adoption. However, management support and external pressure moderate the relationship between technology motivation and e-business adoption. Chapter two discusses in great detail the rationale of this relationship. This relationship is extremely difficult to support given the low power and high multicollinearity (Baron and Kenny, 1986). Figure 4.2 illustrates the moderated mediation relationship.

Figure 4.2: Moderated Mediation Relationship



Following Baron and Kenny (1986), a moderated mediation regression analysis was conducted. In the first step, the predictor variables which consist of market orientation, innovativeness, organisational learning and business environment were entered first in the X – Y relationship. Having controlled for organisational culture, the interaction effects of the predictor variables and management support (XZ) were entered in block 1 and the predictor variables in block 2. XZ_1 is the product of interaction effects of market orientation and management support, XZ_2 innovativeness and management support, XZ_3 organisational learning and management support and finally XZ_4 business environment and management support. In this phase, there is no need to show that X relates to Y; but support for the model would increase if the unique XZ effects are significant.

In step two, the predictor variable was entered in the regression equation of X – M relationship. In this phase, X needs to be significantly related to M. In the third step, one needs to show that MZ uniquely predicts Y after controlling for X, M, Z and XZ. Therefore, organisational culture, technology motivation and management support were entered in the first block of the hierarchical multiple regression. In the second block, the

interaction effects of organisational culture and management support (XZ) and the interaction effects of technology motivation and management support (MZ) were entered. The final step was to show that XZ does not predict Y after controlling for X, M, Z and MZ. The above regression equations were entered in the hierarchical regression analysis. Following similar techniques, the analysis of external pressure was done.

4.5.2 Structural Equation Modelling (SEM)

Structural equation modelling (SEM) has become one of the popular statistical tools to test the relationship proposed in a parsimonious models. It has been adopted across different disciplines for empirical studies that require quantitative analysis. SEM is a technique that combines the elements of both multiple regression and factor analysis that enables the researcher to assess complex interrelated dependant relationship and also incorporate the effects of measurement error on the structural coefficients at the same time. In the process, underlying latent variables which may consist of independent (exogenous) and dependent (endogenous) variables are linked by a series of linear relationships known as structural equations.

SEM models employ latent constructs that are measured by imperfect indicators. The set of links between indicators and latent constructs is called the measurement model. The measurement model describes how each of the latent variables is operationalized via the manifest variables and provides information about the validities and reliabilities of the structural model. The structural model specifies the relationships between the latent variables themselves and the amount of unexplained variance. The analysis is predominantly confirmatory in nature, as it seeks to determine the extent to which the postulate structure is actually consistent with the empirical data at hand.

Formulating and testing a structure equation model, in general, involves four steps. The first step, called specification, involves the researcher determining which indicators reflect which latent variable and what the causal relations between latent variables are. Thus,

prior to that, the linkages between the latent variables need to be specified, reflecting the substantive hypotheses of interest. This is followed by the graphical representation of how the various elements of the model relate to one another. In the second step, called identification, the researcher determines whether there is enough information to estimate the model. In SEM, a system of equations can only be solved if the number of equations is at least equal to the number of unknowns.

Therefore, to obtain a unique solution of the parameters in a covariance structure model, it is necessary to have at least as many unique equations relating observable variables to the model parameters as there are parameters. In the third step, called estimation, the parameters of the models are estimated. The most widely used estimation of models with latent variables is the maximum likelihood estimation method. Maximum likelihood estimation assumes that the data are in a multivariate normal distribution. Finally, in the fourth step, the fit of the model is evaluated. If the fit is poor, the model can be respecified and so part of the evaluation of model fit is determination of where the poor fit lies.

Jöreskog and Sörbom (1993) distinguish three situations in model testing. First, in a strict confirmatory situation the researcher formulates one single model and obtains empirical data to test it. This leads to the model being accepted or rejected. In the second situation, alternative models are tested. Several alternative models or competing models are specified. One of the models should be selected based on the analyses of a single set of empirical data. Finally, the third situation involves model generation. A tentative initial model is specified and if the initial model does not fit the data, the model should be modified and tested again using the same data. The goal may be to find a model that not only fits the data well from the statistical point of view, but also has the property that every parameter of the model can be given a substantively meaningful interpretation. This approach is model generating rather than model testing. This study takes the view of the second situation where alternative models are tested using the same data.

Following the steps elaborated earlier in the formulation and testing of the structure equation model, the theoretical model is conceptualised and the linkages between the

latent variables focused in this study is constructed. With regard to the measurement model, each of the latent variables is operationalised by multiple empirical indicators. All the indicators have been assessed in terms of reliability, dimensionality and validity. The measures were found to be reliable and valid. Figure 4.3 illustrates the path diagram detailing the relationships between the constructs under investigation. The model estimation is represented by the following set of equations:

$$\text{Organisational Culture} = \alpha_1 + \beta_{11}X_1 + \beta_{21}X_2 + \beta_{31}X_3 + \varepsilon_1 \quad (1)$$

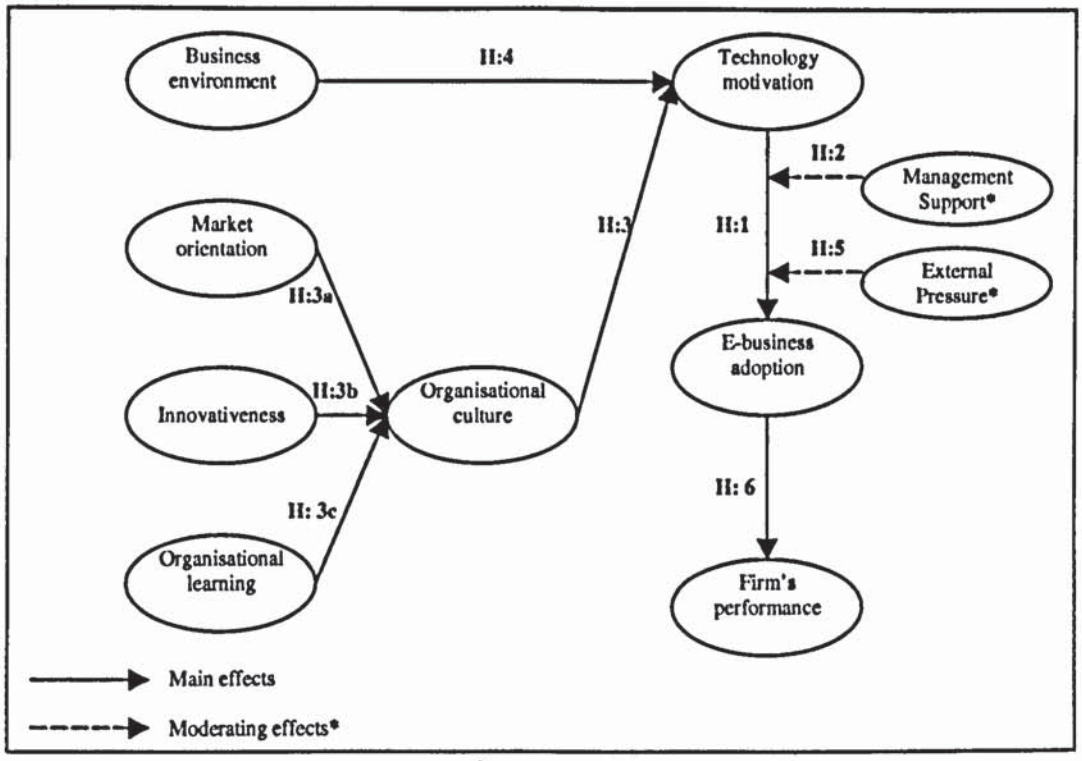
$$\text{Technology motivation} = \alpha_2 + \beta_{12}\text{Organisational Culture} + \beta_{41}X_4 + \varepsilon_2 \quad (2)$$

$$\text{E-business adoption} = \alpha_3 + \beta_{22}\text{Technology Motivation}*X_7 + \beta_{23}\text{Technology Motivation}*X_8 + \varepsilon_3 \quad (3)$$

$$\text{Firm's Performance} = \alpha_4 + \beta_{32}\,\text{E-business adoption} + \varepsilon_4 \quad (4)$$

Here, X_1 = market orientation, X_2 = innovativeness, X_3 = organisational learning, X_4 = business environment, X_5 = technology motivation, X_6 = e-business adoption, X_7 = management support, X_8 = external pressure, X_9 = firm's performance and ε_i represents the error term.

Figure 4.3: Theoretical Model of Firm E-business Technology Adoption



Modelling was undertaken using the covariance matrix as the data input and the maximum likelihood estimation procedure. SIMPLIS language was used to specify the commands for LISREL analysis. Given the model's complexity, it suffers from sample size-estimation constraints. Therefore, prior to model testing, single indicators for each latent variable were computed by taking the average of each scale's items. The single indicator approach has been used by, for example Cadogan et al. (2001) and Hooley et al. (2003b) and it avoids the estimation and model-to-data fit problems (Ping, 2003).

Following this, the error variance of the single indicants for each latent variable was set at $[(1-\alpha)\times\sigma^2]$. Here, α is the composite reliability from the sample and σ is the standard deviation of the observed indicator (Hooley et al., 2003b; Ping, 2003). The error variances of each single indicators representing organisational culture (market orientation, innovativeness and organisational learning) were not fixed to the above formula since

three indicators represent the construct. Therefore, the error variances of the three indicators were left free to be estimated. For assessing and determining the model that best represent the postulated structure and the empirical data, goodness-of-fit tests were performed.

4.6 Conclusion

This chapter has discussed in detail the methodology adopted in this study and presented the arguments for choosing the specific methods. The study adopted a dual approach, which consisted of an exploratory study in the first phase, and a descriptive approach in the second phase. Various issues concerning the refinement of the scales with respect to reliability and validity were addressed. Rigorous analysis using exploratory factor analysis and confirmatory factor analysis showed that the measures were reliable and valid. Finally, the model testing approach adopted in this study was elaborated. A dual analysis strategy was adopted using multiple regression and structural equation modelling. Specific techniques used in analysing mediating effects as well as moderated mediation were explained using multiple regression analysis.

CHAPTER 5: RESULTS OF HYPOTHESIS-TESTING

This chapter presents the results of the testing of the hypotheses developed in chapter three. As explained in the previous chapter, a dual analysis approach was adopted in testing the model and hypotheses. Initially, the model and hypotheses were tested using multivariate regression analysis via SPSS. This included testing six main hypotheses and thirty-four related hypotheses. Subsequently, structural equation modelling analysis using LISREL software was used to corroborate the findings of the former analysis. Therefore, the composition of this chapter is organised according to the testing of the hypotheses using multivariate regression and subsequently structural equation modelling.

5.1 Hypothesis Testing with Multivariate Regression Analysis

Multiple regressions were done for the hypothesis testing. In testing hypothesis 1, which determines the effect of firm's technology motivation on e-business technology adoption, a testing on the mediating role of technology motivation was initially done. This first set of analyses focused on testing that firm's technology motivation mediates the relationship between the antecedents and firm's e-business technology adoption. Subsequently, various analyses were done in determining the main effects of firm's technology motivation on e-business adoption. The analyses progressed from an overall technology motivation and e-business technology adoption relationship towards more specific constructs linking the specific technology motivation and the types of e-business technologies adopted.

Next, the analyses focused on determining the antecedents of firm's technology motivation. Similarly, the analyses advanced from determining the antecedents of a firm's general technology motivation to a more specific technology motivation (i.e. improving effectiveness and improving customer retention). Returning to the relationship between the firm's technology motivation and e-business technology adoption, the remaining analyses examined the hypothesised moderated mediation effects of management support and external pressure. Finally, various sets of analyses were done to determine the effects

of e-business technology adoption on firm's performance. Again, the analyses advanced from testing a general adoption-performance relationship towards specific e-business technologies and firm's performance measurements.

5.1.1 Mediating Effects Analyses

As elaborated in chapter four, in determining the mediation effects of firms' technology motivation in the e-business technology adoption relationship, the techniques suggested by Baron and Kenny (1986) and Judd and Kenny (1981) were followed. The following paragraphs discuss the results of the analyses with respect to the steps suggested by these authors. Table 5.1 summarises the results of the analyses in determining the mediation effects of technology motivation and e-business adoption relationship.

Table 5.1: Results of Mediation Analyses

Step	Analysis / Variables	β	S.E.	*t*	R^2	F	Sig.
	Dependent: E-Business adoption (Y)						.004
1	1. Market orientation (X)	.091	.157	.901	.099	4.043*	.369
	Innovativeness	.278*	.122	2.695			.008
	Organisational learning	-0.190	.169	-1.644			.102
	Business environment	.161*	.133	1.989			.048
	Dependent: Technology motivation (M)						.000
2	1. Market orientation (X)	.257*	.149	2.635	.154	6.751*	.009
	Innovativeness	.112	.116	1.124			.263
	Organisational learning	-0.174	.161	-1.547			.124
	Business environment	.261*	.126	3.328			.001
	Dependent: E-business adoption (Y)						.002
3	1. Market orientation (X)	.048	.159	.472			.638
	Innovativeness	.259*	.121	2.528			.013
	Organisational learning	-0.162	.169	-1.398			.164
	Business environment	.118	.137	1.417			.158
4	2. Technology motivation (M)	.166**	.086	1.971	.122	4.074*	.051

* Significant at 0.05.
** Significant at 0.10.

As suggested by Baron and Kenny (1986), the first step requires that the independent variables (X) must be a significant predictor of the dependent variable (Y). Therefore, in step 1, e-business technology adoption was used as the criterion variable in a regression equation and the initial variables (antecedents) were used as predictors. As depicted in Table 5.1, the results showed that the overall relationship of the antecedents were a significant predictor of e-business technology adoption. The *F*-ratio was 0.004, which explains that the overall model was statistically significant. Nevertheless, the specific results of the individual antecedents showed that only firm's innovativeness and firm's business environment were significant to e-business technology adoption. Both market orientation and organisational learning were not significant. In spite of that, with the overall model showing a significant relationship, this step established that technology motivation could be a mediator.

Subsequently, step 2 essentially involved treating the 'mediator' as if it were an outcome variable against the initial variables (antecedents). Therefore, technology motivation was used as the criterion variable and the antecedents were used as predictors in the regression equation. The results of the overall model showed that the antecedents were significant predictors of firm's technology motivation at $\rho < 0.05$. The regression equation explains 13.1% of the variance in technology motivation. However, the individual results of the antecedents showed that only market orientation and firm's business environment have a significant relationship. Innovativeness and organisational learning were not significant. Nevertheless, the results of the overall model in this analysis fulfilled Baron and Kenny's (1986) requirements in step 2 that the independent variable is a significant predictor of the mediator variable.

Step 3 requires that the mediator affect the outcome variable after controlling the initial variables (antecedents). Therefore, e-business adoption was used as the criterion variable in a regression equation with the antecedents and firm's technology motivation as predictors. As the antecedents were required to be controlled in establishing the effect of the mediator on the outcome, the variables were entered first in block 1 using the techniques similar to hierarchical regression analyses. The mediator (technology

motivation) was then entered in block 2. The results of the overall model provided evidence that technology motivation significantly affects e-business adoption at $\rho < 0.05$. The regression equation explains 9.2% of the variance in e-business technology adoption. As the condition for step 3 was met, the results provided further evidence that firm's technology motivation mediates the antecedents and firm's e-business technology adoption relationship.

Finally, step 4 was to establish whether technology motivation completely mediates the antecedents and e-business technology adoption relationship. For a full mediation relationship to be established, the effect of the antecedents (X) on e-business technology adoption (Y) controlling for technology motivation (M) should be non-significant. The effects were estimated in the same regression equation as in step 3. The results depicted in table 5.1 showed that the relationship of the antecedents (X) on e-business technology adoption (Y) was significant. Therefore, the step 4 condition was not met.

As explained by Baron and Kenny (1986), if all the four steps are met, then the data is consistent with the hypothesis that technology motivation completely mediates the antecedents and e-business technology adoption relationship. However, if the first three steps are met but step 4 is not, then ***partial*** mediation is indicated. The results of the above analyses indicated that technology motivation acts as a partial mediator in the hypothesized relationship. This indicates that technology motivation may decrease path c (refer to figure 4.1, page 161) rather than eliminating the relationship between the antecedents and e-business technology adoption altogether.

The amount of mediation is defined as the reduction of the effect of the initial variable on the outcome. This difference in coefficients can be shown to equal exactly the product of the effect of X on M times the effect of M on Y. If Step 2 (the test of *a*) and Step 3 (the test of *b*) are met, it follows that there necessarily is a reduction in the effect of X on Y. An indirect and approximate test that $ab = 0$ is to test that both *a* and *b* are zero (Steps 2 and 3). Baron and Kenny (1986) provide a direct test of *ab* which is a modification of a test originally proposed by Sobel (1982). It requires the standard error of a or s_a (which

equals a/t_a where t_a is the t test of coefficient a) and the standard error of b or s_b. The standard error of *ab* can be shown to equal approximately the square root of $s_a^2 s_b^2 + b^2 s_a^2 + a^2 s_b^2$ and so under the null hypothesis that *ab* equals zero, the following

$$\frac{ab}{\sqrt{sa2sb2 + b2sa2 + a2sb2}}$$

is approximately distributed as Z (i.e., larger than 1.96 in absolute value is significant at the .05 level).

Therefore, using the Baron and Kenny modification of the Sobel test, the findings demonstrate that the reduction due to technology motivation is not significant (Z= 0.47, p=0.6). Nevertheless, as asserted by Baron and Kenny (1986), step 4 does not have to be met unless the expectation is for a ***complete*** mediation. The results are expected, considering that some of the specific constructs showed an insignificant relationship in the analyses (step 2 and 3) although the main relationship was significant. The findings also are theoretically sensible as a firm's technology motivation is not expected to *totally* affect the firm's choice of e-business technology adoption but rather influence the firm's propensity to choose a specific e-business technology. Baron and Kenny (1986) elaborated that a significant reduction demonstrates that a given mediator is indeed potent, albeit neither a necessary nor a sufficient condition for an effect to occur.

Hence, given the findings presented in the above paragraphs, there is enough evidence to accept that a firm's technology motivation ***partially mediates*** the relationships between the antecedents and firm's e-business technology adoption. Consequently, various analyses were done to determine the main effects of the relationship between the firm's technology motivation and adoption of e-business technologies.

5.1.2 Main Effects of Firm's Technology Motivation and E-Business Technology Adoption

In this section, the results of the various analyses relating to the main effects of the firm's technology motivation and e-business adoption are discussed. As reiterated earlier, the analyses progressed from testing a general technology motivation-adoption relationship to a more specific construct of the above relationship.

Hypothesis 1: There is a positive relationship between firm technology motivation and e-business technology adoption.

In conducting this analysis, the average composite scores of e-business technology adoption constructs, which include e-commerce, CRM and SCM technologies were regressed with the average composite score of firm's technology motivation. The regression results between technology motivation and e-business technology adoption indicated a significant positive relationship (ρ at 0.02) with standardised coefficients beta of 0.246. Technology motivation explained 5.4% of the variance in e-business technology adoption. This illustrates that a firm's technology motivation would most likely influence firm's likelihood of adopting e-business technology. Therefore, with respect to hypothesis 1, there is sufficient evidence to accept that there is a positive relationship between the firm's technology motivation and its adoption of e-business technology. The following paragraphs explain the results of testing the various hypotheses relating to the adoption of the different types of e-business technology in relation to the specific firm's technology motivation. In this analysis, the specific type of e-business technologies was regressed with the two types of technology motivation, namely, improving effectiveness and improving customer retention.

Hypothesis 1(i)(b): There is a positive relationship between the adoption of SCM technology and firm technology motivation to improve effectiveness.

The relationship between a firm's technology motivation of improving effectiveness and the adoption of SCM technology was tested. The results demonstrated that the hypothesised relationship was significant at $\rho = 0.082$ with beta of .204. The results indicated that a firm's technology motivation of improving effectiveness would most likely affect the firm's decision in adopting SCM technology. Therefore, there is enough evidence to accept the hypothesis that there is a positive relationship between a firm's technology motivation to improve effectiveness and the adoption of SCM technology.

Hypothesis 1(i)(c): There is a positive relationship between the adoption of SCM technology and firm technology motivation to improve customer retention.

The regression equation between firm's technology motivation of improving customer retention and firm's adoption of SCM technology was tested. The results indicated that the relationship was not significant, with a standardised coefficient of 0.135. Thus, there was not enough evidence to accept that there is a positive relationship between a firm's technology motivation of improving customer retention and the adoption of SCM technology.

Hypothesis 1(iii) (b): There is a positive relationship between the adoption of e-commerce technology and firm technology motivation to improve effectiveness.

The relationship between a firm's technology motivation of improving effectiveness and the adoption of e-commerce technology was tested. The results of this analysis showed that e-commerce has a negative relationship with improving effectiveness at beta -0.117. However, the relationship was not significant. Therefore, there was not enough evidence to accept the hypothesis that there is a positive relationship between firm's technology motivation of effectiveness and the adoption of e-commerce technology.

Hypothesis 1(iii) (e): There is a positive relationship between the adoption of e-commerce technology and firm technology motivation to improve customer retention.

Following similar analyses to that used in testing the previous hypotheses, the results related to this hypothesised relationship showed that the firm's technology motivation of improving customer retention has a significant positive relationship with the firm's adoption of e-commerce technology. The standardised coefficient of this regression equation was beta = 0.290 significant at 0.017. Thus, a firm's technology motivation of improving customer retention would most likely influence the firm's decision of adopting e-commerce technology. The results convinced us to accept the hypothesis that there is a positive relationship between firm's technology motivation of improving customer retention and the adoption of e-commerce technology.

Hypothesis 1(iv)(b): There is a positive relationship between the adoption of CRM technology and firm technology motivation to improve effectiveness.

The results of the above hypothesis testing showed a negative relationship. Firm's technology motivation of improving effectiveness has a beta of -0.166 with CRM technology adoption. Nevertheless, the relationship was not significant. Therefore, with respect to the hypothesis, there was not enough evidence to accept the hypothesis that there is a positive relationship between firm's technology motivation of improving effectiveness and the adoption of CRM technology.

Hypothesis 1(iv)(e): There is a positive relationship between the adoption of CRM technology and firm technology motivation to improve customer retention.

The results of this analysis showed that the firm's technology motivation of improving customer retention has a significant relationship with the firm's adoption of CRM technology. The hypothesised relationship was significant at 0.051 with standardised coefficient beta at 0.239. The findings indicated that a firm's adoption of CRM technology is positively influenced by its technology motivation of improving customer retention. Therefore, with respect to the above hypothesis, there was enough evidence to accept that

there is a positive relationship between a firm's technology motivation of improving customer retention and the adoption of CRM technology. The overall results of the above hypothesis-testing are summarised in Table 5.2.

Table 5.2: Regression Results for the Main Effects of the Relationship between Technology Motivation and E-Business Technologies Adoption

Predictor variables	Dependent	Beta (β)	Sig. (ρ)	Results √ = Significant
Technology motivation	**E-business technologies**	.246	.002	√
Improving effectiveness	e-commerce technology	-0.117	.332	n.s.
	CRM technology	-0.166	.174	n.s.
	SCM technology	.204	.082	√
Improving customer retention	e-commerce technology	.290	.017	√
	CRM technology	.239	.051	√
	SCM technology	.135	.250	n.s.

5.1.2.1 Conclusion

After determining that technology motivation partially mediates the antecedents and e-business technology adoption relationship, further analyses were done to establish the main effects of technology motivation on e-business technology adoption. The results revealed interesting findings, where technology motivation was significantly related to e-business technology adoption.

The adoption of the various e-business technologies was also found to be significantly related to firm's technology motivation. The results portrayed that firms with a technology motivation of improving effectiveness, would most likely adopt "cost savings technologies" like SCM. However, firms that intended to improve their customer retention as their technology motivation, would most likely adopt "customer interface technologies" like e-commerce and CRM.

The findings suggested that a firm's adoption of a particular e-business technology was based on the firm's specific technology motivation. This implied that firms are aware of the specific e-business applications and their distinctive advantages. Therefore, the 'selection' of these technologies is specific rather than general.

5.1.3 Hypothesis-Testing of the Antecedents of Firm's Technology Motivation

The following sections contain the results of the analyses for determining the relationship of the specific predictor variables (antecedents) and firm's technology motivation. The analyses tested hypotheses related to two main predictor variables which are firm's organisational culture and firm's business environment. As reiterated earlier, the analyses progressed from determining a general predictor-technology motivation relationship to analysis of more specific relationships.

Hypothesis 2: There is a positive relationship between firm's organisational culture and firm's technology motivation.

The composite variable of firm's organisational culture, which comprises the average score of market orientation, innovativeness and organisational learning, was entered in the regression equation of the organisational culture technology motivation relationship. The results showed that it has a significant impact on technology motivation (ρ at 0.015). The regression equation explains 3.2% of the variance in technology motivation. The standardized coefficient beta is at 0.197, $F = 6.066$. Therefore, there was enough evidence to accept the hypothesis that there is a positive relationship between firm's organisational culture and firm's technology motivation. The following analyses of the impact of specific components of firm's organisational culture on firm's technology motivation will provide more information regarding the specific relationships.

Hypothesis 2a (i): There is a positive relationship between a firm's market orientation and its technology motivation.

In this analysis, the components of firm's organisational culture which comprises market orientation, innovativeness and organisational learning were entered into the analysis. The standardised coefficient of market orientation (β at 0.317) is the highest among all the three components of firm's organisational culture and was significant at $\rho = 0.002$. The overall model was significant at $\rho = 0.003$ with variance explained at 7.3%. Therefore, given the above statistical data, there is enough evidence to accept the hypothesis that there is a positive relationship between a firm's market orientation and its technology motivation.

Hypothesis 2b (i)(b): There is a positive relationship between a firm's market orientation and its motivation of improving effectiveness.

In this analysis, a firm's specific technology motivation of encompassing improving effectiveness and improving customer retention was regressed against firm's market orientation. The results in this analysis showed that the hypothesised relationship was significant at $\rho = 0.05$ with the standardised coefficient beta at 0.282. This suggests that as a firm's market orientation increases, its technology motivation of improving effectiveness increases concurrently. Therefore, there was enough evidence to accept the hypothesis that there is a positive relationship between firm's market orientation and firm's motivation of improving effectiveness.

Hypothesis 2b (i)(e): There is a positive relationship between a firm's market orientation and its motivation of improving customer retention.

The results of this analysis supported the above hypothesis that there is a positive relationship between firm's market orientation and firm's motivation of improving customer retention. The relationship was significant at $\rho = 0.002$ with standardised

coefficient beta at 0.311. The relationship explained a variance of 6.6% in comparison to the former analysis (improving effectiveness) of 5.5%. Based on the statistical results of the analysis, it can be interpreted that the relationship between firm's adoption of market orientation and firm's motivation of improving customer retention is much stronger. Therefore, as the firm's market orientation increases, its technology motivation of improving customer retention would be stronger.

Hypothesis 2a (ii): There is a positive relationship between a firm's innovativeness and its technology motivation.

In this analysis, firm's innovativeness as a component of organisational culture was tested in relation to firm's technology motivation. The results showed that firm's innovativeness has a low standardised coefficient (β at 0.162) and is not significant (ρ at 0.131). Although the overall score of the model was significant ($\rho = 0.003$), innovativeness as part of a firm's organisational culture has little contribution. Thus, there was not enough evidence to accept the above hypothesis stating that there is a positive relationship between firm's innovativeness and firm's technology motivation.

Hypothesis 2b (ii)(b): There is a positive relationship between a firm's innovativeness and its motivation of improving effectiveness.

Subsequent to the above analysis, a further test was done to analyse the relationship between firm's innovativeness and firm's motivation of improving effectiveness. The result replicated the former analysis, as the relationship was not significant with a standardised coefficient of beta at 0.169 and ρ at 0.103. Therefore, there was not enough evidence to accept the hypothesis that there is a positive relationship between firm's innovativeness and firm's technology motivation of improving effectiveness.

Hypothesis 2b (ii)(e): There is a positive relationship between a firm's innovativeness and its motivation of improving customer retention.

This analysis concluded the investigation of the relationship between organisational innovativeness and firm's technology motivation. The results demonstrated that the relationship between firm's innovativeness and firm's technology motivation of improving customer retention was not significant, although the overall model was significant at 0.004. Therefore, there was not enough evidence to accept the existence of the above relationship.

Hypothesis 2a (iii): There is a positive relationship between a firm's organisational learning and its technology motivation.

Initially, the organisational learning construct was entered based on a composite average score of two components of organisational learning, adaptive and generative learning. The results showed that the relationship was significant with a standardised coefficient beta of -0.217 and ρ at 0.062. The overall model was significant at $\rho = 0.004$ with variance explained at 5.7% and $F = 4.056$. The analysis yields an unexpected result of a negative relationship. Subsequently, organisational learning was entered through two separate constructs, namely adaptive and generative learning. The results showed that only generative learning ($\beta = -0.226$) was significant ($\rho = 0.040$) while adaptive learning ($\beta = -0.015$) was not significant. In investigating the probable cause of a negative relationship, the constructs were shown to be positive when correlated with technology motivation. When only adaptive and generative learning were regressed with technology motivation, the findings showed that the relationship to be non-significant though positive relationship. Hence, finer hypothesis testing was carried out to shed more light on the relationship.

Hypothesis 2b (iii)(b): There is a positive relationship between a firm's organisational learning and its motivation of improving effectiveness.

The results of this analysis corroborated the earlier analysis, as the above hypothesised relationship is significant at $\rho = 0.057$. Again, the relationship between firm's organisational learning and firm's technology motivation of improving effectiveness is negative. Accordingly, the organisational learning individual constructs were entered separately and were tested with the same specific technology motivation. The results showed that generative learning was significant at $\rho = 0.051$ with a negative relationship of beta at -0.216 while adaptive learning depicts similar relationship (-0.032) but was not significant. Therefore, there is enough evidence to accept the hypothesis that there is a positive relationship between firm's organisational learning and firm's technology motivation of improving effectiveness.

Hypothesis 2b (iii)(e): There is a positive relationship between firm's organisational learning and firm's technology motivation of improving customer retention.

This analysis concluded the investigation of the relationship between the firm's organisational learning and technology motivation. The results revealed that the above-hypothesized relationship was not supported. There was not enough evidence to support a positive relationship between firm's organisational learning and firm's motivation of improving customer retention. The results showed a consistent negative relationship although it was not significant. Similarly to the previous analysis, the organisational learning individual constructs were entered separately and tested with the same specific technology motivation. The results showed that generative learning was significant at $\rho = 0.062$ with a negative relationship of beta at -0.206. Adaptive learning remained non significant with a positive beta value of 0.004. The findings illustrated that generative learning is a strong predictor of organisational learning. In both analyses, generative learning is the only construct that was significant. However, when the construct is combined with adaptive learning (representing organisational learning), the effect of the

relationship is weakened to give a non-significant relationship for organisational learning overall.

5.1.3.1 Conclusion

Hypothesis two and its derivatives refer to firm's organisational culture as an antecedent to firm's technology motivation. The results of the hypothesis-testing illustrate that a firm's organisational culture is a significant predictor of its technology motivation. However, when specific analyses were performed, the firm's innovativeness was found to be a non-significant predictor. Organisational learning yielded a negative relationship and was not significant when tested with firm's technology motivation of improving customer retention. The probable cause of the non-significant relationship could be adaptive learning (a component of organisational learning) which weakens the relationship. In general, firm's market orientation yielded the highest standardised coefficient. It was also found to be a significant predictor in all the hypothesised relationships. In conclusion, firm's organisational culture was best represented by market orientation and generative learning. These two predictor variables influence the firm's technology motivation.

Hypothesis 3: There is a positive relationship between a firm's business environment and its technology motivation.

Firm's business environment, composed of environmental uncertainty, hostility and heterogeneity, was entered as an average composite score. The results indicated that firm's business environment has a positive relationship with firm's technology motivation and was significant at $\rho = 0.000$. The standardized coefficient of firm's business environment showed a high-standardized coefficient value of beta at 0.320, indicating a strong predictor of firm's technology motivation. The overall model also explained 9.7% variance and was significant at 0.000. Therefore, there was enough evidence to accept the hypothesis that there is a positive relationship between a firm's business environment and

its technology motivation. The remainder of this paragraph will further highlight the relationship between the specific dimensions of the firm's business environment and a firm's technology motivation.

Hypothesis 3a (i): A firm's technology motivation is likely to be greater, the less certain the business environment.

Continuing with the former analysis, firm's business environment was further tested as three separate constructs. These are environmental uncertainty, environmental hostility and environmental heterogeneity. These constructs were regressed against firm's technology motivation. The findings demonstrated that firm's environmental uncertainty has the highest standardised coefficient beta at 0.244 and was significant at $\rho = 0.003$. The results indicated that the more uncertain the environment is perceived by firms, the higher the firm's technology motivation. Therefore, there was enough evidence to show that there is a positive relationship between a firm's uncertain business environment and its technology motivation. Additionally, further analyses were carried out to determine the relationship of a firm's uncertain business environment with respect to the specific technology motivation.

Hypothesis 3b (i)(b): The more uncertain the firm's business environment, the greater the motivation to improve effectiveness.

This analysis was performed to determine the relationship between perceived environmental uncertainty and the specific technology motivation of improving effectiveness. The results illustrate that the hypothesised relationship was significant at 0.018 with a standardised coefficient beta of 0.193 (the highest among the three environmental constructs). The findings provided evidence to conclude that there is a positive relationship between firm's uncertain business environment and its motivation of improving effectiveness. Therefore, as the environment is perceived to be more uncertain, a firm's technology motivation of improving effectiveness would also intensify.

Hypothesis 3b (i)(e): The more uncertain the firm's business environment, the greater the motivation to improve customer retention.

Finally, the relationship of firm's uncertain business environment and firm's technology motivation in improving customer retention was tested. The results corroborated the previous analysis, as the relationship was found to be significant at $\rho = 0.001$ with the standardised coefficient beta at 0.262 (which is the highest among the three environmental constructs). The results of the standardised coefficient in this relationship are much better compared to the former analysis. Hence, there is enough evidence to accept the hypothesis that there is a positive relationship between a firm's uncertain business environment and its motivation of improving customer retention.

Hypothesis 3a (ii): A firm's technology motivation is likely to be greater, the more hostile the business environment.

Continuing from the earlier analysis in hypothesis 4, this analysis hypothesised the positive relationship between firm's hostile business environment and its technology motivation. The findings indicated that a firm's environmental hostility has a significant relationship with its technology motivation at $\rho = 0.092$ and standardised coefficient beta at 0.136. This illustrates that a firm's technology motivation is likely to be higher if the environment is perceived as hostile by the firms. Therefore, there is enough evidence to support the hypothesis that there is a positive relationship between a firm's hostile business environment and its technology motivation.

Hypothesis 3b (ii)(b): The more hostile the firm's business environment, the greater the motivation to improve effectiveness.

Subsequent to the above analysis, the hypothesis of a relationship between a firm's hostile business environment and its technology motivation of improving effectiveness was further tested. The results corroborated earlier findings, as the relationship of firm's hostile business environment was found to be significant ($\rho = 0.043$) and positive with the

standardised coefficient beta at 0.165. Hence, as the firm perceives the environment to be hostile, its technology motivation of improving effectiveness increases. The results provided enough evidence to accept the above hypothesis that there is a positive relationship between a firm's hostile business environment and its motivation of improving effectiveness.

Hypothesis 3b (ii)(e): The more hostile the firm's business environment, the greater the motivation to improve customer retention.

This analysis attempted to prove the hypothesised positive relationship between a firm's hostile business environment and its technology motivation of improving customer retention. The results showed an insignificant relationship, although the overall model was significant ($\rho = 0.001$) with variance explained 8.6%. Based on the former analysis, it seems that when firm perceives the environment as hostile, it is more likely to focus on its technology motivation of improving effectiveness rather than improving customer retention. Thus, there was not enough evidence to accept the above hypothesis.

Hypothesis 3a (iii): A firm's technology motivation is likely to be greater, the more heterogeneous the business environment.

Finally, firm's heterogeneous business environment was tested to confirm its hypothesised positive relation with its technology motivation. The results failed to indicate that there was any evidence to support the hypothesis of a positive relationship between a firm's heterogeneous business environment and its technology motivation. Firm's environmental heterogeneity had the lowest standardised coefficient beta at 0.088 among all the environmental constructs and was not significant at $\rho = 0.287$. The results indicate that although the overall construct of firms' business environment is significant and contributed a high beta value to the model, environmental heterogeneity has little contribution.

Hypothesis 3b (iii)(b): The more heterogeneous the firm's business environment, the greater the motivation to improve effectiveness.

Further investigation was made of the above relationship, where a firm's heterogeneous business environment and its technology motivation of improving effectiveness were tested. The results replicated the previous analysis, failing to provide any evidence to support the above hypothesised relationship. Although the overall model was significant ($\rho = 0.001$), the beta value showed that environmental heterogeneity has little contribution (0.074). Therefore, there was not enough evidence to accept the hypothesis that there is a positive relationship between a firm's heterogeneous business environment and its motivation of improving effectiveness.

Hypothesis 3b (iii)(e): The more heterogeneous the firm's business environment, the greater the motivation to improve customer retention.

Finally, the relationship between a firm's heterogeneous business environment and its technology motivation of improving customer retention was tested. The results revealed consistent findings; the relationship of firm's heterogeneous business environment and its technology motivation of improving customer retention were not significant. Hence, we can conclude that there was not enough evidence to prove the hypothesised relationship. Table 5.3 illustrates the overall findings of testing hypotheses 2 and 3, which are the antecedents of a firm's technology motivation.

5.1.3.2 Conclusion

The third series of hypotheses attempted to determine the relationship of elements of the firm's business environment as antecedents to the firm's technology motivation. The results of the analyses demonstrated that firm's business environment is a strong predictor of its technology motivation. However, finer analyses with the specific constructs of firm's business environment provided more information regarding the significance of the hypothesised relationship. Firm's uncertain business environment showed a consistent, significant positive relationship with the specific constructs of technology motivation. However, for firms in a hostile business environment, a unique relationship was found, where firms are more likely to focus on the technology motivation of improving effectiveness rather than improving customer retention. Finally, the hypothesised relationship between firm's heterogeneous business environment and its technology motivation was rejected. Subsequent analyses failed to prove any relationship between firms' perception of a heterogeneous business environment and the specific technology motivation. Therefore, the analysis concluded that a firm's heterogeneous business environment is a weak predictor of its technology motivation.

Table 5.3: Regression Results for the Relationship between the Antecedents and Firm's Technology Motivation

Predictor variables	Dependent	Beta (β)	Sig. (ρ)	Results √ = Significant
	Technology motivation			
Organisational culture		.197	.015	√
Market orientation		.317	.002	√
Innovativeness		.162	.115	n.s.
Organisational learning		-.217	.062	√
Adaptive learning		-.015	.880	n.s.
Generative learning		-.226	.040	√
Business environment		.320	.000	√
Environmental uncertainty		.244	.003	√
Environmental hostility		.136	.092	√
Environmental heterogeneity		.088	.287	n.s.
	Improving effectiveness			
Organisational culture		.170	.036	√
Market orientation		.291	.004	√
Innovativeness		.163	.116	n.s.
Organisational learning		-.223	.057	√
Adaptive learning		-.032	.739	n.s.
Generative learning		-.216	.051	√
Business environment		.294	.000	√
Environmental uncertainty		.193	.018	√
Environmental hostility		.165	.043	√
Environmental heterogeneity		.074	.371	n.s.
	Improving customer retention			
Organisational culture		.197	.014	√
Market orientation		.323	.002	√
Innovativeness		.127	.191	n.s.
Organisational learning		-.183	.115	n.s.
Adaptive learning		.004	.963	n.s.
Generative learning		-.206	.062	√
Business environment		.305	.000	√
Environmental uncertainty		.262	.001	√
Environmental hostility		.090	.262	n.s.
Environmental heterogeneity		.089	.280	n.s.

5.1.4 Moderated Mediation Effects Analyses

Initially, the analysis of mediating effects in testing hypothesis 1 significantly proved that technology motivation partially mediates the relationships between the antecedents and firm's adoption of e-business technology. Subsequently, as management support and external pressure were hypothesised as moderating the technology motivation and e-

business technology adoption relationship, analyses of moderated mediation effects were carried out.

In testing hypotheses 4 and 5, the techniques suggested by Baron and Kenny (1986) were used to analyse the moderated mediation effects of management support (Z_1) and firm's external pressure (Z_2) in the firms' technology motivation (M) and e-business technology adoption relationship (Y). The sequence of analyses began with testing the effect of management support followed by firm's external pressure. As elaborated in chapter four, a moderated mediation effect occurs when a variable (M) mediates the X – Y relationship, but a fourth variable (Z_i) moderates the M – Y relationship. The following paragraphs discuss the results of the analyses with respect to the steps suggested by the author.

Hypothesis 4: The positive relationship between firm's technology motivation and firm's e-business technology adoption will be further strengthened in the presence of favourable management support.

In the first step, the predictor variables (antecedents) which consist of market orientation (X_1), innovativeness (X_2), organisational learning (X_3) and firm's business environment (X_4) were entered in the X – Y relationship. In controlling the effects of the antecedents, the predictor variables were entered in Block 1 and the interaction effects of the predictor variables and management support (X_iZ_1) were entered in block 2. This technique is similar to hierarchical multiple regression. The results indicated that the overall model of the unique effect of XZ relationship was significant at $\rho = 0.000$. The results signified that support for the model was increased with adjusted r square at 0.185. Although step 1 was fulfilled, the specific interaction effects of the XZ relationship showed that only market orientation (X_1Z_1) and firm's business environment (X_4Z_1) were significant at 0.081 and 0.052 respectively.

In step two, the predictor variables were entered in the regression equation of X – M relationship. In this phase, the antecedents (X) needed to be significantly related to technology motivation (M) to support the model. Therefore, technology motivation was

regressed with market orientation, innovativeness, organisational learning and business environment. The overall results indicated that the model was significant at 0.000 with variance 0.131 explaining technology motivation. This confirmed that step 2 was accomplished. However, the specific predictors within X showed different results. The predictors that were significant were market orientation and firm's business environment at 0.009 and 0.001 respectively.

In the third step, one needs to show that MZ uniquely predicts Y after controlling for X, M, Z and XZ. Therefore, the predictor variables (X_i), technology motivation (M) and management support (Z_1) and the interaction effects of the specific predictor variables and management support (X_iZ_1) were entered in the first block of the hierarchical multiple regression. In the second block, the interaction effects of technology motivation and management support (MZ) were entered in the second block. The overall results indicated that the model was significant at 0.000 with variance explaining e-business technology adoption at 0.191. However, with reference to the specific interaction effect of technology motivation and management support (MZ) predicting e-business technology adoption (Y), the results showed that it was not significant. The multicollinearity diagnostics (i.e. tolerance values and variance inflation factors) showed that there were no issue of multicollinearity in any of the regression equations. Therefore, step 3 of the moderated mediation regression analyses was not fulfilled.

Finally, in step 4 XZ, it needed to be shown that the predictor variables (X_i) do not predict Y after controlling for X, M, Z and MZ. As in the previous step, the above regression equations were entered in a similar fashion in hierarchical regression analyses. The results showed that the overall model was significant at 0.000. Referring to the interaction effects of the predictors and management support (XZ) relationship, the results showed that the interaction effects of market orientation (X_1Z_1) and firm's business environment (X_4Z_1) were significant at 0.096 and 0.090 respectively. This means that the predictor variables (X_i) have some influence in predicting e-business adoption (Y). Therefore, step 4 of the moderated mediation regression analyses was not met. Table 5.4 summarises the results of

the analyses in determining the moderated mediation effects of management support (Z_1) in the firm's technology motivation and e-business technology adoption relationship.

Table 5.4: Results of Moderated Mediation Analyses of Management Support in the Technology Motivation and e-Business Technology Adoption Relationship

Step	Analysis / Variables	β	S.E.	*t*	Total R^2	ΔR	ΔF
	Dependent: E-Business adoption (Y)						
	1. Market orientation (X)	.092					
	Innovativeness	.303*					
	Organisational learning	-0.212*					
	Business environment	.161*					
	Management support (Z)	.319					
1	2. XZ						
	Market orientation x Z (X_1Z_1)	.206*	.083	1.861	.171	.073*	3.166*
	Innovativeness x Z (X_2Z_1)	-0.036	.058	-0.460			
	Organisational learning x Z (X_3Z_1)	-0.161	.081	-1.476			
	Business environment x Z (X_4Z_1)	.202*	.065	2.419			
	Dependent: Technology motivation (M)						
2	1. Market orientation (X)	.257*	.149	2.635	.154	.154	6.751*
	Innovativeness	.112	.116	1.124			
	Organisational learning	-0.174	.161	-1.547			
	Business environment	.261*	.126	3.328			
	Dependent: E-business adoption (Y)						
	1. Market orientation (X)	.036	.152	.371	.		
	Innovativeness	.217*	.121	2.114			
	Organisational learning	-0.301*	.171	-2.584			
	Business environment	.066	.133	.818			
	Technology motivation (M)	.136	.088	1.583			
	Management support (Z)	.282*	.115	2.930			
3	2. Technology motivation x Z (MZ)				.250	.006	1.159
4	XZ						
	Market orientation x Z (X_1Z_1)	.182*	.082	1.677	.250	.042	1.961
	Innovativeness x Z (X_2Z_1)	.054	.070	.519			
	Organisational learning x Z (X_3Z_1)	-0.204	.091	-1.652			
	Business environment x Z (X_4Z_1)	.143*	.065	1.706			

* Significant at 0.05

Based on the analyses of the moderated mediated analyses of firm's technology motivation and management support, the results showed that there was not enough evidence that management support moderates the relationship between the firm's technology motivation and e-business technology adoption. Although steps 1 and 2 of the analyses were met, the remaining steps failed to show that management support acts as a moderator to the relationship. Step 3 which intended to highlight the influence of the specific moderator in the M – Y relationship failed although the overall model was significant. Finally step 4, which aimed to delineate the effects of the predictor variables and the interaction effects of X_iZ_1 also failed, as the results were significant. Therefore, with reference to the above hypothesis, there is not enough evidence to accept that the positive relationship between firm's technology motivation and firm's e-business technology adoption would be further strengthened in the presence of favourable management support.

Hypothesis 5: The positive relationship between firm's technology motivation and firm's e-business technology adoption will be further strengthened in the presence of external pressure.

Corresponding to the analyses of moderated mediation, external pressure (Z_2) was tested following similar steps suggested by Baron and Kenny (1986). The results of the overall model in step 1 showed that it was significant at $\rho = 0.024$, and explained 6.7% of variance in e-business adoption (Y). However, all the interaction effects of X_iZ_2 showed an insignificant relationship. Therefore, step 1 of the moderated mediation regression analyses was not met.

The following step which concerned whether the predictor variables (X_i) were related to firm's technology motivation (M) was reproduced as in the previous analyses. The overall results indicated that the model was significant at 0.000 with explained variance of 0.131. The results showed that only market orientation (X_1) and firm's business environment (X_2) were significantly related to firm's technology motivation. Nevertheless, step 2 of the moderated mediation regression analyses was met. In step 3, the results showed that the

overall model was significant at 0.01 with explained variance in e-business technology adoption of 0.085. However, referring to the specific interaction effects of firm's technology motivation and external pressure (MZ_2) predicting e-business technology adoption (Y), the outcome was not significant. Therefore, step 3 of the moderated mediation regression analyses was not met.

Finally, in step 4 the interaction effect of the predictor variables and external pressure (X_iZ_2) were entered in the regression equation. The results shown in table 5.5 indicated that the relationship was not significant in the overall model $\rho = 0.014$. Therefore, with reference to the analyses suggested by Baron and Kenny (1986), three out of four steps required in testing the effects of the moderated mediation failed to provide support for the proposition that external pressure moderates the M- Y relationship. To verify the true effects of the relationship, appropriate measures were taken to check that there was no issue of multicollinearity that could affect the results. The results of the analyses failed to provide evidence that the positive relationship between firm's technology motivation and firm's e-business technology adoption would be further strengthened in the presence of external pressure. Table 5.5 summarises the results of the analyses in determining the moderated mediation effects of external pressure (Z_2) in the firm's technology motivation and e-business technology adoption relationship.

Table 5.5: Results of Moderated Mediation Analyses of External Pressure in the Technology Motivation and e-Business Technology Adoption Relationship

Step	Analysis / Variables	β	S.E.	*t*	Total R^2	ΔR	ΔF
	Dependent: E-Business adoption (Y)						
	1. Market orientation (X)	.071	.164	.672	.122	.067	.930
	Innovativeness	.283*	.125	2.684			
	Organisational learning	-0.179	.174	-1.505			
	Business environment	.158*	.141	1.853			
	External Pressure (Z)	.041	.088	.486			
	2. XZ						
1	Market orientation x Z (X_1Z_1)	.134	.095	1.279			
	Innovativeness x Z (X_2Z_1)	.010	.081	.090			
	Organisational learning x Z (X_3Z_1)	-0.157	.103	-1.301			
	Business environment x Z (X_4Z_1)	.042	.068	.491			
	Dependent: Technology motivation (M)						
2	1. Market orientation (X)	.257*	.149	2.635	.154	.154	6.751*
	Innovativeness	.112	.116	1.124			
	Organisational learning	-0.174	.161	-1.547			
	Business environment	.261*	.126	3.328			
	Dependent: E-business adoption (Y)						
	1. Market orientation (X)	.026					
	Innovativeness	.257*					
	Organisational learning	-0.154					
	Business environment	.129					
	Technology motivation (M)	.186*					
	External Pressure (Z)	.005					
3	2. Technology motivation x Z (MZ)	.065	.071	.752	.151	.020	.850
	XZ						
	Market orientation x Z (X_1Z_1)	.124	.094	1.194			
	Innovativeness x Z (X_2Z_1)	.010	.080	.089			
	Organisational learning x Z (X_3Z_1)	-0.157	.102	-1.314			
4	Business environment x Z (X_4Z_1)	.040	.072	.442	.151	.020	.850

*Significant at 0.05

5.1.4.1 Conclusion

Hypothesis 1 and its derivatives successfully determined that a firm's technology motivation influences the likelihood of its adopting e-business technology. Hypotheses 4 and 5 suggested that this relationship would be further strengthened by the existence of management support and external pressure. However, the results of the analyses failed to provide any evidence for these proposals. Although top management support and external pressure have been argued in the literature to be the determinants of a firm's technology adoption, the findings illustrated that the 'decision' of adoption could already have been set based on the firm's technology motivation.

It could also be argued that technology motivation, as a partial mediator to the hypothesised relationship could affect the results of the analyses. The results of the two hypotheses illustrated that management support seems to be a 'stronger' construct than external pressure, although the result was not statistically significant. The adjusted r square value of the regression equation in step 3 showed a higher value for top management support than for external pressure. In addition, the beta value for the former was significant in step 1, whereas the value was non significant for external pressure.

5.1.5 Determining the Effects of Firm's e-Business Technology Adoption on Firm's Performance

This section elaborates on the results of the hypothesis-testing on the impact of e-business technology adoption on the firm's performance. Initially, the composite score of e-business technologies was tested against firm's performance. Subsequently, 'finer' hypotheses related to of the specific e-business technologies such as e-commerce, customer relationship management (CRM) and supplier chain management (SCM) were tested against firm's financial and customer performance (the specific constructs of firm's performance).

Hypothesis 6: There is a positive relationship between e-business adoption and organisational performance.

In this analysis, the composite score of e-business technologies was computed by taking the average score of the three e-business technology constructs, which are e-commerce, customer relations management (CRM) and supplier chain management (SCM) technologies. The e-business composite score was later regressed with firm's performance, which was derived from the average composite scores of financial and customer performance. The results indicated that the relationship was not significant, with a low beta value of 0.037. Therefore, there was not enough evidence to accept that e-business technology adoption positively influences a firm's performance.

Hypothesis 6a (ii): There is a positive relationship between adoption of e-commerce technology and organisational performance.

Corresponding to the former analysis, e-business components including e-commerce, CRM and SCM technologies were entered as individual constructs and were regressed with firm's performance. The result revealed a poor standardised coefficient of only 0.060 and was not significant. Therefore, there is not enough evidence to accept the hypothesis that there is a positive relationship between a firm's adoption of e-commerce technology and its performance.

Hypothesis 6c (ii): There is a positive relationship between adoption of e-commerce technology and financial performance.

Subsequent to the previous analysis, firm's adoption of e-commerce technology was further tested with the specific constructs of firm's performance. In this analysis, firm's adoption of e-commerce technology was tested with firm's financial performance. The

results showed similar findings as in the previous analysis, where the relationship was not significant.

Hypothesis 6d (ii): There is a positive relationship between adoption of e-commerce technology and customer performance.

Analogous to the above analysis, e-commerce was regressed against firm's customer performance. The results showed a consistent non significant relationship. Thus, there was not enough evidence to indicate that there is a positive relationship between a firm's e-commerce adoption and its performance.

Hypothesis 6a (iii): There is a positive relationship between adoption of customer relationship management technology (CRM) and organisational performance.

Additionally, the relationship between firm's adoption of CRM technology and performance was tested. The result showed a poor standardised coefficient beta value of -0.098 and was not significant. Therefore, there was not enough evidence to accept the hypothesis that there is a positive relationship between a firm's adoption of Customer Relationship Management (CRM) and its performance.

Hypothesis 6c (iii): There is a positive relationship between adoption of CRM technology and financial performance.

Subsequently, firm's adoption of CRM technology was regressed against firm's financial performance as a specific construct of firm's performance. The results replicate the former analyses, in that the association between firm's adoption of CRM technology and firm's financial performance was not significant, with a standardised coefficient of -0.13.

Therefore, there was not enough evidence to accept the hypothesis that there is a positive relationship between a firm's adoption of CRM technology and its financial performance.

Hypothesis 6d (iii): There is a positive relationship between adoption of CRM technology and customer performance.

This analysis aimed to test the hypothesised relationship between a firm's adoption of CRM technology and customer performance. The results showed that the relationship was not significant, with the standardised coefficient beta at -0.18. Therefore, the above hypothesis cannot be proved.

Hypothesis 6a (iv): There is a positive relationship between adoption of supplier chain management technology (SCM) and organisational performance.

In testing the relationship between a firm's adoption of SCM technology and its performance, the results showed that the relationship was not significant, although SCM obtained the highest standardised coefficient ($\beta = 0.102$) of all the e-business technologies. Therefore, there was not enough evidence to accept the hypothesis that there is a positive relationship between a firm's adoption of SCM technology adoption and its performance.

Hypothesis 6c (iv): There is a positive relationship between adoption of SCM technology and financial performance.

Subsequent to the above analysis, finer analyses were carried out to investigate firm's adoption of SCM technology with respect to the specific constructs of firm's performance. The results showed that the relationship of the hypothesised SCM technology adoption with firm's financial performance was not significant. It exhibited a low beta value of 0.084. Once again, the hypothesised relationship cannot be proved.

Hypothesis 6d (iv): There is a positive relationship between a firm's adoption of SCM technology and its customer performance.

Finally, the possibility of a relationship between firm's adoption of SCM technology and the firm's customer performance was tested. The results showed that there was not enough evidence to indicate that there was a positive relationship between a firm's SCM technology adoption and its customer performance. In addition, the overall model was not significant to the specific relationship.

5.1.5.1 Conclusion

Hypothesis six along with the testing of the specific relationships aimed to examine the relationship between a firm's adoption of e-business technologies and its firm performance. As the findings illustrated, none of the tests showed any significant relationships among the specific constructs. Therefore, the consistent results of all the tests for hypothesis 6 cause us to conclude that a firm's adoption of e-business technologies has no relationship with the firm's performance.

Finally, the results of the above hypothesis-testing conclude the entire testing of the overall model. The results of the analyses revealed interesting findings that were relevant to our propositions, although some of the results are non significant. The analyses also demonstrate the ability of multiple regressions in analysing and testing 'finer' relationships between each construct. This provides more information on the relationship that structural equation modelling is unable to provide (due to the sample size-parameter relationship).

5.2 Hypothesis Testing with Structural Equation Modelling

As elaborated in chapter four, multiple regressions were adopted to test the hypotheses while structural equation modelling (SEM) was used to test the theoretical model. The selection of SEM over multiple regressions in testing the overall model was made based on the SEM graphical modelling interface, the desirability of testing models overall rather than coefficients individually, the ability to model mediating variables and the ability to model error terms. Therefore, modelling was undertaken using the covariance matrix and the maximum likelihood estimation procedure. However, as explained in chapter four, the model suffers from the sample size-parameter constraints. Hence appropriate measures were taken to address the problem. In this phase of analyses, the hypotheses related to the direct effects were tested simultaneously using LISREL 8.50 (Jöreskog and Sörbom, 2000).

In testing the hypotheses, we followed the approach of Hult and Ketchen (2001), Hult et al. (2002) and Hult et al. (2003), who modelled market orientation, innovativeness and organisational learning as first-order indicators of the higher-order factor of firm's organisational culture. We would like to stress that the first-order latent constructs are not expected to 'cause' organisational culture but rather they are necessary contributing elements (Jöreskog and Sörbom, 1996; Jöreskog et al., 2000). Although the constructs have been shown to be empirically distinct, we concurred with the authors that the complex constellation of values formed by the interplay of these factors serve as a guidepost to managers as they seek to create competitive advantages for their firms in the marketplace (Hult et al., 2003).

Figure 5.1: Initial Theoretical Model

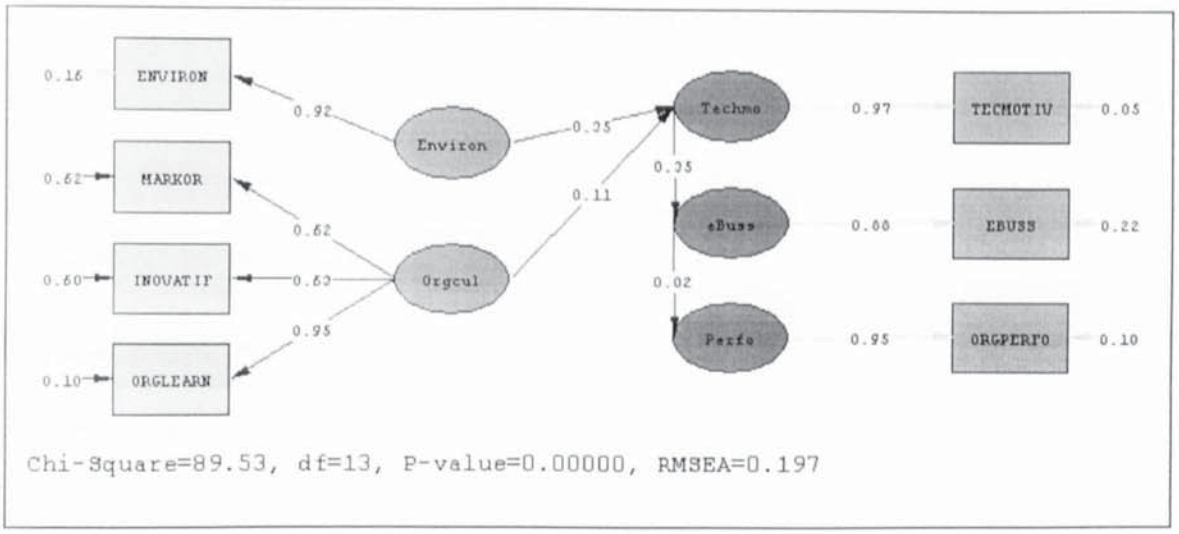
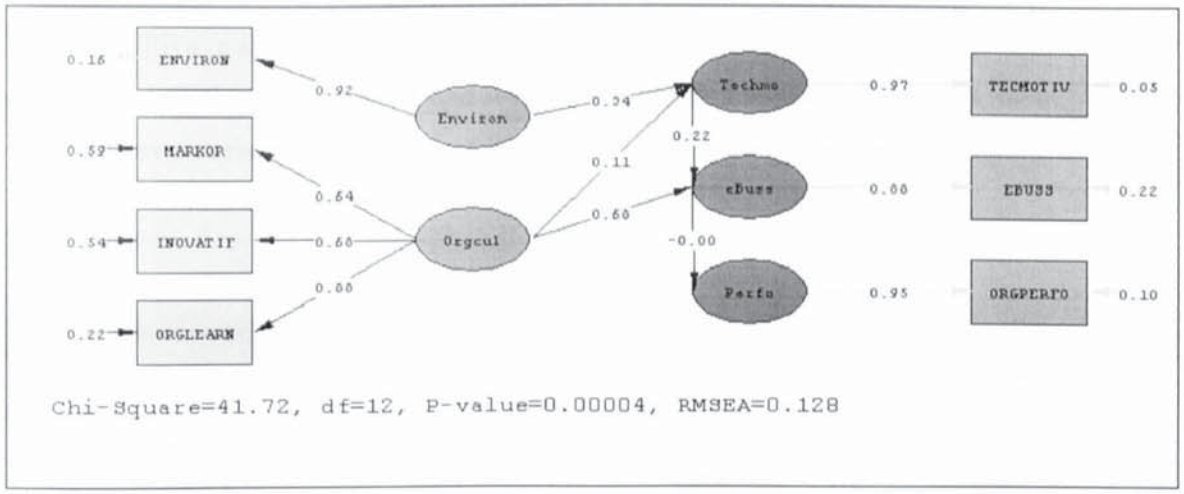


Figure 5.1 illustrates the parameters for our main theoretical model. The strength of the relationship among the constructs is represented by standardised path coefficients. The path estimates showed that with the exception of the path from e-business adoption to firm's performance, all paths were significant. These were consistent with multiple regression analysis. However, inspection of the coefficients indicated that organisational learning showed a positive relationship towards firm's organisational culture. The results showed mixed findings with multiple regression. Firm's innovativeness also showed a positive and significant relationship. Nevertheless, the result for innovativeness was acceptable considering the effects of error terms and the weaknesses of multiple regression in detecting weak relationships. However, the goodness-of-fit indexes for the model showed relatively low fit scores compared to the recommended threshold level of 0.90. Therefore, further analyses were deemed essential. In line with the alternative model approach, other analytical models were tested drawing primarily from the literature and suggestions by SEM modification indexes (Cheng, 2001; Hult et al., 2003; Jöreskog and Sörbom, 1993). These models are developed one by one so that the latter models were built based on previous statistical results as well as theories.

Figure 5.2: Model A

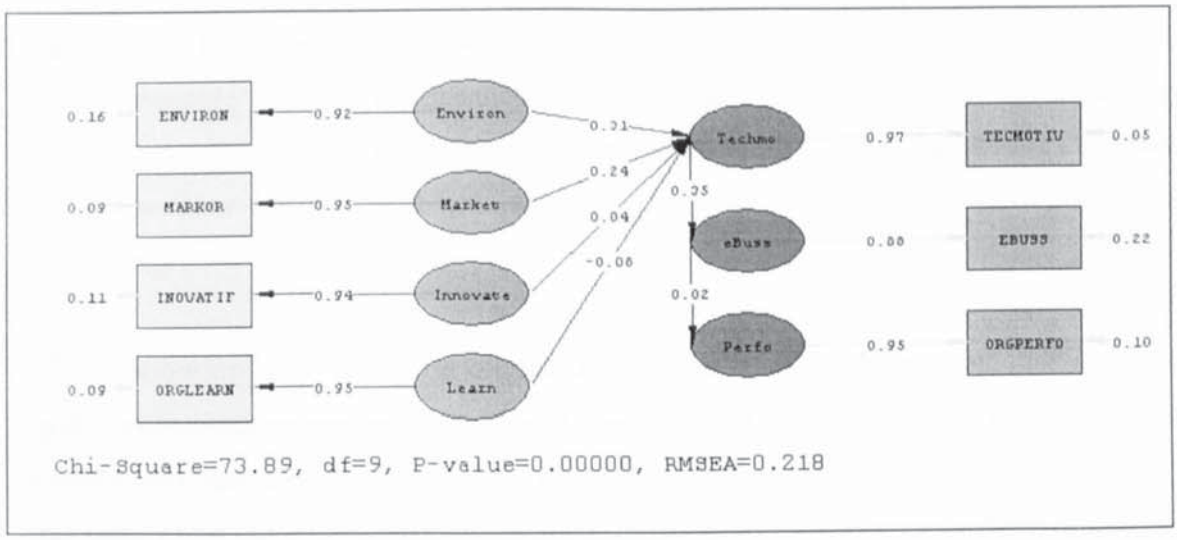


Model A. Model A (as shown in Figure 5.2) consists of a similar configuration of the variables to that in the initial model. However, based on the suggestions by SEM modification indexes of the initial model, a new path was added linking organisational culture to e-business technology adoption. This new relationship proposes a direct relationship of firm's organisational culture influencing e-business technology adoption. Drawing on the literature from strategic management and strategic marketing, the new relationship was justified by various studies. Initially, Poku and Vlosky (2003) argued that marketing orientation as a firm's corporate culture influenced the firm's adoption of information technology. Kitchell (1995) demonstrated empirically that corporate culture determines a firm's technology adoption strategies. Finally, Cooper (1994) and Stock and McDermott (2001) provided support for the assumption that culture is an antecedent of a firm's technology implementation.

Therefore, although a firm's organisational culture was hypothesised to influence its technology motivation, the construct has also a direct effect on the firm's e-business technology adoption. Table 5.6 lists the goodness-of-fit results for model A and shows greater support for this model as compared to the initial hypothesised structural model. The indexes surpassed the recommended threshold level of 0.90. Furthermore, the results were consistent with the multiple regression analyses with the exception of the direction of

organisational learning on firm's organisational culture (positive instead of negative). The new path linking firm's organisational culture and e-business technology adoption was also positive and significant. The relative chi-square in model A was much better compared to the initial model and was within the recommended value. Although Kline (1998) says a relative chi-square of 3 or less is acceptable, some researchers allow values as high as 5 to consider a model to be adequate fit (Garson, 2001).

Figure 5.3: Model B



Model B. In model B, the specific constructs of firm's organisational culture: market orientation, innovativeness and organisational learning were directly linked to technology motivation instead of being represented through a second-order latent variable. Due to the sample size-parameter constraints, a single indicator represented all the latent variables. Therefore, appropriate measures were taken, as explained in chapter four. The results for model B showed less support as compared to the initial hypothesised model and model A. The goodness-of-fit indexes were below the recommended threshold and two of the specific constructs of organisational culture (innovativeness and organisational learning) were not significant. Contrary to our predictions, innovativeness showed a negative relationship. The relative chi-square in this model was worse compared to the other two

models and was above the acceptable value. Therefore, the model was modified accordingly following similar steps, becoming model C.

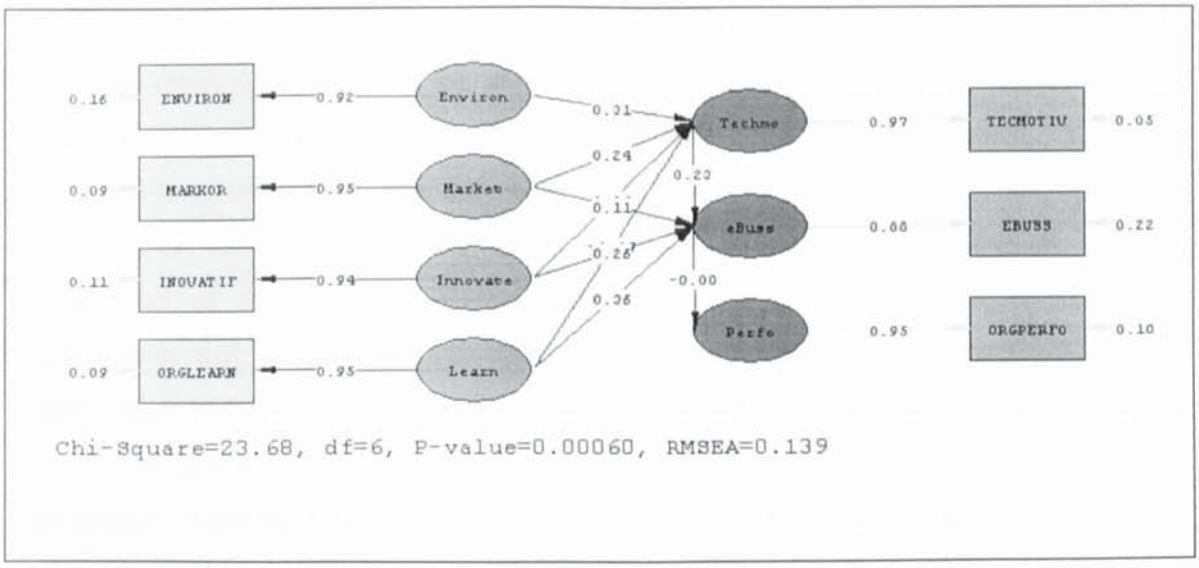
Model C. The modification indexes in model B suggested similar new paths of the organisational culture constructs to e-business technology adoption. This signified that market orientation, innovativeness and organisational learning, apart from having an impact on a firm's technology motivation, also influence a firm's e-business technology adoption directly. The suggestion was relevant to the results of the multiple regression analysis where firm's technology motivation was found to be a partial mediator in the relationship between the antecedents and e-business technology adoption. Therefore, it was reasonable that the organisational culture constructs were related to technology motivation and e-business technology adoption concurrently. Again, the literature supports the proposition that the constructs positively influence a firm's adoption of e-business technology.

The relationship between market orientation and innovation has been much discussed and noted by various researchers (Atuahene-Gima, 1996; Hurley and Hult, 1998). Han et al. (1998) provided empirical evidence that market orientation facilitates an organisation's innovativeness (adoption). Meanwhile, there seems to be wide agreement that learning and firm innovation are highly correlated, and many authors have called for an examination of how they are linked (Hurley and Hult, 1998; Damanpour, 1991; Sinkula et al., 1997). In addition, Baker and Sinkula (1999) stated that organisational adaptive learning is capable of facilitating incremental innovation. Finally, Hurley and Hult (1998) argued that innovativeness in the organisation's culture facilitates the implementation of innovations when adequate resources are present. Therefore, there is sufficient literature to support the proposed new link as suggested by the SEM modification index.

As a result, alternative model C surpassed the acceptable levels of the goodness-of-fit indexes. The model's relative chi-square was also at an acceptable value at less than 5 (Garson, 2001). Pertaining to the significant paths as shown by their path coefficients in figure 5.4, the results of this analysis agreed with those of the multiple regression analysis.

The goodness-of-fit (GFI) index, which is described as the percent of observed covariance explained by the covariance implied by the model, was 0.96. Meanwhile, the comparative fit index (CFI) scored a value of 0.94. The index compares the existing model fit with a null model which assumes the latent variables in the model are uncorrelated. CFI is similar to NFI but penalizes for sample size. Finally, the incremental fit index (IFI) also known as Delta2 also exceeded the recommended threshold value.

Figure 5.4: Model C



Therefore, model C is the "best fitting" model among the four models tested. Table 5.6 illustrates the goodness-of-fit index for the four models tested. The remaining sections regarding the results of the hypothesis-testing using SEM are based on this model. However, as stated in chapter four, SEM analyses are unable to analyse 'finer' hypotheses due to the limitations confronted. In addition, hypotheses 4 and 5 were not tested using SEM due to the reasons described in chapter 4. Therefore, these hypotheses will not be discussed in this section.

Table 5.6: Goodness-of-fit Indexes for Different Proposed Structural Models

Structural Model	Chi-square (χ^2)	df	χ^2/df	CFI	IFI	GFI
Hypothesised	89.53	13	6.89	0.71	0.72	0.86
Model A	41.72	12	3.47	0.90	0.90	0.93
Model B	73.89	9	8.21	0.75	0.76	0.88
Model C	23.68	6	3.94	0.94	0.94	0.96

5.2.1 Mediating Effects Analysis

Based on the model, the results showed that a firm's technology motivation *partially* mediates relationship between the antecedents and e-business technology adoption. This can be explained by the dual paths linking the specific constructs of organisational culture to technology motivation and also to the firm's e-business technology adoption. The results of the individual constructs linking the two relationships provided further evidence in support of our findings. Market orientation, for instance, showed a significant relationship with technology motivation, while it produced a non significant result in the relationship with e-business technology adoption. While the results are consistent with the mediation analyses using multiple regression, they exemplify that market orientation influences e-business technology adoption indirectly through the firm's technology motivation. However, in the case of organisational learning, the variable produced an insignificant relationship with technology motivation while being significant with e-business technology adoption. These results substantiated our argument that technology motivation is a partial mediator. It acted as a mediator for market orientation, but failed to show any relationship for organisational learning. The latter variable, on the other hand, had a significant direct relationship with e-business technology adoption. Therefore, given the above evidence, there is enough evidence to support that technology motivation *partially* mediates the relationship between the antecedents and e-business technology adoption.

Hypothesis 1: There is a positive relationship between firm technology motivation and e-business technology adoption.

Model C in Figure 5.4 depicted the positive relationship between a firm's technology motivation and e-business technology adoption. The standardised parameter from technology motivation to e-business technology adoption was at 0.23 and significant at t = 2.88, thus supporting hypothesis 1. The result of this analysis also conformed to the earlier multiple regression analysis with the standardised beta coefficient at 0.25. However, this analysis was unable to determine the relationship between the specific technology motivation and the specific e-business technology due to the sample size-parameter constraints. Nevertheless, with results from two different analysis approaches corroborating the above hypothesis, we can safely conclude that a firm's technology motivation is likely to influence its adoption of e-business technologies.

Hypothesis 2a (i): There is a positive relationship between a firm's market orientation and its technology motivation.

Based on the information in model C, the parameter estimate of market orientation to firm's technology motivation was positive at 0.24 and significant at t = 2.00. As depicted, the direct path from market orientation to firm's e-business technology adoption showed a much lower parameter estimate at 0.11 and was not significant. The results showed that market orientation affects e-business technology adoption through the firm's technology motivation. Again, the SEM results corroborate earlier analysis using multiple regression. Therefore, there is enough evidence to accept that there is a positive relationship between a firm's market orientation and its technology motivation.

Hypothesis 2a (ii): There is a positive relationship between a firm's innovativeness and its technology motivation.

The results in model C showed a positive relationship of firm's innovativeness to firm's technology motivation. However, the parameter estimate (0.03) was very weak and was not significant. Meanwhile, the path of innovativeness to firm's e-business technology adoption produced a relatively stronger result at 0.26 and was significant (t = 2.27). This illustrates that firm innovativeness influences the firm's adoption of e-business technology directly, rather than through technology motivation. The results agree with previous findings in the organisational innovation (technology) adoption literature, where innovativeness was found to be a significant predictor of technology adoption in firms.

Therefore, the findings in this analysis indicate that innovativeness influences a firm's technology adoption directly, rather than having an influence on its (technology) motivation. The results of the former relationship are consistent with the findings of multiple regression analysis where both results showed a weak relationship (although multiple regression was positive) and was not significant. The consistent results of both analyses assured us that a firm's innovativeness does not influence its technology motivation.

Hypothesis 2a (iii): There is a positive relationship between a firm's organisational learning and its technology motivation.

The path linking organisational learning to firm's technology motivation was not significant, with a low parameter estimate at (-0.08). However, the parameter estimate linking organisational learning to e-business technology adoption was positive (0.36) and showed a significant (t = 2.59) relationship. This suggests that a firm's e-business technology adoption is influenced by organisational learning directly and not through the firm's technology motivation. The results somehow agree with the findings of multiple regression. The former analysis showed a significant, negative relationship of

organisational learning to firm's technology motivation. Nevertheless, given the weak and insignificant relationship highlighted in the SEM analysis, there is not enough evidence to conclude that a firm's organisational learning negatively influences technology motivation.

Hypothesis 3: There is a positive relationship between a firm's business environment and its technology motivation.

The parameter estimate linking the firm's business environment and its technology motivation showed a positive relationship at 0.31 and was significant (t = 3.37). This conformed to the findings of multiple regression analyses where the standardized coefficient value of beta was 0.32. The results indicated that the firm's business environment is a strong predictor of its technology motivation. Thus, rather than the business environment directly influencing e-business technology adoption, the firm would channel its interest by coming up with a technology motivation that 'corresponds' to the firm's business environment. The significant findings using both methods of analyses lead us to conclude that there is a positive relationship between a firm's business environment and its technology motivation.

Hypothesis 6: There is a positive relationship between e-business adoption and organisational performance.

Finally, the parameter estimate linking firm's adoption of e-business technology with firm's performance showed a no relationship at (-0.00) and was not significant. The result of this analysis conformed to the findings of multiple regression analysis where the standardised coefficient beta value was 0.04 and was not significant. Although both results were contrary to our expectations, various studies of firm technology adoption showed similar findings of an insignificant relationship that to a certain extent contributed to the "IT productivity paradox" (Barua et al., 1995; Brynjolfsson, 1993). Therefore, with both findings indicating that a firm's adoption of e-business technology does not influence the

firm's performance, the above hypothesis was rejected. Table 5.7 presents the results of the hypothesis-testing using SEM.

Table 5.7: Standardised Parameter Estimates of SEM Analysis

Hypothesis	Path	Estimate	*t* Value	Significance
H1	Technology motivation → e-business adoption	0.22	2.88	√
H 2	Market orientation → technology motivation	0.22	1.78	√
	Innovativeness → technology motivation	-0.03	-0.20	n.s.
	Organisational learning → technology motivation	0.05	0.30	n.s.
New path*	Market orientation → e-business adoption	0.12	1.04	n.s.
	Innovativeness → e-business adoption	0.29	2.48	√
	Organisational learning → e-business adoption	0.35	2.43	√
H3	Business environment → technology motivation	0.32	3.39	√
H6	E-business adoption → firm's performance	0.02	0.23	n.s.

5.2.1.1 Conclusion

In general, the results of the analysis using SEM conformed to the earlier findings gained through multiple regression analysis. The findings provided strong support to our argument and also verified our theoretical model. In addition, the results illustrate that SEM is a powerful statistical tool, although faced with several limitations. The hypothesised model was improved not only in achieving goodness-of-fit indexes but also in proposing new statistically significant relationships. Through LISREL, new relationships linking the organisational culture constructs (market orientation, innovativeness, organisational learning) and e-business technology adoption were developed and tested.

The new relationship provided more interesting information and rationale to the proposed theoretical model. From the results of SEM analysis, a firm's technology motivation is influenced by market orientation and firm's perception of its business environment. These constructs provide cues to the firm in responding to the market which are later

transformed into the specific (technology) motivation towards adopting a particular e-business technology. Meanwhile, firm's innovativeness and organisational learning acted more as a 'predictors' in generating the firm's interest in adopting a particular e-business technology. The extent or 'sophistication' of a firm's adoption of e-business technology would depend on its innovativeness and organisational learning.

The results of these analyses also demonstrate the benefits of using a dual strategy approach in testing the proposed hypotheses and model. While multiple regression analyses provided much of the finer information regarding the effect of the specific constructs, the results of SEM analysis provided more support and justification for the proposed relationship.

CHAPTER SIX: DISCUSSION

This chapter discusses the results of the hypothesis-testing presented in the preceding chapter. The discussion highlights the findings on the proposed relationships based on the analyses using multiple regression and SEM. Previous studies are drawn on to elaborate and support the results and significance of this study. In discussing the findings, the results of the hypothesis testing are restated. Consequently, brief summaries of the implications of the findings are stated to guide readers in the following discussion. In general, the discussion of the results revolves around the theoretical model proposed by the author.

6.1 Technology Motivation As a Mediator in E-Business Technology Adoption

Results: Technology motivation partially mediates the antecedents and e-business technology adoption relationship.

6.1.1 Implications

6.1.1.1 Demonstrate that the relationships between the antecedents and organisational technology adoption are not direct.

6.1.1.2 Substantiates the existence of technology motivation in organisational technology adoption.

6.1.1.3 The validity of perceived benefits of technology as predictor.

The main thesis of this study was that technology motivation mediates the antecedents and e-business technology adoption relationship. The results of multiple regression and SEM showed that technology motivation *partially* mediates e-business adoption. This was illustrated by the following Baron and Kenny's (1986) mediation analysis where the final step of a four-step analysis failed to show that a full mediation relationship exist. Nevertheless, as elaborated by Baron and Kenny (1986), even though it may not be a necessary and sufficient condition to occur, the partial effect demonstrates that a given

mediator is indeed potent. Meanwhile, the results from SEM analysis further substantiated our findings where only market orientation and business environment influence technology motivation while innovativeness and organisational learning 'directly' influenced firm adoptions of e-business technology. As such, this corroborated the findings that technology motivation is a partial mediator in the antecedents and e-business technology adoption relationship. While the 'strength' of the mediation was not as initially posited, the findings continue to have important implications.

6.1.1.1 Demonstrate that the relationships between the antecedents and organisational technology adoption are not direct.

Our findings demonstrate that the relationships between the predictors and organisational technology adoption are not direct. This supports our earlier assertion that the predictors act more as "cues" in generating the appropriate motivation of adoption rather than influencing technology adoption itself. The results of the SEM indicated that market orientation and business environment influence firm e-business adoption through technology motivation. Both constructs demonstrate a strong loading and a significant t-value showing that their influences are mediated through technology motivation.

The findings also corroborated earlier assertions by Hult et al., (2001) and Hult et al. (2002) that the 'outward organisational culture' dominated by market orientation is a culture that is targeted at detecting and filling gaps between what the market desires and what is currently offered. Hence, market orientation acts as 'radar' that constantly seeks information and the changes in the market. Consequently, the process generates possible motives (technology motivation) in responding to the situation. The motives may be operational (e.g. effectiveness) or strategic (e.g. customer retention) depending on the 'outcome' of firm market orientation in uncovering customers' expressed and latent needs and/or anticipating competitors' actions (Slater and Narver, 1999).

Another example of the predictor 'influence' is firm business environment. Although the relationship of this construct with technology motivation will be discussed in more detail in a later section, the results corroborated Kwon and Zmud's (1987) assertions that the environment is a source of information to the organisation. Hence, a firm with a market orientation culture would gauge the environment, which in turn would suggest possible motives for possible actions by the firm. As market orientation tries to fill the gaps between what the market desires and what is currently offered, the appropriate technology motivation would take into account these considerations with respect to the different types of environment. Consequently, as the results in our following section demonstrate, these technology motivations would influence firm technology adoption. Hence, our assertion concurred with Han, Kim, and Srivastava's (1998) findings, that the extent to which organisational innovations vary with market orientation depends on the level of technological turbulence and market turbulence.

This demonstrates that the "dynamic" nature of technology motivation varies depending on the environment where the firm operates in sync with the level of firm market orientation. As such, this corroborated our assertion that the relationships between such predictors (e.g. business environment) and technology adoption are not direct. However, we do not imply that previous studies that support the direct relationship theory are flawed. Yet, we believe our findings provide more clarification on the relationship of those predictors with organisational technology adoption.

6.1.1.2 Substantiates the existence of technology motivation in organisational technology adoption.

As the selected predictors lead towards certain technology motivation, this motivation further influences firm adoption of the "appropriate" technology. The results provide empirical evidence of the "existence" and distinctiveness of technology motivation in organisational technology adoption. This corroborates Le Bon and Merunka's (1998) assertion that "attitudinal" components such as motivation mediate the influence of

external variables in organisational settings. Hence, although the concept of technology motivation was initially "abstract", the findings demonstrate that technology motivation "tactfully" guides the organisation in choosing the technologies that could fulfil its needs. Our finding further substantiates the assertion by Kaplan (1999), Clark et al. (2000) and Gagnon and Toulouse (1996) on the relationship between motivation and organisational technology adoption. The authors argued that motivation helps drive the adoption decision process and is also a clear driver of technology adoption.

6.1.1.3 The validity of technology perceived benefits as predictor.

An important theoretical implication of this finding is the validity of technology's perceived benefits as a predictor in organisational technology adoption research. Previous studies identified that perceived benefits of technology influence organisational technology adoption based on the rationale that the benefits correspond with firm needs. We argued that perceived benefits as a predictor, is in effect a manifestation of firm technology motivation. In addition to the various weaknesses depicted in the usage of perceived benefits, we argued that to place the construct (which represents firm motivation) in a similar position to other sets of predictors is a conceptual fallacy. Our findings illustrate that the mediating role of technology motivation signifies the logical process or stage of firm technology adoption, whereby the predictors lead towards a specific motivation which influences technology adoption.

6.1.2 Technology Motivation and E-business Initiatives

Results: Technology motivation of improving effectiveness influences the adoption of SCM.

Technology motivation of improving customer retention influences the adoption of e-commerce and CRM.

6.1.2.1 Implications

6.1.2.1.1 Corroborate that technology motivation influences the specific e-business initiatives.

6.1.2.1.2 Technology choice is determined by the "fit" between technology motivation and the technology 'core benefits'.

6.1.2.1.3 Technology 'affects' where its impact is most expected.

Improving effectiveness seems to be a prevalent technology motivation among the firms interviewed in the qualitative study. An obvious explanation for this phenomenon is that the majority of the companies are competing in a hostile environment characterised by stiff competition and price war activities. Thus, it is sensible that these companies seek to improve their effectiveness by reducing their operating costs. In addition, the global market competition for low cost producers has resulted in a "universal" motivation for cost cutting and improves effectiveness in all manufacturing firms throughout the industry in all parts of the world.

Meanwhile, the findings indicated that firms exercised relationship marketing with the belief that customer retention affects company profitability. Numerous scholars have put the idea that it is more efficient to maintain an existing relationship with a customer than to create a new one (Payne et al., 1995; Reichheld, 1996). As the majority of the companies interviewed were component manufacturers – an industry overwhelmed by

over-capacity, monitoring customers' requests and patterns is a paramount issue. In addition, the stiff competition characterised by price war activities has alerted these companies that their existing customers might switch to other suppliers that offer better pricing. Hence, they take significant actions on customers' complaints and suggestions with the intention to improve the quality of service and consequently retain existing customers. In addition, web sites and e-mail system were also used to answer customers' queries about their products as well as to solicit for new product arrangements.

6.1.2.1.1 Corroborate that technology motivation influences the specific e-business initiatives.

In the previous section, we have provided evidence of the existence of technology motivation in organisational technology adoption. We argued that the predictors acted as "cues" in leadings towards a particular technology motivation that would facilitate solution of existing problems or provide opportunities for the firm. This is in concert with Rogers (1983) argument that organisations adopt innovation only if it provides significantly better benefits than existing methods. Pursuing technology motivation, the firm adopts technology that is "compatible" with achieving those motives (Sarrina Li, 2003). The results in this section demonstrate the impact of technology motivation in influencing specific e-business initiatives.

Improving effectiveness is basically an operational technology motivation where a firm's emphasis is to improve the operational activities of the company. Among the notable activities within the manufacturing firms are the supplies purchasing process or activities concerning the management of the supply chain. This is an area where the "automisation" of routine business processes is carried out to improve efficiency and effectiveness, which could translate to cost reduction. Business institutions such as Wal-Mart have been known to focus on improving their supply chain management with the motivation to improve operating efficiencies and reduce operating costs. This is done through the adoption of SCM technologies like EDI or SCM. Traditionally, the objectives of supply-chain

management have been efficiency driven, aiming to pass the products through the chain in the shortest time with the lowest costs (Morrell and Ezingeard, 2002). Hence, it is sensible that firms that intend to improve their operating efficiencies would adopt cost-saving technologies like SCM.

Meanwhile, improving customer retention is a strategic technology motivation where a firm's emphasis is to improve its quality of service. A customer retention motivation is accomplished through relationship marketing where firms employ various technologies that are designed to improve customers' experience in dealing with the company and also keep track of their business transactions. Hence, various technology applications are adopted that enable a firm to improve customers' experience in dealing with the company. These technologies that aid customers to keep track of their purchase orders, handle enquiries and complaints and customise orders are some of the applications of e-commerce and CRM. These "offerings" are sometimes done with strategic alliance with other companies that jointly cooperate to improve their quality of service. An example of this relationship is Dell Computer Corporation's in marketing its computers in collaboration with Fedex (Bruun and Mefford, 2004). Consumers are able to track their purchase orders and also the flow of their product through the Fedex tracking system. This system ensures that the orders are safely delivered to the respective parties. Therefore, firms that decide to improve customer retention would most likely resort to customer interface technologies like e-commerce and CRM. These technologies are able to improve their quality of services in dealing with customers in terms of the selling activities and after sales service.

6.1.2.1.2 Technology choice is determined by the "fit" between technology motivation and the technology "core benefits".

Firms that possess the technology motivation of improving effectiveness would initially search for appropriate technology that would provide the expected benefits. During this process, the organisation might have some sort of "criteria" that are of importance, such as

reducing overall order cycle time or reducing inventory level. Clark et al. (2000) described this as "expected motivations" which are a set of considerations which are notionally of significance to those contemplating technology adoptions. After "finalising" on the selected technology options, the adoption decision would be made based on these motivations. At this stage, firm decision making would be based on specific motives that the firm wishes to achieve. Clark et al. (2000) explained this as "stated motivations" which can be viewed as a framework of considered actions, or decision space. Greer (1985) identified the "stated motivations" in hospital adoption of technology as being fiscal-managerial (operational), strategic-institutional (strategic-competitiveness) and medical-individualistic (niche-differentiation).

In determining the "compatibility" of the technology motivation and the specific e-business initiatives, our findings demonstrated that firms would refer to the "core proposition" of the technology. This is based on our argument that the current e-business initiatives which claimed various benefits "overlap" with each other. In illustrating our argument, almost all the e-business initiatives such as ERP, e-commerce, SCM and CRM claimed that they enable businesses to improve their efficiency/effectiveness, reduce operating costs, and improve quality of service which ultimately will improve their customer services and customer retention. Although it seems that the marketing of these technologies tends to send confusing signals to potential users, the findings demonstrate that firms refer to the technology "core proposition" when it comes to adoption. Hence, when it comes to improving effectiveness, a firm would refer to cost-reducing technologies such as SCM, while a firm that seeks to improve its customer retention would refer to customer-interface technologies such as e-commerce and CRM.

6.1.2.1.3 Technology 'affects' where its impact is most expected.

Finally, a theoretical implication of the technology motivation and e-business initiative relationship is its substantiation of Porter's (1980) value chain analysis as an impact model. In the preceding section, we argued that the current scenario of e-business

initiatives is rather confusing, as the various technology benefits overlap with each other. While firms could initially examine the core proposition (benefits) of these technologies in determining the fit with their technology motivation, another plausible explanation for the choices of these technologies is that the selected technologies 'affect' where their impact is most expected.

The inbound interface, for instance, is characterised by the supply-related process which deals with procurement, ordering, stock replenishment, payment and plan deliveries. The emphasis on improving efficiency and effectiveness, which will ultimately reduce operating costs, is more important in this stage than in other stages such as the business itself or outbound interface. Meanwhile, in the outbound interface which is characterised as a customer-related process, the emphasis on to improving quality of service leading to customer retention, is dominant in this stage more than in any other. As such, the two e-business technologies that correspond to these motives and value chain analysis are e-commerce and CRM. The results of this study substantiate the assertions of Lumpkin, Droege and Dess (2002) and Pires and Aisbett (2002) that value chain analysis helps in identifying key value-adding processes that could be made more effective using information technology. In addition, they also show that a firm still needs to refer to conventional strategy formulation. This supports Porter's (2001) argument that conventional strategy models are just as effective and relevant in an e-business context.

6.2 Moderated Mediation Effects

Results: Top management support and external pressure do not moderate the mediating effects of technology motivation and e-business relationship.

6.2.1 Implications

6.2.1.1 Technology motivation is a strong determinant.

6.2.1.2 Technology motivation prevents "interference" and "bandwagon" effects on technology adoption.

This study proposed a unique relationship of moderated mediation effects. Initially, we theorised that technology motivation mediates the relationship between antecedents and e-business adoption. Based on previous studies that highlight the importance of top management support and external pressure in organisational technology adoption, we argued that these predictors "reinforced" firm technology motivation in adopting the particular e-business initiatives. However, the findings demonstrate that management support and external pressure do not moderate the mediating effects of technology motivation and e-business technology adoption. Although these constructs have been reported in the literature to influence organisational technology adoption, the results in this study showed a non-significant relationship. This illustrates the importance of technology motivation. In the following sections, we explain the implications of these findings.

6.2.1.1 Technology motivation is a strong determinant.

A notable implication of this finding is the "strength" of technology motivation in determining e-business initiatives. Although the two moderators have been demonstrated to be strong predictors (in previous studies) and consequently act as moderators here, the results showed that the decision of adoption could already have been made at technology motivation. Therefore, the mediation effect of technology motivation towards e-business adoption continues to be "operative", despite the presence of the two constructs.

There are numerous explanations for this. First, the organisation could have already "endorsed" the motives for adoption. Hence, the appropriate commitment and resources expected from top management are no longer an issue. The process is expected to run its due course of selecting and adopting the technology that is appropriate to achieve the intended technology motivation. Consequently, firms are not also under stress to conform to their trading partners' pressure to adopt a particular technology, even though the promoted technology is in line with firm motivation. Hence, this illustrates that technology motivation serves as a rational "guideline" for organisations in adopting the "appropriate" technology.

6.2.1.2 Technology motivation prevents "interference" and "bandwagon" effects on technology adoption.

The identification of technology motivation enables a firm to ascertain the technology that is appropriate for adoption. This prevents the possible occurrence of top management "interference" or "bandwagon effect" of technology adoption. Swink (2000) has raised the argument that in the process of supporting and advocating technology adoption, top management support in reality could lead to top management interference. Interference is thought to be especially detrimental in high technologically innovative projects because inexperience with new technologies increases the likelihood that top managers' situation assessments are incorrect (Crawford, 1992). Thus, when a top manager presses his or her own agenda, there is a greater risk that his or her perceptions will lead to an ineffective technology adoption strategy (Ettlie, Bridges and O'Keefe, 1984; Takeuchi and Nonaka, 1986).

Meanwhile, the bandwagon effect is the culprit that pressures an organisation in conforming to industry practice. Institutional bandwagon pressures occur because non adopters fear appearing different from many adopters (Abrahamson and Rosenkopf, 1993). Bandwagons are diffusion processes whereby organisations adopt an innovation, not because of their individual assessments of the innovation's efficiency or returns, but because of a bandwagon pressure created by the sheer number of organisations that have already adopted this innovation (Abrahamson and Rosenkopf, 1990; Tolbert and Zucker, 1983). Bandwagon cycles can cause many organisations to adopt innovations they assess as technically inefficient (Abrahamson and Rosenkopf, 1993). Hence, this could lead to underutilisation or "failure" organisationally (Mohamed, 1995). This is because the organisation might not be ready to adopt the technology. In addition, the adopted technology may not be appropriate for their motivation. Hence, Abrahamson (1991) argued that over time, organisations that adopted a technology during a bandwagon may likely reject it for many different reasons. Therefore, by having an appropriate technology motivation, a firm would be able to safeguard itself from the negative influence of top management interference and bandwagon effects.

6.3 Antecedents of Organisational Technology Motivation.

Results: Organisational culture and business environment influence organisational technology motivation.

Market orientation influences technology motivation of improving effectiveness and customer retention.

Environmental uncertainty influences technology motivation of improving effectiveness and customer retention.
Environmental hostility influences technology motivation of improving effectiveness.

6.3.1 Implications

6.3.1.1 Highlights the role of market orientation components in influencing organisational technology motivation.

6.3.1.2 Highlights the operational and strategic influence of market orientation.

6.3.1.3 Corroborates the contingency and strategic choice theories in organisational technology adoption.

Initially, firm organisational culture which comprises market orientation, organisational learning and innovativeness and business environment (environmental uncertainty, hostility and heterogeneity) were theorised as the antecedents of organisational technology motivation. However, the results of the SEM analyses indicated that only market orientation and firm business environment were significant in influencing firm technology motivation. The results of multiple regression further illustrate that within business environment, only environmental uncertainty and hostility were significant. While the

results differ from our initial assertion, the findings provide a better explanation and justification for the model. In this section, the impact of the antecedents toward organisational technology motivation is discussed.

The findings of this study indicated that the technology motivation of adopting e-business technology was derived from firms' reaction to their market orientation activities and their response to the business environment. These two constructs have been noted in previous studies to influence firms' actions and strategy. Indeed, research concerning organisational responsiveness to environments began with a focus on market orientation (Hurley, 2002). The subsequent paragraphs of this section elaborate on the influence of the two constructs towards firm technology motivation. The implication of these findings fills the theoretical gap in the current literature, where there is currently no study that seeks to determine the antecedents of "perceived benefits of technology" in organisational technology adoption (Min and Galle, 2002).

6.3.1.1 Highlights the role of market orientation components in influencing organisational technology motivation.

The findings of our study demonstrate that market orientation provides the 'direction' of firm actions. The results show that market orientation is indirectly related to e-business adoption through technology motivation. This substantiates our argument that market orientation is a source of new ideas and provides motivation for a firm to respond (Hurley and Hult, 1998). Our assertion is also supported by the findings in the qualitative phase of the study. At the start of this study, we observed that a majority of the sample companies showed signs of customer oriented culture where mottos and slogans like 'responsive to customer needs' and 'customers are our number one priority' were a common sight in the office walls of the firms. This demonstrates that customer orientation is a significant importance to these companies. These firms would go to great lengths to meet the needs and wants of their customers.

Hence, prevalent initiatives adopted by these companies were improving their communication facilities. Frequent exchange of information is an essential task to facilitate firms' understanding of their customers' needs. Customer oriented organisations are more likely to focus efforts and resources to satisfy customer needs and to adopt a proactive disposition toward innovations that facilitate customer transactions and robust customer relationships. According to Chang et al. (2002), such business is more likely to implement online order taking (e-commerce/CRM).

Meanwhile, apart from focusing on their current customers, firms are also aware of their competitors' actions and keep a close watch on what is going on in the market. In addition, they are also attentive to new competitors coming into the market. This orientation can be defined as competitor orientation, that is, the ability and will to identify, analyse, and respond to competitors' actions. Our qualitative findings from personal interviews concurred with Chang's et al., (2002) assertion that competitor-driven firms watch costs closely, quickly match the marketing initiatives of competitors, and look for their sustainable edge in technology. The firms narrated that they were constantly approached by their current customers to discuss the pricing of their products. Normally, the customer would relate the price negotiated with the price offered or quoted by their competitors. Typically, these firms would try to accommodate the negotiated price, although not at other times. Nevertheless, their customers are still content with them, due to their established relationship and quality of services offered.

The firms added that they value their relationship with their customers and trading partners. Together, they both try to reduce the costs and increase the quality of services of both parties. Thus, as elaborated earlier, these firms would engage in improving communication mechanisms and internal/external efficiencies (and effectiveness) to reduce the operating costs. The firms would subsequently resort to technology for solution. For instance, many e-commerce technologies are particularly suited to supporting market orientation activities by providing a responsive and interactive medium through which an organisation can gain and respond to in-depth knowledge with respect to competitors' and customers' profiles (Peterson et al., 1997).

Finally, inter-functional coordination is, in fact, a function of intelligence generation, dissemination, and responsiveness (Chang et al., 2002). This is illustrated in the firms' proactive actions of gathering information in subscribing to trade magazines, attending conferences and also information from sales representatives. Adoption of efficient and effective communications mechanism and information dissemination within the company ensures that vital information is shared throughout all the departments in the company. Daily communication was also made through the company internal e-mail system as part of company organisational culture in encouraging effective communication and shared information.

6.3.1.2 Highlights the operational and strategic influence of market orientation.

In the previous section, we have demonstrated the influence of market orientation components in influencing organisational technology motivation. The implication of the findings further illustrates the influence of market orientation in influencing the technology motivation of improving effectiveness and customer retention. Earlier, we argued that improving effectiveness is often seen as an operational perspective while improving customer retention has the characteristics of a strategic perspective. This exemplifies that market orientation has a 'balanced' influence on firm technology motivation. As such, this corroborates Slater and Narver's (1998) assertion that firms with a market orientation scan the market more broadly and have a longer-term focus than others.

Market oriented firms are aware that the hostile nature of the business environment drives the industry to compete on price. Hence, to employ a cost leadership strategy, the firm's operational motives would obviously lead to improving its operating efficiency and effectiveness. Competing on a cost leadership strategy in an industry that is price conscious could lead to a competitive advantage. However, to continue emphasising price would be counter-productive, as the firm would be hard-pressed to make profits. In

addition, other firms in the industry would also take similar steps, which would lead to a downward spiral. Therefore, improving efficiency is considered as an operational technology motivation to keep pace with the industry.

The strategic notion for firm survival would be to establish loyalty among its customers and trading partners. Firms that manage to establish loyalty among their customers would have an added advantage. In addition, price is not the main factor for loyal customers. Nevertheless, this does not mean that firms can ignore cost, as 'premium' prices would be eroded by a markedly inferior cost position. Therefore, firms must attain a level of cost parity or proximity relative to competitors. Firms could do this by reducing costs in all areas that do not affect the quality of service or their differentiation strategy (Lumpkin, Droege and Dess, 2002). As illustrated in the qualitative study, customers may tolerate a slightly higher price from their suppliers in return for a quality services. Hence, a strategic technology motivation would be to improve customer retention by providing a high quality of relationship. This could be in terms of improving and sharing inter-firm information, simplified business transactions, innovative business solutions and etc.

6.3.1.3 Corroborates the contingency and strategic choice theories in organisational technology adoption.

In the initial stage of this research, several assumptions were made regarding firm actions over the business environment. Firm actions are theorised as a reactive and/ or proactive response towards the environment in what are known respectively as the contingency (Donaldson, 2001; Kast, 1973) and strategic choice theories (Child, 1972). As firms' adoption of technology is often regarded as a response towards the environment, their proposed motivations and actions are argued to be triggered in a similar fashion to that proposed by the contingency and strategic choice theory.

The results in this study corroborate our assumptions on the influence of the contingency and strategic choice theories towards organisational technology adoption. This is

demonstrated in the significant effects of business environment in relation to technology motivation. To begin with, the findings substantiate Kwon and Zmud's (1987) perspective of the business environment as a source of information where environment entities such as environmental uncertainty and hostility are important predictors. They also substantiate our argument that a firm's business environment provides the necessary information for the firm's technology motivation in responding through the adoption of the appropriate technology. Consistent with previous studies, the results showed that environmental uncertainty and hostility appear to be critical dimensions of the firm's business environment (Child, 1972; Dess and Beard, 1984; Kwon and Zmud, 1987).

The contingency theory postulates that the effectiveness of the organisation depends on the congruence between elements of the organisation subsystem and the demands of the environment. Hence, when firms perceive the environment as uncertain or hostile, the motivation for technology adoption would focus on reducing the uncertainty or hostility in the business environment. Consequently, firms in an uncertain business environment would emphasise a strategic and operational effort that would reduce firm uncertainties. Meanwhile, firms that perceive a hostile business environment would normally focus on operational efficiencies, since the environment is characterised by cost efficiencies and the competitiveness of a firm lies in its ability to become a low cost producer.

Our qualitative findings revealed that companies in hostile environments report that their reasons for adopting various technologies such as email and ERP were to improve the firm's effectiveness through effective communications, reduction in errors and consequently cost savings. This is due to the poor profit margins of the industry and to enable them to compete competitively in the market. As elaborated in the previous sections, existing customers typically request the firms to review their prices in comparison with what is offered by their competitors. Our findings concurred with Appiah-Adu and Singh's (1998) research which indicates that environmental hostility or competitive intensity does not intend to result in increased emphasis on customer-oriented strategies among SMEs. This is because in highly dynamic or competitive conditions,

firms tend to adopt cost or price cutting strategies in an effort to counter or respond to competitive pressures.

Meanwhile, to overcome imperfect information and uncertainty, firms institute a variety of mechanisms to 'promote, advance, and strengthen coordination' between organisational subunits and partners (Truman, 2000). This is done through more frequent exchange of information between business partners so that activities can be prioritized as changes occur and delivery expectations met (Ahmad and Schroeder, 2001). Hence, technologies like SCM, e-commerce and CRM are an effective way to provide timely and relevant information to top managers and thus to help reduce uncertainty.

On the other hand, the strategic choice view is that, through choices made, key decision-makers have considerable influence over an organisation's future direction. These firms believe that their options of technology are not "confined" to selected technologies appropriate to the environment in which they are operating. They believe that technology is not just an enabler of organisational processes, but also becoming the core of a firm business strategy (Orlikowski, 1992). Hence, these firms would take bold decisions in introducing new technology to the environment. In addition, the e-business "fame" attributed to the media helps fuel these companies in adopting the latest technology available in the market.

Hence, firms that undertake various e-business initiatives are argued to perform better with environmental changes in an information-intensive environment (Weiss and Heide, 1993). Customer interface e-business technologies like e-commerce and CRM help firms in establishing a relationship with their current and prospective customers. By better understanding the needs of their customers, a firm could weather the hostile environment. This is done by meeting and anticipating the needs of their customers with innovative solutions.

6.4 Antecedents of E-Business Technology Adoption

Results: Innovativeness influences e-business technology adoption.

Organisational learning influences e-business technology adoption.
Adaptive learning influences e-business technology adoption.
Generative learning has negative effects on e-business technology adoption.

6.4.1 Implications

6.4.1.1 Receptiveness to new ideas as an important feature of "innovative" company.

6.4.1.2 Highlights the relationship of learning style and dimensions of innovation.

6.4.1.3 The effects of 'internal factors' on the magnitude of e-business technology adoption.

Initially, in the proposed theoretical framework, e-business technology adoption was influenced mainly by firm technology motivation. However, the results from the structural equation modelling displayed a weak goodness-of-fit of the proposed model. The analysis suggested an alternative model which produced an acceptable goodness-of-fit and gave more credibility to the proposed relationship. Innovativeness and organisational learning, which were earlier proposed to be the antecedents of firm technology motivation, are now the antecedents of e-business technology adoption in addition to the path from firm technology motivation. The relationship of firm technology motivation and e-business technology adoption has already been clarified in the previous sections. Hence, the relationship of innovativeness and organisational learning in relation to firm adoption of e-business technology is explained in this section.

6.4.1.1 Receptiveness to new ideas as an important feature of "innovative" company.

This study viewed innovativeness as an aspect of firm's culture that is openness or receptiveness to new ideas (Hurley and Hult, 1998). Receptiveness of organisations to change has been found to be significant factor for achieving success in technical innovations (Zmud, 1984). However, unlike market orientation, which is outward looking; innovativeness in firms could be motivated internally or externally. As such, firms oriented to technological innovation may or may not have customers in mind. The changes could be technologically, driven where innovativeness is motivated by the technological advancements and has little to do with the business environment.

Innovativeness is present when the implementation of new ideas, products, or processes is encouraged in firms (Hurley and Hult, 1998). Our qualitative findings showed that firms 'empowered' their managers to take ownership of their manufactured products. These managers were encouraged to introduce new processes, products or ideas that would benefit the organisation. As a result, innovativeness fosters risk taking, and managers in these firms were willing to experiment with new technologies. This corroborated Cravens, Piercy and Low's (2002) assertion that innovative cultures are likely to involve open communications throughout the organisation, and high levels of employee involvement and interest.

Our field interviews also revealed that the motivations for new technologies were mainly 'business oriented'. Thus, although innovativeness itself is 'pro-innovation', firms that ventured into new technology adoption were generally focused on pursuing new opportunities, fulfilling market demands or improving the firm's performance. Consequently, these firms implemented 'customer interface technologies' (e.g. e-commerce and CRM) and 'cost-cutting technologies' (e.g. SCM) in relation to firms' market orientation culture. The findings showed that market orientation as a corporate culture 'governs' innovativeness (through technology motivation) as its source of direction. While the findings showed the importance of market orientation, this is not to

underestimate innovativeness as an organisational culture influencing e-business technology adoption. Van de Ven and Polley (1992) argued that innovativeness is a critical complement for an organisation that pursues a market orientation philosophy. They elaborated that a firm is unlikely to enjoy long-term success if it is not innovative in meeting the desires of the market. Hence, innovativeness as an organisational culture is an important feature of an "innovative" company.

6.4.1.2 Highlights the relationship of learning style and dimensions of innovation.

The notion of market orientation and organisational learning influencing each other in achieving a long term competitive advantage has been the subject of interesting discussions among strategic scholars (e.g. Baker and Sinkula, 2002; Cravens, Greenley, Piercy and Slater, 1997; Farrell and Oczkowski, 2002; Slater and Narver, 1995). While the emerging literature continues to struggle to reach a consensus regarding the causality between the two constructs (Bell, Whitwell and Lukas, 2002; Farrell and Oczkowski, 2002), it is beyond the scope of this research to discuss or validate those issues. Nevertheless, the "relatedness" of market orientation and organisational learning has to an extent contributed to the inception of a "market-driven learning-oriented culture" (Pires and Aisbett, 2003).

Our initial findings from the field interviews demonstrated that firms stressed the importance of learning among their employees. It is notable that most of the companies emphasised on-the-job training, which included quality circles and group meetings. The nature of such learning is 'gradual learning', where firms improve past decision outcomes and make them better through small-scale adjustments (Stacey, 1996; Quinn, 1980). In addition, the process involved the firm's coping ability of adapting to the environment successfully through its ability to select, interpret and respond to environmental stimuli (Murray, 2002). The learning process could involve production related issues (e.g. quality, efficiencies), market related issues (price, competitors' action) and other 'tactical' issues based from the information gleaned from the business environment. This type of learning

according to Baker and Sinkula (2002), is called adaptive learning, which involves the purposeful detection and correction of errors in existing theories in use (knowing how things are done).

Baker and Sinkula (1999) stated that adaptive learning facilitates incremental innovation. This suggests that firm adopt technology in 'small progresses' in parallel with their "learning level" and the developments of their counterparts (e.g. customers, trading partners). Our field study demonstrates that firms adopt technology 'moderately' to prevent existing practices and technology being rendered obsolete. Incremental innovations are likely to be capability enhancing and may not require changes to existing routines (Darroch and McNaughton, 2003). Thus, the 'cautious' transformation of technology was mainly to adapt to the existing business models. It also emerged from our interviews that managers cognitively clustered e-business activities pertaining to suppliers, to the internal operations of the business and to customers. The 'concentration' of e-business technology in firms can be associated with Porter's (1980) value chain framework which suggests that value creation within a business unit can be traced through distinct stages – beginning with the inbound interface (where supplier-related processes are concentrated), through the business itself and culminating at the outbound interface (where customer-related processes are concentrated). Our findings of e-business 'concentration' are consistent with Wu, Mahajan and Balasubramaniam (2003).

In the previous section, we have explained how firms empowered their managers to take ownership of the manufactured products. The firms believed that by empowering their managers to make vital decisions, they could be more responsive to the customers' needs and changes in the market. The crux of this exercise is to enable firms to adapt to changes in the market conditions. Baker and Sinkula (2002) assert that effective adaptive learning in firms enables market-driven incremental innovation. Likewise, market-oriented firms in adapting to changing market conditions also enable successful incremental innovation, whether it is proactive (company driven) or reactive (market/competitor driven). Jaworski, Kohli and Sahay (2000) suggest that market driven orientation involves customer relationships reflecting adaptive learning in terms of market intelligence generation. Meanwhile, Baker and Sinkula (2002) elaborated that a strong market orientation and

adaptive learning orientation are capable of effective market-driven incremental innovation. The regression results of organisational learning and e-business adoption demonstrate that adaptive learning has a positive relationship with e-business technologies (e-commerce, CRM and SCM). Thus, as explained earlier, e-business technologies adopted by the firms are concentrated within the firm's value-chain activities. These technologies are 'incremental innovations' that enhance the existing capabilities and do not require change to existing routines (Darroch and McNaughton, 2003). The findings provide empirical support for the relationship between adaptive learning and incremental innovation.

Meanwhile, the regression results showed that generative learning has a negative relationship with the adoption of all the e-business technologies (e-commerce, CRM and SCM). Generative learning requires new ways of looking at the world, whether in understanding customers or in understanding how to better manage a business (Senge, 1990). According to Schein (1999), generative learning and culture change involves questioning one's basic assumptions, and this is inherently anxiety-provoking process that will be resisted. This type of learning, which entails the replacement of the current business practice, may lead to administrative forms of radical innovation (Baker and Sinkula, 2002). Generative learning would produce a culture dedicated to changing rather than reacting to the environment (Calvert, Mobley and Marshall, 1994). The notion of generative learning and its impact on e-business technology adoption is illustrated through our findings on a companies' adoption of enterprise resource planning (ERP) technology.

ERP is a technology that attempts to integrate all departments and functions across a company onto a single computer system that can serve all those different departments' particular needs. The integrated software program runs from a single database to enable the various departments to share information and communicate with each other. The firm Eng Teknologi, which manufactures precision components, adopted the technology to improve their response time through availability of updated and accurate information of manufacturing productivity figures and costs. The firm's vice-president (the initiator) also expected that it would increase its administrative and communication efficiencies that could contribute to cost savings. Nevertheless, the response from the employees was

rather half-hearted. The technology or its applications were hardly used as a daily practice, while training in using the system took more than six months of the firm's time. Our findings are consistent with Ghiassi and Spera's (2003) view that ERP implementations are very complex and require enormous resources to implement. The vice-president (who has an engineering background) stated that an 'IT gap' among its employees could be the culprit for the problem. In actual fact, the technology was considered ahead of its time for most of the firm's employees, including the managers. The firm has adopted a 'radical innovation', which refers to changes in technology that facilitate significant nonlinear improvements in the delivery of their product category benefits (McKee, 1992). The firms' stakeholders, who include the employees, customers and trading partners, could not assimilate the 'radical' changes that confronted them. As such, the technology can be considered as 'failed'. Klein and Sorra (1996) stated that implementation failure occurs when "...[targeted] employees use the innovation less frequently, less consistently, or less assiduously than required for the potential benefits of the innovation to be realised".

This illustrates our earlier argument that firms' adoption of new technology ought to be in parallel with the firm's learning level and the development of their counterparts (e.g. customers, trading partners). Although the technology (ERP) was superior and promised many benefits, the firm's organisational learning 'culture' was not compatible. We concurred with Hamel and Prahalad (1993) view that learning style must support the acquisition of 'new knowledge' that can be used to upgrade competencies that permit the organisation to be more effective than its competitors. The technology was considered a radical innovation which required a new way of managing business. However, similar to Murray's (2002) finding, adaptive learning was found to be more evident than generative learning in firms. This supports Slater and Narver's (1995) argument that generative learning cannot be planned, occurs episodically and happens only during some businesses lives. In addition, generative learning is difficult to sustain (Farrell and Oczkowski, 2002).

6.4.1.3 The effects of "internal factors" on the magnitude of e-business technology adoption.

We have earlier argued that an outward-focused culture and business environment tactfully guides the organisation in adopting the particular e-business technology through technology motivation. However, the magnitude of e-business adoption depends on a firm's 'alacrity' or readiness. Firm readiness is a consequence of organisational innovativeness and organisational learning. A firm which has a culture of higher receptivity to new ideas (innovativeness) is willing to experiment with a much greater scale of e-business technology in its business process. Such firms are open to new ideas and are willing to take risks in trying new technology. The innovativeness culture would initially reflect the behavioural definition of innovativeness, according to which firms would adopt the technology relatively earlier than their competitors (Rogers, 1983).

Meanwhile, the influence of organisational learning on technology adoption is rather complex. While generative learning is argued to influence organisations towards radical changes in conducting business, adaptive learning rationalises technology adoption by gradually adopting technology that enables the external and internal stakeholders to accept it in accordance with the firm's organisational culture. Therefore, the magnitude of technology adoption would depend on the 'dominant' influence of the organisational learning type in the firm. In summary, the results demonstrate the importance of internal factors in influencing the magnitude of organisational technology adoption.

6.5 E-business Adoption and Organisational Performance

Results: Firm e-business adoption does not affect organisational performance.

Firm adoption of e-commerce technology does not affect organisational performance.

Firm adoption of CRM technology does not affect organisational performance.

Firm adoption of SCM technology does not affect organisational performance.

6.5.1 Implications

6.5.1.1 Highlights the "productivity paradox" issue.

6.5.1.2 Conditions necessary for successful technology adoption.

6.5.1.3 Corroborates the weaknesses in using perceived benefits of technology as an indicator.

Previous studies on the effects of technology adoption and firm performance have produced mixed results. The issue whether technology adoption improves firms' performance is a significant matter, considering firm investments in technology are to achieve a particular purpose or benefits. In the case of e-business technologies, the issue is even more pertinent, as there has been much hype concerning its benefits. Our findings showed that e-business technologies did not improve firms' performance, either in terms of financial performance or customer retention performance. Although the results were contrary to our proposed hypothesis, they were consistent with previous studies which found a non-significant relationship.

6.5.1.1 Highlights the issue of "productivity paradox".

Initially, several empirical studies and ample anecdotal evidence indicate that companies that spend more on technology adoption were not rewarded with superior financial performance (Barua, Kreibel and Mukhopadhyay, 1995; Dos Santos, Peffers and Mauer, 1993; Strassmann, 1990; Weill, 1992). In addition, previous studies that examined the market returns to investments in information technology (IT) have found little evidence that the market rewards companies that spend relatively more on IT (Hitt and Brynjolfsson, 1996; Tam, 1998). Davis, Dehning and Stratopoulos (2003) asserted that their review of the popular press and academic literature led them to believe the benefits of investments in technology are particularly difficult to measure (Bharadwaj, Bharadwaj and Konsynski, 1999; Davis and Riggs, 1999). The researchers concluded that in most of the studies, technology does not pay off in the same way as traditional investments. They argued that if the adopting firm finds it difficult to measure the return to technology investments (Alpar and Kim, 1990), it would be more difficult for researchers to assess the performance of companies adopting a technology.

Thus, studies of EDI adoption, for instance, have identified that one of the barriers to adopting the technology is the difficulty in quantifying the costs and benefits involved (Pfeiffer, 1992). This situation is evident in our fieldwork, where the respondents noted that it is very difficult to assess the influence of technology adoption on firm's performance. Although they mentioned that the adopted technology managed to 'improve' their business efficiencies and 'reduce' their administrative costs, it is difficult to quantify its influence on sales or profits. Thus, this supports Rai, Patnayakuni and Patnayakuni (1996) assertion that a new measurement for studying the impact of technology on firm performance should be constructed.

The findings of the fieldwork interviews regarding the benefits of adopting e-business technology indicated that firms' assessments were directed at administrative and communication efficiencies. These were the highlighted benefits of using electronic communication systems (e.g. e-mail) among their employees, customers and trading

partners. Meanwhile, corporate websites (including e-commerce technology) improve customers' inquiries from current and new markets. This finding agrees with the study by Lancioni et al. (2002) who found that "obtaining price quotes from vendors" was the largest increase in firms adopting Internet application in their supply chain. One of the companies that adopted ERP technology in our interview sample stated that ERP improves administrative and communication efficiency. In addition, it enables the firm to issue purchase orders more quickly, which reduces operating costs by 10 to 15 per cent a year. The response indicated that apart from specific cost reduction, the rest of the benefits mentioned are indirectly related to firms' performance as argued by Dewett and Jones (2001). We concurred with Ragowsky, Ahituv and Neumann's (1996) assertion that the benefits of technology adoption cannot be precisely measured. Therefore, this explains the reason for the non-significant relationship.

Meanwhile, researchers measuring the technology-performance relationship stated that technology is expected to have a lagged effect on organisational performance (Barua, Kreibel and Mukhopadhyay, 1995; Damanpour, 1990; Rai et al., 1996 and Brynjolfsson, 1993). The lags suggest that the benefits associated with investments in technology may take several years before they show up in the financial statements. This is due to a period of learning associated with adjustment and possibly restructuring of the organisation caused by new technology. Assimilation gap (Fichman and Kemerer, 1999) could also contribute to the lag, where adoption and implementation takes quite some time, especially with high implementation complexity (Leonard Barton, 1988; Ettlie and Vellenga, 1979).

The raw results of e-business technology adoption indicate that most of the firms were in the early stages of implementing e-business technology. The results showed that e-commerce and SCM were the 'latest' technology, with 89.5 and 90.8 per cent of firms, respectively, having adopted them in less than a year previously. Meanwhile, CRM technology is more or less 'stabilised' with 17 per cent of the firms having adopted it within the past one to two years. Hence, as the technology was still new or recently adopted, its effects were not visible. Our findings were consistent with Tam's (1998) study

that examined the relationship between computer capital (CC) and return on assets (ROA), 1-year total return to shareholders, and other performance measures, for companies in Hong Kong, Malaysia, Singapore, and Taiwan. The author found no significant relationship between 1-year shareholder return and CC in any of the four countries, and no significant relation between 1-year shareholder return and a 1-year lagged value of CC.

6.5.1.2 Conditions necessary for successful technology adoption.

The productivity paradox issue of technology adoption-performance highlights the problem that certain conditions are necessary for successful technology adoption. This is an area where the "process" approach researchers mainly focus on understanding how innovation emerges, develops and becomes part of the routine activities of an organisation (Gopalakrishnan and Damanpour, 1997, Van de Ven et al., 1989). As the process of innovation continues in the organisation, specific tasks and roles of organisational participants change (Burgelman and Sayles, 1986). The interaction of events and people at each stage of the process influences events in subsequent stages, determining whether the adoption process will continue or not. Therefore, more studies are needed to provide more information that could aid managers in the adoption process. Nevertheless, a notable lesson that one could extract from this study is that merely adopting technology would not solve the firm's problems or create competitive advantage. There are numerous factors that a firm should possess to 'unlock' the synergistic effect of technology adoption.

6.5.1.3 Corroborates the weakness in the usage of perceived benefits of technology as an indicator.

The results of this study further magnify the weaknesses of using technology perceived benefits as a predictor in organisational technology adoption. While it is becoming more and more difficult to determine the "core proposition" of a technology due to the overlap of the current technology options, firms would find it frustrating that, often, the impact of the adopted technology is not as propagated by the technology vendors. Poon and

Swatman (1999) asserted that some of the benefits of e-business are still unrealised. Hence, this could result in firm's disillusion with their technology strategy. Future technology adoption would in consequence be more uncertain and difficult to plan.

6.6 Explanations of the Final E-Business Adoption Model

Figure 6.1 depicts the new framework based on the findings of this study. In general, the results confirmed our central thesis that technology motivation partially mediates the antecedents and firm e-business technology adoption. Firm technology motivation is influence by its business environment and market orientation culture. Environmental hostility influence firm technology motivation in improving its effectiveness while environmental uncertainty leads firm technology motivation of improving effectiveness and customer retention. Market orientation as well, influence firm technology motivation of improving effectiveness and customer retention.

The selection of the specific e-business initiatives is influence by firm technology motivation. Firms that are motivated to improve its effectiveness would select SCM technology. Firms that possess the technology motivation of improving customer retention would select e-commerce and CRM technology. The adoption "scale" of the specific e-business technology is influence by firm innovativeness and organisational learning. As firm innovativeness increases, so does the scale of e-business technology adoption. Firm organisational learning also influences the "scale" of the e-business project. Adaptive learning would lead to incremental e-business initiatives while generative learning would lead to drastic technology adoption.

We believe the new model of firm e-business technology adoption as in Figure 6.1 provides better explanation. Based from the model, firm technology motivation is largely influence by two major predictors which are business environment and market orientation. Firms that perceived its business environment as hostile would influence its technology motivation of improving effectiveness. The rationale for this motivation is obvious.

Hostile environment represents precarious industry setting and intense competition. Under this market conditions, profit margins are characteristically low. Firms in such environment recognise the importance of having a low costs structure in order to be competitive. Hence, improving operating effectiveness is vital. This would lead firms to focus on its value chain analysis to identify the stages that would most likely impact its effectiveness (cost savings). The inbound interface, which is characterised by the supply-related process, place an enormous importance on reducing costs than in any other interface. Consequently, the corresponding technology for this stage and motive (effectiveness) is SCM.

On the other hand, firms that are operating in an uncertain business environment demand a longer term perspective. As uncertain business environment is characterised by the "amount and unpredictability of change in customer tastes, production or service technologies, and the modes of competition in the firm's principal industries" (Miller and Friesen, 1978), firms technology motivation consists of both operational as well as strategic. In overcoming environmental uncertainty, firms strive to improve its operating efficiencies and effectiveness as well as retaining current customers. This will lead firms to adopting cost savings technology (i.e. SCM) as well as customer facing technology (i.e. e-commerce and CRM).

The model also demonstrates that market orientation influence firm technology motivation. The "balanced" view of market orientation which includes short and long term focus influence firm technology motivation to include operational as well as strategic motives. As such, market orientation influence firm technology motivation of improving effectiveness and customer retention. Similarly, this will lead firms to adopt the related e-business technologies in achieving the intended motives.

The "internal factors" which consists of firm innovativeness and organisational learning determines the magnitude of firm e-business adoption. Firms that possess higher innovativeness (more receptive to new ideas and high risk taker) are more willing to experiment with a much greater scale of e-business technology. In addition, the magnitude

of firm e-business adoption would also depend on the "dominant" influence of the organisational learning in the firm. The scale of the adopted technology is the outcome between the gradual learning and or radical learning culture of the firm.

While we argued that the final model provides more credence in explaining firm adoption of e-business technology, the model differs with our initial theoretical framework. In the earlier model, we proposed that firm organisational culture which comprises of market orientation, innovativeness and organisational learning influence firm technology motivation. However, our findings demonstrate that the constructs represent two different perspectives which are outward and inward focus. Market orientation represents the outward focus influencing firm technology motivation through its broad and longer-term focus. The outward focus will enable firms to detect and fill gaps between what the market desires and what is currently offered. Consequently, pertinent motivations in achieving the specific outcome are derived.

On the other hand, the "inward focus" variables of innovativeness and organisational learning lead firms toward pro-innovation. Firms oriented to technological innovation may or may not have customers in mind. The changes could be technologically driven, where innovativeness is motivated by the technological advancements and has little to do with the customers or business environment. Hence, technology is adopted with out any clear motive. This illustrates the pro-innovation bias where it is assume that the adoption of a given innovation will produce beneficial results for its adopters.

6.7 Conclusion

This study extends the continuing number of researches carried out on the antecedents of new technology adoption among firms. Although research on technology adoption began almost twenty years ago with quite a large number of articles bearing on organisational technology adoption (Allen, 2000), the subject remains an important area of research inquiry in marketing (Plouffe et al., 2001) and continues to draw attention from new researchers (Avlonitis et al., 1994). Our study differs, as we looked at organisational culture (market orientation, organisational learning and innovativeness) and the firm's business environment as factors that influence a firm's adoption of new technology. Although various scholars have acknowledged the possible linkage between the specific aspect of organisational culture (e.g. market orientation, organisational learning and innovativeness) to firms' innovation/technology adoption (Kohli and Jaworski, 1993; Narver and Slater, 1995), there is limited empirical evidence with anecdotal evidence linking these constructs to technology adoption (Easterby-Smith, 1997; Lukas and Ferrell, 2000; Morgan et al., 1998). This study proposed a new construct called technology motivation. The findings of the study demonstrate that it is a better predictor of technology adoption especially when there are many technology options in the market.

The results of this study have confirmed some of the conceptual framework developed as in Figure 2.2 (page 74). Figure 6.1 depicts the new framework based on the findings of this study. In general, the results confirmed our central thesis that technology motivation partially mediates the antecedents and firm e-business technology adoption.

In conclusion, the key findings from the present study are:

a) Technology motivation partially mediates the antecedents and e-business technology adoption relationship.

b) Technology motivation influences the choice of e-business initiatives.

c) Top management support and external pressure do not reinforce the firm technology motivation and e-business adoption relationship.

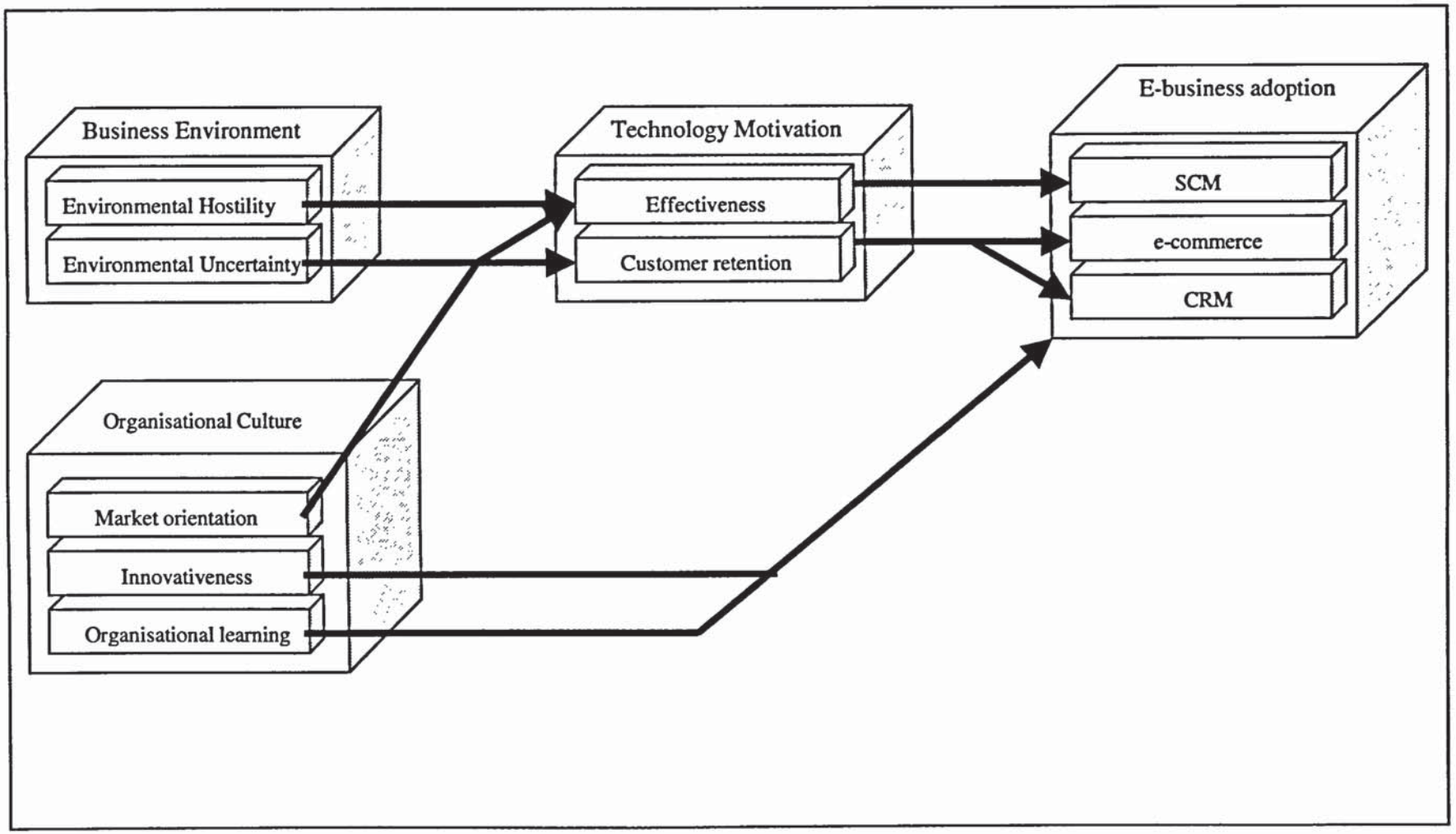
d) Market orientation influences firm selection of technology motivation.

e) Environmental uncertainty and hostility influence firm selection of technology motivation.

f) Innovativeness and organisational learning influence the magnitude of e-business technology adoption.

g) Firm adoptions of e-business technology do not affect organisational performance.

Figure 6.1: Firm E-business Adoption Model



CHAPTER SEVEN: SUMMARY AND CONCLUSIONS

This chapter summarises all the chapters that were written in this thesis. In summarising each of the previous chapters, the main points or contribution are highlighted. Subsequently, a conclusion of the overall thesis is provided, commenting on the general motivation of the research, gaps and findings. In elaborating the research findings, the research contribution was discussed with implications for practitioners or managers. Finally, the limitations of the research are stated, in addition to avenues for future research.

7.1 Summary of Chapters

Chapter one highlighted the importance of organisational innovation adoption in light of today's dynamic and competitive business landscape. Scholars and practitioners have long recognised the importance and contribution of innovation in developing firm competitiveness, industry growth and expanding economy. Nevertheless, despite the proliferation of innovation studies from various fields, researchers continue to disagree on the causes and effects of organisational innovation adoption. In addition, previous studies tend to emphasise a particular set of variables and also fail to include organisational culture-based predictors, despite recognising its importance. The author also highlighted the lack of resources regarding firms' motivation in adopting a technology. In light of the current e-business technology, little is known about firms' motivation in adopting the specific e-business initiatives and its effects on firms' performance. Attention was drawn to the dearth of innovation research in developing economies. Consequently, numerous research objectives were set up to address these issues. The chapter ended by providing general information on Malaysian economy and ICT take up as a background.

Chapter two provided an elaborated review and discussions of the subject under study. Apart from providing the operational definition of the chosen constructs, the author justified its selection. Initially, organisational innovation was defined as the adoption of an

idea or behaviour, whether a system, policy, programme, device, process, product or service, perceived as new to the adopting organisation (Daft 1982; Damanpour, 1991,1992; Damanpour and Evan 1984; Zaltman et al., 1973). Meanwhile, as the adoption of any form of technology by a firm may be regarded as an innovation (Ilori and Irefin, 1997), e-business was chosen due to its importance and relevance in the current business scenario. Another notable contribution in this chapter was the conceptualisations of technology motivation. The section discussed in depth the rationale and elements of technology motivation.

The literature review of organisational innovation adoption identified "organisation-technology-environment" characteristics as a theoretical framework in numerous studies. However, this study differs, in that the organisational characteristics are represented by organisational culture-based constructs, namely, market orientation, organisational learning and innovativeness. Meanwhile, firm business environment is composed of environmental uncertainty, hostility and heterogeneity. Within the technology motivation and e-business adoption relationship, top management support and external pressure are recognised as moderators that would influence the strength of this relationship.

The chapter concluded by reviewing the technology adoption and organisational performance relationship. The review found that this aspect has been neglected due to the "pro-innovation bias", which assumes adoption of a given innovation will produce only beneficial results for its adopters (Rogers, 1983). For this reason, previous studies tended to explore the factors related to the adoption of technological innovation by organisations, rather than the effects of innovations on organisational performance. Finally, chapter two concluded by illustrating the proposed theoretical framework adopted in this study.

In chapter three, various hypotheses regarding the proposed relationship of the stated constructs were discussed and developed in light of relevant literature. The study proposed six main hypotheses and sixty-six sub-hypotheses of the various relationships. The central hypothesis of this study was that technology motivation influences e-business adoption. Derivatives of hypotheses were later developed, based from the argument that firm

technology motivation "dictates" the selection of e-business initiatives: ERP, SCM, CRM and e-commerce. Meanwhile, the antecedents of technology motivation, which comprise market orientation, organisational learning, innovativeness and business environment, were hypothesised to influence firm technology motivation. Firm technology motivation consists of increasing firm efficiencies, effectiveness, competitiveness, market growth and customer retention.

Within the technology motivation and e-business adoption relationship, the study hypothesised that the relationship would be further strengthened in the presence of top management support and external pressure. Finally, it was hypothesised that firm adoption of e-business would result in improved organisational performance. Regarding the anticipated effects of the specific e-business initiatives on firm performance, subsequent sub-hypotheses were constructed. These concerned of the four e-business initiatives and the three measures of organisational performance, namely market performance, financial performance and customer performance.

Chapter four covered issues related to research methodology and scale development used in this study. The research design consisted of two approaches, exploratory and descriptive. The goal of the exploratory study was to identify the key issues and determine whether other possible factors not covered in previous research exist in the context discussed, while the descriptive study aimed to verify and test the hypotheses and to enable the results to be generalised. The data for the former method were collected by means of semi-structured interviews, while a mail survey was chosen for the descriptive method. The population of this study was Malaysian manufacturing firms drawn from the Federation of Malaysian Manufacturers 2001 directory. Systematic sampling was done, where 1700 questionnaires were addressed personally to the most senior manager of the firm, such as the managing director, general manager or senior manager.

The final usable sample consisted of 153 responses, making an effective response rate of 10.39 %. It was explained how the measures of all the constructs were subjected to a scale development and validation procedure as suggested by Churchill (1979) and Gerbing and

Anderson (1988) which consists of an assessment of the scale reliability, unidimensionality and convergent validity. A final test of discriminant validity was also conducted on the constructs. The chapter concluded by explaining the general testing method adopted in this study, which consisted of multiple regression and structural equation modelling (SEM).

In chapter five, the results of the hypothesis-testing were presented. Dual analysis approaches were adopted, where multiple regression was used to conduct the "finer" analyses while structural equation modelling was used to test the model. The data provided support for the study hypotheses and verified the theoretical model. The multiple regression results showed that technology motivation partially mediates the relationship between the antecedents and e-business adoption. The results demonstrate that firms with technology motivation of improving effectiveness would most likely adopt "cost saving technologies" like SCM. However, firms that intended to improve their customer retention as their technology motivation would most likely adopt "customer interface technologies" like e-commerce and CRM.

The overall results illustrated that organisational culture was a significant predictor of firm technology motivation. Market orientation was found to be a strong predictor, which was significant in all the hypothesised relationships. Meanwhile, firms in an uncertain business environment showed a significant positive relationship with the technology motivation of improving effectiveness and customer retention. Firms in a hostile business environment tended to focus only on improving effectiveness. Heterogeneity of the business environment does not influence firm technology motivation. The results also showed that top management support and external pressure do not strengthen firm motivation of adopting e-business technology. Finally, the results showed that firm adoption of e-business technology does not affect organisational performance. In conclusion, the SEM analysis suggested a modification of the theoretical framework where market orientation and firm business environment influence technology motivation while innovativeness and organisational learning influence e-business adoption.

Chapter six addressed the results of the study and elaborated on their implications. The discussion was organised based on the hypothesised relationships and previous studies were highlighted in providing the rationales and support. The results in general were consistent with previous studies. The discussions were supported by the findings of both methods adopted in the study. In a nutshell, the findings emphasised that a culture of "receptivity to change" is essential in influencing firm technology adoption, while market orientation is dominant in influencing firm technology motivation. The findings also demonstrated that technology motivation influences the choice of e-business initiatives.

7.2 Conclusion

Recognising the ongoing spread of new technologies and their importance for future growth, this study was undertaken to determine the factors that motivate firm adoption and selection of the various e-business initiatives. In the process of coming up with the theoretical framework for the study, various gaps in the literature were found. These include the weaknesses of the current predictors (e.g. perceived benefits), "neglect" of various sets of relevant variables and the motives of the particular technology adoption. Little is also known about the influence of organisational culture on technology adoption, although its importance is repeatedly stressed elsewhere. In addition, the exaggeration or hype reported in the media about the effects of this new "breed" of technology presses the need for empirical evidence to these claims.

Therefore, this study has taken an initial step towards remedying this lack of knowledge by developing a new construct called technology motivation, by incorporating organisational culture-based predictors and by examination of the effects of the various e-business initiatives on firm performance. The results from the study indicate that the predictors and initiation of technology adoption in Malaysia are similar to those found in the literature (mainly from developed economies). What is interesting to note is that the attitudes of managers in Malaysia resemble those of managers in industrialised countries as reported in previous studies. While they may assign them different weights, they both

display awareness of the same internal and external factors necessary for new technology adoption. In addition, the results showed that firms need to have the "appropriate organisational culture" in order to be successful in adopting new technology. Nevertheless, in terms of the scale of e-business adoption, most of the sample companies still have a long way to go towards implementing a fully integrated e-business system.

Finally, the study also confirms the usefulness of the technology–organisation–environment framework for studying adoption of technological innovations. The decision to adopt technology is not primarily based on the characteristics of the technology itself. In the case of e-business adoption, the decision also depends upon other factors related to the internal organisation and the external environment. We expect that our research framework is able to explain technology adoption in other areas where other relevant technologies play a significant role. Future work is needed, however, to re-examine the proposed model in other settings, for instance in a business-to-consumer context, and/or with other technology innovations.

7.3 Research Contribution

This thesis makes contribution to both theory and practice. Previous studies on innovation adoption have primarily taken an organisational theory perspective and explored the "visible" organisational determinants of innovation adoption (Damanpour, 1988, 1991; Saleh and Wang, 1993). We contribute to the existing literature on organisational innovation adoption by incorporating and "formalising" the three sets of variables that influence firm propensity to adopt an innovation, which are organisational characteristics, technology characteristics and environmental characteristics.

Next, we incorporated an organisational culture-based predictors consisting of market orientation, organisational learning and innovativeness. To the best of our knowledge, no study has used the three-culture perspective constructs in tandem, despite previous studies

propagating their relevance to each other and their relationship towards innovation. In addition, by incorporating these constructs, this study answers the call by Webster (1994) to broaden the "outward focus" organisational culture constructs.

Third, we defined and developed the construct of organisational technology motivation. While firm's motive for adoption has been indirectly alluded in prior research, we systematically operationalised and measured it reliably using a survey of 153 managers. We also established the distinctiveness of firm technology motivation from the other adopted constructs of innovativeness. The new construct of technology motivation that is developed in this thesis offers interesting opportunities for future research on adoption of other technology.

Fourth, in incorporating e-business as an organisational innovation, we addressed the calls for research in this important domain (MSI, 2000). In addition, this research also recognises e-business as a unique technology comprising all the different dimensions of innovation. The recognition of innovation as a phenomenon consisting of a multiple dimension responds to the weakness of previous research in treating innovation as a single dimension (Cooper, 1998).

Fifth, this study fills a gap in innovation research in developing economies. It is also an attempt to quantify in an area where research on e-business adoption by Asian firms is very limited (Kendall et al., 2001; Mehrtens et al., 2001). It is expected that the quantitative and qualitative nature of this study would provide a better understanding of the issue, particularly in relation to e-business adoption and its effect on firm performance.

Finally, the findings of this study are also expected to be useful to policy makers. Technology is not just an enabler of organisational processes but is increasingly becoming the core of a firm business strategy (Orlikowski, 1992). For government bodies or others whose mission is to support business, to promote e-business diffusion and assimilation in

firms, one implication would be to assist organisations in identifying and incorporating e-business technology in the respective business process that would enhance firm's competitiveness in competing in the new global business environment. This would also imply finding appropriate ways to identify and transmit the required knowledge to the owner-managers of these firms. This could involve government reviewing its policies and incentives in promoting the adoption of technology in the manufacturing industry.

7.4 Management Implications

Given the importance of widespread adoption for the success of e-business and the slower than expected growth of e-business in Malaysian firms, there is certainly a need to understand more about what factors are important in the adoption of e-business. This study represents an early attempt to examine the technology motivation in e-business adoption that was theoretically grounded in a technology-organisation-environment framework. For practitioners and managers, the findings have considerable significance.

Initially, the identification of organisational culture antecedence of technology adoption could provide insights on how managers and firms can proactively manage new technologies in firms. Previous studies have shown that some organisations are "unreceptive" to new technologies that render new technological investments a useless expense. Firms cannot afford to invest the money, time and additional resources to bring in technologies that are not going to be used as intensively as would be favourable for achievement of their motives and objectives.

The results of the study demonstrate that firms need to inculcate the culture of "receptivity to change" in adopting and accommodating new technology in firm business process. The culture of receptiveness to new ideas would turn firms to being avant-garde in experimenting new ways of improving its business process and strategic vision. In addition, firms that possess an "outwardly focused" organisational culture would be able to recognise the gap between what the market needs and what is offered and successfully

direct resources toward filling that need. This would lead to the appropriate technology motivation for adoption that can ultimately determine the suitable technology. Firms that possess these organisational cultures could prevent "failed" technology adoption and/ or improper investment. On the other hand, from the perspective of the technology seller firm, understanding the technology motivation of their customers is crucial in developing effective marketing strategies for their product. Hence, the identification of firm technology motivation would assist technology marketers in developing segmentation strategies for their products.

The management implications of firm technology motivation are worth elaborated. As argued in chapter six, Swink (2000) has raised the argument that in the process of supporting and advocating technology adoption, top management could lead to management interference. The management may exert undue influence in the adoption of a particular technology of his/her choice or merely adopt technology for "technology's sake". The entrepreneurial activity of managers towards pro-innovation could lead firms to "manager's focus" or "technology focused" instead of the more appropriate market-oriented focused or "outwardly focused". The effects of such actions are detrimental where it is likely that the adopted technology will fail due to "inappropriate" technology selection or the organisations being "unreceptive" to the new technology.

The findings of this study also illustrate and substantiate Fahy and Hooley's (2002) argument that in the e-business era, the fundamentals of strategic marketing are still relevant and should not be dismissed. Businesses that wish to incorporate e-business technology can still apply the conventional strategy models as asserted by Porter (2001). Finally, as shown in previous studies and the findings of this study, firms need to persist with their adopted strategies, as the benefits of e-business technologies may not be obtained in a short period of time. Once again, this demonstrates the necessity of the appropriate organisational cultures to ensure firm "endurance" in competing in the market.

7.5 Limitations

As with any research endeavour, this research suffers from some methodological limitations. We discuss these limitations and suggest ways in which future research can overcome these limitations and strengthen the findings of this research. First, the variance explained (R^2) of the empirical findings in the multiple regressions was small, indicating weak relationship. As such, the results of this study should be used with caution. In addition, the sample size in this study is relatively small compared to the number of constructs and proposed relationships. A large sample would enable more rigorous analysis using SEM for the respective sub-hypotheses.

Second, in the process of purifying and validating our constructs, a few measures produced results below the recommended value suggested by previous researchers. The measurements affected in this way are competitiveness, market growth and efficiencies in technology motivation; ERP in e-business; and market performance in organisational performance. Hence, due to the rigorous standards in conformance with previous studies, the measurements were deemed "psychometrically" inappropriate for further analysis. Consequently, this contributes towards the variance in the initial theoretical framework and the final theoretical model. The subsequent paragraphs discussed the strengths and weaknesses between the two theoretical models.

To start with, the strength of the initial theoretical framework lies in its composition of constructs where it covers a comprehensive range of variables that are hypothesised to influence firm technology motivation, influence the choice of e-business technology and its effects on firm performance. The firm technology motivation also consists of five different types of themes. The initial theoretical framework looked into the possibility of the moderation effects of firm technology motivation and the choices of e-business technology. There are few studies that include moderating effects in their theoretical framework. However, the comprehensive range of variables adopted in this model entailed that the study acquire a substantial number of sample size to fulfil the requirements for a valid analysis.

Hence, the final theoretical framework offers a more balance view between comprehensiveness and practicality for model testing. The latter model depicts a parsimonious composition which reduces the strain of sample size-parameter concerns. In addition, the "simple" relationship between each construct provides greater understanding by coming up with numerous plausible reasons for such association. In a nutshell, the final model provides more credence to the model of firm e-business adoption. Nevertheless, the trade-off of a parsimonious model is undoubtedly the ability to shed more light on specific relationship.

7.6 Future Research

Adoption of technology is one of the important areas of research in the organisational innovation adoption. Nevertheless, after an innovation is adopted, a related issue of managerial interest is to study what happens to an innovation after it is adopted. How well does innovations fare in the firm once they are adopted and why do they exit the organisation? Hence, it would be quite interesting to know whether technology motivation and the organisational culture-based predictors like market orientation, organisational learning and innovativeness continue to play a significant role after technology is adopted. Although past research suggest that factors facilitating the adoption of innovation may be quite different from those facilitating the performance of an innovation (Downs and Mohr, 1976), we have reasons to believe that the predictors used in this study would continue to have significant effects.

We tested our model of organisational innovation adoption using the presently important context of e-business. It is possible that the choice of e-business may have affected the generalisability of the results, due to the multi-dimensional facets of the technology. Hence, an important avenue for further research would be to replicate and extend this research design in the context of other technologies and/ or to other countries. This would enable the generalisability of the findings reported here to be tested. Finally, our model is designed to explain technology adoption among existing firms and not dot.coms, for

various reasons specified earlier. It would be interesting to find out whether the model could explain technology adoption in dot.com firms and determine the technology motivation of the selected technology.

Finally, the cross-sectional nature of the data used in our study restricts conclusions to those of association and not causation. Hence, a fruitful extension of this research could be to collect data via a longitudinal study. Such a method would provide stronger support for our model and alleviate concerns about justification bias. In addition, by adopting the longitudinal approach, more information on the adoption process could be obtained.

7.7 Concluding Remarks

In conclusion, this study has fulfilled its goal and expectations initially set at the beginning of the study. Despite the limitations faced in this research, the work presented here makes a significant contribution in the field of organisational innovation adoption, information technology and strategic marketing/management. The study provides the empirical evidence crucially required to substantiate the anecdotal accounts on some of the proposed relationships. Finally, although e-business is a dynamic and evolving technology, we believe that the findings obtained in this study would still be beneficial in providing the necessary guidance for firm technology adoption.

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SURVEY ON ORGANIZATIONAL TECHNOLOGY ADOPTION

1. Listed below are a number of statements that managers described about their markets. How would you characterize the industry in which you operate? Please circle the scale closest to your views.

	Strongly Disagree 1	Disagree 2	Neither Agree nor Disagree 3	Agree 4	Strongly Agree 5
Very dynamic, changing rapidly in technical, economic and cultural dimensions	1	2	3	4	5
Very risky, one false step can mean the firm's undoing	1	2	3	4	5
Very rapidly expanding through the expansion of old markets and emergence of new ones	1	2	3	4	5
Very stressful, exacting, hostile, hard to keep afloat	1	2	3	4	5
Competition in our industry is cutthroat	1	2	3	4	5
There are many promotion wars in our industry	1	2	3	4	5
Anything that one competitor can offer, others can match readily	1	2	3	4	5
Price competition is the hallmark of our industry	1	2	3	4	5
One hears of a new competitive move almost every day	1	2	3	4	5
The diversity in our marketing practices needed to serve our different customers has substantially increased	1	2	3	4	5
The product preferences of price/quality of my clients are substantially diversified	1	2	3	4	5
The types of business of my clients are substantially diversified	1	2	3	4	5

2. The statements below describe norms that operate in business. Please indicate your extend of agreement about how well the statements describe the actual norms in your organization.

	Strongly Disagree 1	Disagree 2	Neither Agree nor Disagree 3	Agree 4	Strongly Agree 5
Our salespeople regularly share information within our business concerning competitors' strategies	1	2	3	4	5
Our business objectives are driven primarily by customer satisfaction	1	2	3	4	5
We rapidly respond to competitive actions that threaten us	1	2	3	4	5
We constantly monitor our level of commitment and orientation to serving customers' needs.	1	2	3	4	5
Our top managers from every function regularly visit our current and prospective customers	1	2	3	4	5
We freely communicate information about our successful and unsuccessful customer experiences across all business functions	1	2	3	4	5

	Strongly Disagree 1	Disagree 2	Neither Agree nor Disagree 3	Agree 4	Strongly Agree 5
Our strategy for competitive advantage is based on understanding of customers' needs	1	2	3	4	5
All of our business functions are integrated in serving the needs of our target markets	1	2	3	4	5
Our business strategies are driven by our beliefs about how we can create greater value for customers	1	2	3	4	5
We measure customer satisfaction systematically and frequently.	1	2	3	4	5
We give close attention to after-sales service	1	2	3	4	5
Top management regularly discusses competitors' strengths and strategies	1	2	3	4	5
All of our managers understand how everyone in our business can contribute to creating customer value	1	2	3	4	5
We target customers where we have an opportunity for competitive advantage	1	2	3	4	5
We take great notices of government incentives	1	2	3	4	5
We are keen to respond on government incentives where possible	1	2	3	4	5
Whenever possible, we would tap on government incentives and policies	1	2	3	4	5

3. Here are some other statements managers have made about their business approach. How far do the following statements describe your company's approach? Please circle the scale closest to your views.

	Strongly Disagree 1	Disagree 2	Neither Agree nor Disagree 3	Agree 4	Strongly Agree 5
Our company frequently tries out new ideas	1	2	3	4	5
Our company seeks out new ways to do things	1	2	3	4	5
Our company is creative in its methods of operation	1	2	3	4	5
Our company is often the first to market with new products and services	1	2	3	4	5
Innovation in our company is perceived as too risky and is resisted	1	2	3	4	5
Our new product introduction has increased over the last 5 years	1	2	3	4	5
Constructive feedback is given to all employees on how they are doing	1	2	3	4	5
Employees are encouraged to undertake training and development activities	1	2	3	4	5

	Strongly Disagree 1	Disagree 2	Neither Agree nor Disagree 3	Agree 4	Strongly Agree 5
Employees share training/development learning lessons with others	1	2	3	4	5
Employees share knowledge and resources	1	2	3	4	5
Company goals are made clear to all employees	1	2	3	4	5
Employees, suppliers, customers are all encouraged to let know if anything is going wrong	1	2	3	4	5
Employees are not afraid to voice differing opinions	1	2	3	4	5
Company is always willing to change working practices	1	2	3	4	5
Company is always on the lookout for new ideas from any source	1	2	3	4	5

4. Listed below are several e-Business initiatives adopted by other organizations. Kindly provide us with the information *EVEN* if your organization is **NOT** using any of these technologies. Your information is important to us.

	No 1	Under Implementation 2	Implemented (0-1 yr) 3	Implemented (1-2 yr) 4	Implemented (above 2 yr) 5
Our organization has a corporate web site	1	2	3	4	5
We response to customers' quotations through email/Internet	1	2	3	4	5
Customers have access to our electronic catalogues of products	1	2	3	4	5
We have an eCommerce site where we sell products to customers	1	2	3	4	5
Our eCommerce sites are available through online business portal	1	2	3	4	5
We accept Electronic Fund Transfer (EFT) or other electronic payments	1	2	3	4	5
We use email to request for quotations to our suppliers	1	2	3	4	5
We have an extranet connecting our organization with our suppliers	1	2	3	4	5
We have access to electronic catalogues of major suppliers	1	2	3	4	5
We participate in online business portals and auctions	1	2	3	4	5
We have automated most of our purchasing activities	1	2	3	4	5
We use the Internet in purchasing our indirect material/MRO	1	2	3	4	5
We use the Internet in purchasing our direct material	1	2	3	4	5
We provide our sales force with laptop computers and mobile phones in dealing with customers	1	2	3	4	5

	No Implementation 1	Under Implementation 2	Implemented (0-1 yr) 3	Implemented (1-2 yr) 4	Implemented (above 2 yr) 5
We used call centres to manage customers interaction	1	2	3	4	5
Our email system enables employees to receive and share information.	1	2	3	4	5
Our corporate Intranet enables employees to access information on our functional activities.	1	2	3	4	5

5. Listed below are a number of factors that influence managers in their e-Business decisions. Please indicate your extend of agreement about how well it described your decision-making.

	Strongly Disagree 1	Disagree 2	Not Sure 3	Agree 4	Strongly Agree 5
Top management enthusiastically supports the adoption of these new technologies	1	2	3	4	5
Top management has allocated adequate resources to adoption of these new technologies	1	2	3	4	5
Top management is aware of the benefits of these new technologies	1	2	3	4	5
Top management actively encourages employees to use the new technologies in their tasks	1	2	3	4	5
Our suppliers recommend that we adopt these technologies	1	2	3	4	5
Our suppliers request that we adopt these technologies	1	2	3	4	5
Our suppliers threaten that we adopt these technologies to continue doing business with them	1	2	3	4	5
Our customers recommend that we adopt these technologies	1	2	3	4	5
Our customers request that we adopt these technologies	1	2	3	4	5
Our customers threaten that we adopt these technologies to continue doing business with them	1	2	3	4	5

6. Listed below are motives which are commonly associated with e-Business benefits. How far would you agree these motives were important in your decision making.

	Not Important 1	2	3	4	Critically Important 5
Competitiveness					
Improves competitive positioning	1	2	3	4	5
Improves firm's image within the industry	1	2	3	4	5
Improves relationship with suppliers and customers	1	2	3	4	5
Market growth					
Increased generation of sales leads	1	2	3	4	5

	Not Important 1	2	3	4	Critically Important 5
Generate new business	1	2	3	4	5
Gaining access to new customers	1	2	3	4	5
Efficiency					
Improved efficiency in business transaction	1	2	3	4	5
Reduced operating costs	1	2	3	4	5
Less paperwork-fewer order forms	1	2	3	4	5
Effectiveness					
Increased effectiveness in business transaction	1	2	3	4	5
Operate with fewer assets	1	2	3	4	5
Improve market information	1	2	3	4	5
Customer Focus					
Improves customer service and support	1	2	3	4	5
Increased customer satisfaction	1	2	3	4	5
Increased customer retention	1	2	3	4	5

7. Over the past financial year, how well has your business performed relative to your main competitors? How well has your company performed on the last financial year? Please rate using the scale below on the following criteria.

Much Worse 1	Worse 2	The Same 3	Better 4	Much Better 5

	Relative to main competitors	Relative to last financial year
Sales growth realized	☐	☐
Market share realized	☐	☐
Return on Investment	☐	☐
Profit margins attained	☐	☐
Customer retention	☐	☐
Customer satisfaction	☐	☐

8. Kindly describes the main industry your company operates in. Although you may operate in several industries, specify the single most important industry.

Automotive & component parts	☐	Pharmaceuticals & Medical equipment	☐
Electrical and electronics products	☐	Plastic Resins & Plastic products	☐
Industrial & Engineering Products	☐	Household products & appliances	☐
		Other_____	☐

9. What is the approximate number of employees in your organization?

Less than 75	☐	150 – 499	☐
76 – 149	☐	More than 500	☐

10. When was your organization established:

Less than 2 years ago	☐
3 – 5 years ago	☐
6 – 10 years ago	☐
11 – 30 years ago	☐
More than 30 years ago	☐

10. Is your organization:

Totally domestically owned	☐
Domestic/Foreign owned	☐
Totally foreign owned	☐

11. What was the approximate turnover of your company in the last financial year?

RM: _____

Thank you very much for your time and cooperation.

ALL INFORMATION GIVEN WILL BE TREATED WITH THE UTMOST CONFIDENTIALITY
IF YOU HAVE ANY QUERIES PLEASE CONTACT

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APPENDIX 2: EXPLORATORY FACTOR ANALYSIS (EFA)

Business Environment:

Communalities

	Initial	Extraction
Dynamic changing in technical, economic, cultural dimensions	1.000	.747
Rapidly expanding of old markets and emergence of new markets	1.000	.725
Cutthroat competition	1.000	.583
Many promotion wars	1.000	.534
Competitors can easily imitate offers/strategies	1.000	.426
Price competition is the hallmark of our industry	1.000	.545
Diversity of marketing practices to serve different customers has increased	1.000	.533
Product preferences of price/quality are substantially diversified	1.000	.732
Types of clients are substantially diversified	1.000	.571

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.523	28.036	28.036	2.523	28.036	28.036	1.997	22.191	22.191
2	1.595	17.721	45.757	1.595	17.721	45.757	1.830	20.328	42.519
3	1.277	14.189	59.947	1.277	14.189	59.947	1.568	17.427	59.947
4	.775	8.612	68.558						
5	.736	8.173	76.731						
6	.640	7.112	83.843						
7	.569	6.319	90.162						
8	.470	5.221	95.383						
9	.416	4.617	100.000						

Extraction Method: Principal Component Analysis.

APPENDIX 2: EXPLORATORY FACTOR ANALYSIS (EFA)

Business Environment:

Component Matrix[a]

	Component		
	1	2	3
Dynamic changing in technical, economic, cultural dimensions	.417	.496	.571
Rapidly expanding of old markets and emergence of new markets		.665	
Cutthroat competition	.521		.451
Many promotion wars	.611		
Competitors can easily imitate offers/strategies	.507		
Price competition is the hallmark of our industry	.510	-.533	
Diversity of marketing practices to serve different customers has increased	.591		
Product preferences of price/quality are substantially diversified	.655		-.538
Types of clients are substantially diversified	.525		-.442

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Rotated Component Matrix[a]

	Component		
	1	2	3
Dynamic changing in technical, economic, cultural dimensions			.853
Rapidly expanding of old markets and emergence of new markets			.824
Cutthroat competition	.711		
Many promotion wars	.704		
Competitors can easily imitate offers/strategies	.646		
Price competition is the hallmark of our industry	.708		
Diversity of marketing practices to serve different customers has increased		.685	
Product preferences of price/quality are substantially diversified		.828	
Types of clients are substantially diversified		.749	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Component Transformation Matrix

Component	1	2	3
1	.682	.642	.350
2	-.665	.346	.662
3	.304	-.684	.663

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

APPENDIX 2: EXPLORATORY FACTOR ANALYSIS (EFA)

Organisational Culture: Market Orientation, Innovativeness and Organisational Learning

Communalities

	Initial	Extraction
salespeople share info within our business concerning competitors strategies	1.000	.368
Business objectives are driven by customer satisfaction	1.000	.565
Strategy for competitive advantage based on customers' needs understandings	1.000	.700
Business functions integrated to serve the needs of target markets	1.000	.596
Business strategies driven by beliefs of how we can create greater value for customers	1.000	.697
Target customers where we have an opportunity for competitive advantage	1.000	.378
Company frequently tries out new idea	1.000	.691
Company seeks out new ways to do things	1.000	.708
Company is creative in its methods of operation	1.000	.713
Company first to mkt with new products and services	1.000	.538
new product introduction has increased	1.000	.642
Employees encourage to undertake training and development activities	1.000	.672
Employees share learning lessons with others	1.000	.829
Employees share knowledge and resources	1.000	.736
Employees, customers and suppliers are encouraged to let know if anything is wrong	1.000	.580
Employees are not afraid to voice out different opinions	1.000	.563
Company is willing to change working practices	1.000	.773
Company is always on the lookout for new ideas	1.000	.660

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.100	39.445	39.445	7.100	39.445	39.445	3.322	18.455	18.455
2	1.855	10.305	49.749	1.855	10.305	49.749	3.060	16.999	35.454
3	1.302	7.231	56.980	1.302	7.231	56.980	2.675	14.859	50.313
4	1.152	6.402	63.382	1.152	6.402	63.382	2.352	13.069	63.382
5	.839	4.663	68.045						
6	.757	4.203	72.248						
7	.709	3.938	76.186						
8	.659	3.661	79.847						
9	.561	3.119	82.966						
10	.513	2.848	85.814						
11	.450	2.499	88.313						
12	.440	2.447	90.760						
13	.401	2.230	92.990						
14	.353	1.960	94.950						
15	.306	1.701	96.652						
16	.236	1.312	97.964						
17	.194	1.078	99.041						
18	.173	.959	100.000						

Extraction Method: Principal Component Analysis.

Component Transformation Matrix

Component	1	2	3	4
1	.549	.560	.463	.414
2	.729	.034	-.580	-.362
3	.198	-.547	-.263	.770
4	.359	-.622	.616	-.324

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

APPENDIX 2: EXPLORATORY FACTOR ANALYSIS (EFA)

Organisational Culture: Market Orientation, Innovativeness and Organisational Learning

Component Matrix[a]

	Component			
	1	2	3	4
salespeople share info within our business concerning competitors strategies	.515			
Business objectives are driven by customer satisfaction	.630			
Strategy for competitive advantage based on customers' needs understandings	.529	.582		
Business functions integrated to serve the needs of target markets	.643			
Business strategies driven by beliefs of how we can create greater value for customers	.677			
Target customers where we have an opportunity for competitive advantage				
Company frequently tries out new idea	.743			
Company seeks out new ways to do things	.760			
Company is creative in its methods of operation	.718			
Company first to mkt with new products and services	.526			
new product introduction has increased				.541
Employees encourage to undertake training and development activities	.580			
Employees share learning lessons with others	.584		.576	
Employees share knowledge and resources	.676			
Employees, customers and suppliers are encouraged to let know if anything is wrong	.679			
Employees are not afraid to voice out different opinions	.670			
Company is willing to change working practices	.680			
Company is always on the lookout for new ideas	.694			

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
salespeople share info within our business concerning competitors strategies	.520			
Business objectives are driven by customer satisfaction	.675			
Strategy for competitive advantage based on customers' needs understandings	.827			
Business functions integrated to serve the needs of target markets	.689			
Business strategies driven by beliefs of how we can create greater value for customers	.762			
Target customers where we have an opportunity for competitive advantage	.570			
Company frequently tries out new idea			.612	
Company seeks out new ways to do things			.637	
Company is creative in its methods of operation			.669	
Company first to mkt with new products and services			.693	
new product introduction has increased			.771	
Employees encourage to undertake training and development activities				.745
Employees share learning lessons with others				.877
Employees share knowledge and resources				.759
Employees, customers and suppliers are encouraged to let know if anything is wrong		.626		
Employees are not afraid to voice out different opinions		.638		
Company is willing to change working practices		.836		
Company is always on the lookout for new ideas		.729		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

APPENDIX 2: EXPLORATORY FACTOR ANALYSIS (EFA)

EFA For Technology Motivation, E-Business Technology and Organisational Performance

Communalities

	Initial	Extraction
Reduce operating costs	1.000	.756
Increase effectiveness in business transactions	1.000	.731
Increase revenues through effectve asset utilization	1.000	.696
Improve customer service and support	1.000	.752
Increase customer satisfaction	1.000	.780
Increase customer retention	1.000	.814
eCommerce sites where products are sold	1.000	.887
Our ecommerce sites are available through online business portal	1.000	.892
Respond to customers quotations through email	1.000	.698
Use email for quotations to our suppliers	1.000	.760
Participate in online business portals and auctions	1.000	.634
Automated most of our purchasing activities	1.000	.650
Return on investment relative to main competitors	1.000	.732
Return on investment relative to last financial year	1.000	.832
Profit margins attained relative to last financial year	1.000	.743
Customer retention relative to last financial year	1.000	.576
Customer satisfaction relative to last financial year	1.000	.496

Extraction Method: Principal Component Analysis.

APPENDIX 2: EXPLORATORY FACTOR ANALYSIS (EFA)

EFA For Technology Motivation, E-Business Technology and Organisational Performance

Component Matrix[a]

	Component				
	1	2	3	4	5
Reduce operating costs	.814				
Increase effectiveness in business transactions	.812				
Increase revenues through effectve asset utilization	.804				
Improve customer service and support	.854				
Increase customer satisfaction	.858				
Increase customer retention	.879				
eCommerce sites where products are sold			.621	-.622	
Our ecommerce sites are available through online business portal			.580	-.655	
Respond to customers quotations through email			.644		
Use email for quotations to our suppliers			.664		
Participate in online business portals and auctions					-.588
Automated most of our purchasing activities					
Return on investment relative to main competitors		.821			
Return on investment relative to last financial year		.897			
Profit margins attained relative to last financial year		.836			
Customer retention relative to last financial year		.658			
Customer satisfaction relative to last financial year		.515			

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Reduce operating costs	.846				
Increase effectiveness in business transactions	.837				
Increase revenues through effectve asset utilization	.822				
Improve customer service and support	.849				
Increase customer satisfaction	.870				
Increase customer retention	.882				
eCommerce sites where products are sold			.924		
Our ecommerce sites are available through online business portal			.933		
Respond to customers quotations through email				.801	
Use email for quotations to our suppliers				.859	
Participate in online business portals and auctions					.761
Automated most of our purchasing activities					.656
Return on investment relative to main competitors		.790			
Return on investment relative to last financial year		.887			
Profit margins attained relative to last financial year		.831			
Customer retention relative to last financial year		.697			
Customer satisfaction relative to last financial year		.576			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

APPENDIX 2: EXPLORATORY FACTOR ANALYSIS (EFA)

Top Management Support and External Pressure

Communalities

	Initial	Extraction
Top management supports the adoption of new technologies	1.000	.765
Top management allocate resources to adopt new technologies	1.000	.708
Top management is aware of the benefits of new technologies	1.000	.632
Top management encourages employees to use new technologies in their task	1.000	.745
Our suppliers threaten that we adopt these technologies	1.000	.509
Our customers recommend that we adopt these technologies	1.000	.798
Our customer request that we adopt these technologies	1.000	.785
Our customer threaten that we adopt these technologies	1.000	.756

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Componen	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.946	36.821	36.821	2.946	36.821	36.821	2.939	36.735	36.735
2	2.751	34.394	71.215	2.751	34.394	71.215	2.758	34.480	71.215
3	.828	10.344	81.559						
4	.488	6.098	87.657						
5	.344	4.301	91.958						
6	.316	3.946	95.904						
7	.239	2.986	98.889						
8	884E-02	1.111	100.000						

Extraction Method: Principal Component Analysis.

APPENDIX 2: EXPLORATORY FACTOR ANALYSIS (EFA)

Top Management Support and External Pressure

Component Matrix[a]

	Component	
	1	2
Top management supports the adoption of new technologies	.857	
Top management allocate resources to adopt new technologies	.820	
Top management is aware of the benefits of new technologies	.785	
Top management encourages employees to use new technologies in their task	.852	
Our suppliers threaten that we adopt these technologies		.710
Our customers recommend that we adopt these technologies		.842
Our customer request that we adopt these technologies		.827
Our customer threaten that we adopt these technologies		.868

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Top management supports the adoption of new technologies	.875	
Top management allocate resources to adopt new technologies	.841	
Top management is aware of the benefits of new technologies	.795	
Top management encourages employees to use new technologies in their task	.863	
Our suppliers threaten that we adopt these technologies		.711
Our customers recommend that we adopt these technologies		.883
Our customer request that we adopt these technologies		.872
Our customer threaten that we adopt these technologies		.843

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

APPENDIX 3: RESULTS OF RELIABILITY TEST

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	DYNAMIC	3.7843	.9524	153.0
2.	EXPAND	3.4575	.9933	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	7.2418	2.8293	1.6820	2

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
DYNAMIC	3.4575	.9867	.4944	.
EXPAND	3.7843	.9071	.4944	.

Reliability Coefficients

N of Cases = 153.0 N of Items = 2

Alpha = .6613

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	CUTCOMP	3.5294	1.0264	153.0
2.	PROMOWAR	3.3464	1.0595	153.0
3.	IMITATE	3.6667	.9319	153.0
4.	PRICECOM	3.8758	.9955	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	14.4183	7.9291	2.8159	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
CUTCOMP	10.8889	4.9020	.4343	.5875
PROMOWAR	11.0719	4.6330	.4765	.5569
IMITATE	10.7516	5.3984	.3839	.6200
PRICECOM	10.5425	4.9604	.4460	.5794

Reliability Coefficients

N of Cases = 153.0 N of Items = 4

Alpha = .6547

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	DIFFMIX	3.7516	.7280	153.0
2.	PRODPREF	3.6601	.8285	153.0
3.	CLIENTYP	3.2810	.9209	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	10.6928	3.6879	1.9204	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
DIFFMIX	6.9412	2.2531	.4140	.6379
PRODPREF	7.0327	1.7423	.5757	.4181
CLIENTYP	7.4118	1.7570	.4435	.6154

Reliability Coefficients

N of Cases = 153.0 N of Items = 3

Alpha = .6603

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	INFOSHAR	3.6601	.8823	153.0
2.	BUSSOBJ	4.3268	.6961	153.0
3.	STRATEGY	4.1961	.6393	153.0
4.	BUSSFUNC	3.9739	.7429	153.0
5.	BELIEF	4.1046	.7086	153.0
6.	TARGET	4.0392	.6871	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	24.3007	9.8432	3.1374	6

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
INFOSHAR	20.6405	6.9028	.4663	.8119
BUSSOBJ	19.9739	7.0651	.6198	.7699
STRATEGY	20.1046	7.2127	.6471	.7666
BUSSFUNC	20.3268	6.8662	.6229	.7683
BELIEF	20.1961	6.8560	.6697	.7585
TARGET	20.2614	7.6680	.4475	.8057

Reliability Coefficients

N of Cases = 153.0 N of Items = 6

Alpha = .8101

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	NEWIDEA	3.7255	.8828	153.0
2.	NEWWAY	3.9542	.7975	153.0
3.	CREATIVE	3.7255	.8976	153.0
4.	MKTLEADR	3.2353	.9649	153.0
5.	NEWPROD	3.5556	.9311	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	18.1961	11.8955	3.4490	5

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
NEWIDEA	14.4706	7.7245	.6911	.7741
NEWWAY	14.2418	7.9740	.7294	.7676
CREATIVE	14.4706	7.5666	.7135	.7671
MKTLEADR	14.9608	7.9590	.5520	.8160
NEWPROD	14.6405	8.4818	.4696	.8378

Reliability Coefficients

N of Cases = 153.0 N of Items = 5

Alpha = .8276

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	GOTRAIN	4.0458	.5887	153.0
2.	SHARELES	3.7320	.6978	153.0
3.	SHARERES	3.7190	.7020	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	11.4967	2.9622	1.7211	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
GOTRAIN	7.4510	1.6703	.6212	.8268
SHARELES	7.7647	1.2732	.7633	.6814
SHARERES	7.7778	1.3450	.6904	.7606

Reliability Coefficients

N of Cases = 153.0 N of Items = 3

Alpha = .8283

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	INFORMED	3.8954	.8285	153.0
2.	SPEAKOUT	3.4706	.9323	153.0
3.	FLEXCOM	3.7059	.8877	153.0
4.	INNOVATI	4.0000	.7947	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	15.0719	7.7119	2.7770	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
INFORMED	11.1765	4.8042	.6117	.7854
SPEAKOUT	11.6013	4.4913	.5950	.7967
FLEXCOM	11.3660	4.2730	.7224	.7322
INNOVATI	11.0719	4.8303	.6441	.7723

Reliability Coefficients

N of Cases = 153.0 N of Items = 4

Alpha = .8190

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	REDUCOST	3.8431	1.0138	153.0
2.	EFECTIF	3.8693	.8247	153.0
3.	ASSETU	3.7059	.9451	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	11.4183	6.3239	2.5147	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
REDUCOST	7.5752	2.6933	.7821	.8317
EFECTIF	7.5490	3.3019	.7813	.8364
ASSETU	7.7124	2.9299	.7729	.8341

Reliability Coefficients

N of Cases = 153.0 N of Items = 3

Alpha = .8830

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	CUSERVE	4.0915	.8457	153.0
2.	CUSATIS	4.0392	.9451	153.0
3.	CUSRETEN	3.8562	1.0027	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	11.9869	6.8288	2.6132	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
CUSERVE	7.8954	3.5021	.8250	.9157
CUSATIS	7.9477	3.0499	.8742	.8716
CUSRETEN	8.1307	2.8907	.8601	.8872

Reliability Coefficients

N of Cases = 153.0 N of Items = 3

Alpha = .9258

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	MGTSUPP	3.8954	.8124	153.0
2.	RESOURCE	3.5948	.8991	153.0
3.	AWARE	4.0915	.6724	153.0
4.	ENCOURAG	3.8758	.8376	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	15.4575	7.4735	2.7338	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
MGTSUPP	11.5621	4.2346	.7713	.8050
RESOURCE	11.8627	4.0797	.7118	.8331
AWARE	11.3660	5.0625	.6474	.8570
ENCOURAG	11.5817	4.1923	.7521	.8128

Reliability Coefficients

N of Cases = 153.0 N of Items = 4

Alpha = .8655

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	SUPTHREA	2.1895	.9087	153.0
2.	CUSTRECO	3.1307	.9576	153.0
3.	CUSTREQU	3.0915	.9274	153.0
4.	CUSTHREA	2.4641	.9735	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	10.8758	9.7542	3.1232	4

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
SUPTHREA	8.6863	6.4141	.5463	.8628
CUSTRECO	7.7451	5.4675	.7525	.7775
CUSTREQU	7.7843	5.6440	.7376	.7850
CUSTHREA	8.4118	5.5333	.7147	.7944

Reliability Coefficients

N of Cases = 153.0 N of Items = 4

Alpha = .8480

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	ECOMMERC	1.7778	1.1598	153.0
2.	BUSSPORT	1.7843	1.1638	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	3.5621	4.8530	2.2030	2

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
ECOMMERC	1.7843	1.3545	.7977	.
BUSSPORT	1.7778	1.3450	.7977	.

Reliability Coefficients

N of Cases = 153.0 N of Items = 2

Alpha = .8875

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	CUSTQUO	3.4379	1.4456	153.0
2.	EQUOTES	3.3007	1.4694	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	6.7386	6.7470	2.5975	2

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
CUSTQUO	3.3007	2.1590	.5880	.
EQUOTES	3.4379	2.0899	.5880	.

Reliability Coefficients

N of Cases = 153.0 N of Items = 2

Alpha = .7405

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	PORTALS	1.5229	1.0393	153.0
2.	EPURCHAS	2.2353	1.4408	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	3.7582	4.4082	2.0996	2

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
PORTALS	2.2353	2.0759	.4182	.
EPURCHAS	1.5229	1.0801	.4182	.

Reliability Coefficients

N of Cases = 153.0 N of Items = 2

Alpha = .5682

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	ROICOMP	3.2549	.8234	153.0
2.	ROIFINAN	3.2092	.9223	153.0
3.	PROFMAFI	3.1307	.9507	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	9.5948	5.9531	2.4399	3

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
ROICOMP	6.3399	3.1074	.7467	.8707
ROIFINAN	6.3856	2.5279	.8778	.7485
PROFMAFI	6.4641	2.7503	.7290	.8883

Reliability Coefficients

N of Cases = 153.0 N of Items = 3

Alpha = .8871

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	CUSTRETF	3.4706	.6495	153.0
2.	CUSTSAFI	3.5425	.7344	153.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	7.0131	1.3682	1.1697	2

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
CUSTRETF	3.5425	.5393	.4268	.
CUSTSAFI	3.4706	.4218	.4268	.

Reliability Coefficients

N of Cases = 153.0 N of Items = 2

Alpha = .5951