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EVALUATING E-BUSINESS MODELS FOR THE UK AND MALAYSIAN COMPANIES

By

Kay Hooi Keoy

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Faculty of Art, Computing, Engineering and Sciences
(formerly School of Computing and Management Sciences)

Sheffield Plallam University
United Kingdom

STATEMENT OF AUTHENTICATION

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not presented this material, either whole or in part, for a degree at this or any other institution.

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ABSTRACT

Despite the benefits offered by e-business, there is a lack of indication that its functionality is being widely harnessed in practice. Research evidence suggests that the fear of lagging behind in adopting the technology (Internet) has rushed many firms to blindly engage in e-business initiatives without deriving much benefit. In addition, firms are facing technical, managerial, and cultural issues while adopting e-business strategies in business, which has resulted in failing to appreciate its potential benefits. In addition, most of the research on e-business depends heavily on qualitative methods such as case studies and anecdotes suggesting a weak connection between theory and measures.

This thesis is inspired by the perceived lack of theory and empirical data to guide and characterise the internet-based initiatives and gauge the scale of their impact on firm performance. It seeks to better understand and utilise the factors that contribute to the success of e-business implementation. Building upon e-business literature, an E-Business Capability (EBC) framework is developed. A questionnaire is designed and data from 143 UK and 208 Malaysian firms is collected to empirically test the model using structural equation modelling (SEM) approach. More specifically, a set of twenty empirical models are tested to ascertain the validity and impact of e-business capability factors (EBC) on business performance. Results from the analyses have revealed that the proposed factors (business strategy, supply chain strategy and e-business adoption) embedded with "technological", "organisational" and "people" (TOP) dimensions, play a significant role in influencing e-business to be implemented successfully in multiple industry sectors. In addition, this study also seeks to add an international dimension to this debate by investigating the influence of EBC factors in the context of developed (UK) and developing (Malaysian) countries.

The results of this study show that the proposed conceptual model is able to provide an efficient framework to assess the firm's readiness for Internet adoption in the hope of reaping the e-business benefits. This theoretical framework has included a number of e-business requirements that need to be taken into consideration within the firm. These specific indicators are able to measure the readiness of a firm for emerging e-business. In addition, these indicators also allow managers to identify which of the factors lack strategic implementation when considering e-business adoption. Therefore, managers are able to evaluate the readiness for current and future e-business development within their firms and how they must enhance "technology" "organisation" and "technology" dimensions within each of the EBC factors to improve e-business performance.

This study is able to guide researchers in how an empirical study may be conducted based on the theoretical foundations in the e-business implementation domain. For practitioners, this study offers a useful framework to assess the "technological" conditions incorporated into each of the EBC factors to leverage e-business initiatives and pursue better e-business performance.

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DEDICATION

This dissertation is dedicated to:

My Parents, Eric Keoy and Annie Low

They gave me unconditional love, encouragement, and support. They provided me with strength, dreams, courage, and determination to move through the final stages of this process. My dream came true due to their love and sacrifices.

I also dedicate this dissertation to:

My Beloved Wife, Wendy Yew

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LIST OF ABBREVIATIONS

Adopt	Adopters
N_Adopt	Non Adopters
AC	Attitudinal Capability
ANOVA	Analysis of Variance
AMOS	Analysis of Moment Structures
AVE	Average Variance Extracted
B2B	Business-To-Business
B2C	Business-To-Customers
BP	Business Performance
BS	Business Strategy
C2B	Customer-to-Business
C2C	Customer-to-Customer
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CR	Critical Ratio
CRM	Customer Relationship Management
DF	DegreeS of Freedom
E-Business	Electronic Business
E-Commerce	Electronic Commerce
EBA	Electronic Business Adoption
EBC	Electronic Business Capability
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
G2C	Government-to-Citizens
GFI	Goodness-of-fit
ICT	Information and Communication Technologies
IS	Information System
IT	Information Technology
JIT	Just in Time
M	Malaysia
MANOVA	Multivariate Analysis of Variance
MG	Multiple Group
MRP	Material Requirement Planning

MRP II	Manufacturing Resource Planning
N_Adopt	Non Adopters
NFI	Normed Fit Index
OC	Organisational Capability
OI	Organisational Infrastructure
OIn	Organisational Integration
PLS	Partial Least Square
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SCM	Supply Chain Management
SCS	Supply Chain Strategy
SEM	Structural Equation Modeling
SE	Standard Error
SME	Small Medium Enterprise
SPSS	Statistical Package for Social Science
TC	Technological Capability
TI	Technological Infrastructure
TIn	Technological Integration
TLI	Tucker-Lewis Index
TOP	"Technology", "Organisation", "People"
UK	United Kingdom
WWW	World Wide Web

CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Internet technology has changed the world's business operations by enhancing cooperation and adoption efficiency as well as adding value to products and enterprises. The Internet is a worldwide collection of interconnected computer networks. In recent years, electronic business has increased the sharing of business information, has built business relationships, and has enhanced business transactions by means of telecommunications networks. This has enormous implications that today's managers need to take into account when formulating and implementing strategies. Firstly, Internet-based technologies are creating new capabilities that are altering the rules of competition. These technologies are allowing businesses to interact with each other and customers in new, faster, smarter, and cheaper ways that are forever changing the competitive landscape. Secondly, even though these new capabilities are fundamentally altering the way business is conducted, the technologies themselves do not create the new conditions. It is the *use* of these technologies by suppliers, buyers, intermediaries, alliance partners, and others that will ultimately determine how the Internet affects a firm's operations.

Since the conception of the Internet, companies have been continually identifying ways to improve service aspects of their business operations. Many companies have used the Internet to improve customers' knowledge of their product/service offerings, increase the visibility of their offerings, integrate many internal and external business processes, reduce operational costs, and expedite customers' ability to get the information they need. In an effort to better understand how companies and customers have benefited from the Internet, many authors have researched this subject to detail the ways that companies have used these advantages to improve their service or value of service. Many industries are using the Internet and many more are identifying the need to do so to remain competitive in the cost and the overall service they offer compared to their competitors and hence achieve the highest level of efficiency and integration through their business-to-business (B2B) and business-to-customer (B2C) business processes. Streamlining processes (that is, identifying and eliminating or at least reducing non-value-added activities in processes) allow businesses to reduce the costs of their services, which improve the value of the service for the customer. The Internet is driving down excess inventory and operating costs in the companies that are learning to use it effectively. Another benefit for companies of using the Internet is the ability of customers to have better access to the information they need in a speedy manner. This improves the overall service to the customer and allows companies to lower their operational costs by reducing the number of customer service representatives and support personnel.

Increasingly, the Internet is being promoted as a means to facilitate collaboration between members of supply chains, to result in cost savings, more operations that are efficient, improved customer service and potential for innovation and new business opportunities (Wagner *et al.,* 2003; Hawkins and Prencipe, 2000; Baldwin *et al.,* 2001; Timmers, 2000). Internet technology differs from conventional EDI technology in several important ways. It is relatively inexpensive. It is based on open standards and therefore supports numerous applications, which can process small transaction volumes cost effectively and can be configured to accommodate changes in users with ease (Hawkins and Prencipe, 2000). It is also a public network that is globally available, providing access to customers and suppliers worldwide. Moreover, applications are not limited to inter-firm transactions. Internet and Web technology can be used within the organisation to manage workflow, co-ordinate activities and improve process efficiency through the sharing of information (Rowlatt, 2001; Gunasekaran *et al.,* 2002). The benefits cited for Internet-mediated e-business solutions over proprietary EDI solutions are summarised as speed, consistency, immediate access, lowered transaction costs, flexibility and extensibility - i.e. the potential to access further applications via a Web-server (Manecke and Schoensleben, 2004).

The success of e-business adoption requires a new level of integration among technologies and business processes (Hsin and Shaw, 2005; Turban *et al.,* 2002). Organisations that implement e-business have shifted gradually from a hierarchical to market oriented structure (Shaw, 2001). In a market-oriented structure, it is not sufficient for e-business technology to automate single processes in isolation, but the technology should assist organisations to manage all critical business processes in a coordinated way in order to reach optimal cost and service performance (Rayport and Jaworski, 2002; Teo and Pian, 2003).

The remainder of this chapter is organised as follows. Section 1.2 presents a brief background concerning the issues that are raised in this research work and the context of this research. Section 1.3 discusses the overall aims and objectives of this research work. Finally, Section 1.4 provides an overview of the structure of this thesis and Section 1.5 summarises this chapter.

1.2 RESEARCH CONTEXT

Despite the obvious benefits offered by Internet-mediated e-business, there is a lack of indication that its functionality is being widely harnessed in practice (Hawkins and Prencipe, 2000; Wagner *et al.,* 2003). Evidence suggests that smaller businesses, in particular, are failing to appreciate its potential benefits (Williams, 2001) and that the majority of e-business transactions continue to be associated with conventional EDI technologies and larger organisations (Hawkins and Prencipe, 2000). The following section draws on a range of published literature to develop a macro view of the causes of this and of the scale of the problem.

Some of the e-business themes that have been investigated include barriers to adoption, benchmarking Internet use, innovation and learning (Pandya and Nikhilesh, 2005), the micro-enterprise and Internet usage (Papazoglou and Ribbers, 2006; Keogh *et al.,* 1998), and entrepreneurship and the Internet (Wilding and Humphries, 2006; Tovstiga and Fantner, 2000; Mullane *et al.,* 2001), e-business adoption issues (Dyche, 2001; Liebermann and Stashevsky, 2002), e-business to business activities (Gattiker *et al.,* 2000) and relationships, trust and security (Kotzab and Teller, 2003; Karimi *et al.,* 2001). Some of the more specific e-business adoptions issues have been investigated relating to competitive advantage, competencies, and technological, organisational and environmental factors (Sanders and Premus, 2005; Lumpkin *et al.,* 2002; Kaefer and Bendoly, 2004). There are other e-business studies that investigate the firm's context that influence the processes by which it adopts and implements technological innovation. These include technology context, organisational context and environmental context (Chen *et al.,* 2005; Rahman, 2004). The following will discuss briefly some of the gaps that exist in the current e-business research that is perceived to be significant for the construction of the research.

Firstly, research indicates (Zhu *et al.,* 2004) that the fear of lagging behind in adopting the technology (Internet) has rushed many firms to blindly engage in e-business initiatives without deriving much benefit. Firms are facing to technical, managerial and cultural issues while adopting e-business strategies (Sato *et al.,* 2001). The research on adoption of e-business can be investigated from three perspectives, namely strategic, operational and behavioural perspectives. Each of these perspectives are believed to have an impact and influence on the adoption of e-business regardless of geographical background and type of business. Therefore, it is important to identify and evaluate the factors that contribute to e-business value and affect the firms' performance.

Secondly, while there is much research conducted in the e-business area (Watson *et al.,* 1997; Zhu *et al.,* 2004; Earl, 2000), only a few reliable theoretical models and scales are available to measure the various facets of e-business adoption. Most of the e-business adoption studies using quantitative and qualitative research methods are largely based upon the experience of e-business adoption in the developed countries (Huang and Zhao, 2004). In addition, there is a lack of guidelines to propose suitable measures for empirical validation and reliability. There are examples of research conducted to examine the strategic use of Internet technologies (Chong, 2001; Ramsey *et al.,* 2003; Ramsey *et al.,* 2004). However, as Chong (2001, p. 3) states, "although there is growing body of literature devoted to the analysis of the technical and operational aspects of electronic business, there is little empirical research on topics relating to the factors that lead to the successful adoption of this emerging technological innovation and business practice". Most of the research on e-business depends heavily on qualitative methods such as case studies and anecdotes (Zhu *et al.,* 2004; Sawhney and Zabin, 2001). Fillis (2004) further states that there has been a lack of empirical quantitative studies to investigate the impact of Internet-based initiatives on firm performance, which suggest a weak connection between theory and measures.

Thirdly, despite the Internet being a global phenomenon, most of the existing studies have focused on one country, predominantly the United States (Watson *et al.,* 1997; Zhu *et al.,* 2004; Seyel, 2000). Most of the research conducted was either in industrialised or developed countries which implies that respondents have reached certain levels of e-business maturity in their business processes. Recent research suggests that theories developed in the context of mature markets and industrialised countries need to be re-examined for the developing countries (Austin, 1990) as these may have very different business conditions (Dewan *et al.,* 2000; Jarvenpaa *et al.,* 1998). There are key differences that exist between developed and developing countries such as in the availability, cost and quality of information and communication technology (ICT) networks, services and equipment (Dooley, 2002; UNCTAD, 2001). Therefore, e-business adoption in developing countries could be different from that in developed countries. The e-business development in the context of developing countries has attracted a lot of research and practitioner interest. Therefore, this research seeks to add an international dimension to this investigation by extending beyond the developed countries.

This research examines the adoption of e-business across multiple industry sectors in the multi-countries context in an effort to identify the relationship between the firms' characteristics to ensure the successful adoption of e-business. In order to achieve this objective, this research will identify and develop a theoretical framework from the strategic, operational and behavioural perspectives to explain their impact on business performance in the context of well-known systems dimensions (i.e. technology, organisation and people). The current study intends to bridge this gap by proposing an e-business capability framework for evaluating a company's e-business adoption from a multi-countries perspective.

1.3 RESEARCH OBJECTIVES

The main aim of this research is to identify and evaluate a comprehensive set of potential capability factors that impact on the success of e-business adoption. The specific objectives of the research can be summarised, as below:

1. To develop a theoretical e-business framework in terms of strategic (business strategy), operational (supply chain strategy) and behavioural (e-business adoption) perspectives to explain its impact on business performance.

2. To appraise the proposed framework in the context of well established dimensions/characteristics (i.e. technology, organisation and people).

3. To empirically test the applicability of the proposed framework for UK and Malaysian companies.

The research findings are anticipated to benefit both researchers and practitioners alike. The identification and validation of e-business success factors will assist companies in their e-business strategic plans both in the developing multi country context.

1.4 OUTLINE OF THE THESIS

The rest of this thesis is divided into seven chapters and is organised as follows:

Chapter Two presents a literature review. The distinction between e-commerce and e-business is considered before an in-depth appraisal of the current literature is discussed. Limitations of previous studies are identified and appraised in the context of developed and developing countries. Syntheses of literature review on the success of e-business adoption from the perspective of "strategic", "operational" and "behavioural" will be discussed. Three major factors contributing to e-business success are identified and elaborated on to provide an overview of the theoretical and empirical bases for investigating the significant relationships of these factors on business performance. The conceptual model is proposed to examine the factors that influence the adoption of e-business through technology, organisation, and people issues. Extensive discussions, on the utilisation of e-business success factors coupled with Internet technology for successful e-business adoption, are provided to serve as the basis for the construction of a research framework for this study.

Chapter Three provides a synthesis of the literature review by focusing on measuring and evaluating e-business through the proposed theoretical framework. The definitions, concepts and themes drawn from the literature review are reaffirmed and the approach to operationalise the research is critically discussed. The research problem, research questions and the research variables are reviewed to provide research hypotheses and sub-hypotheses. Specific hypotheses are formulated to test the proposed conceptual model. This chapter concludes with a brief summary.

Chapter Four presents the research design and methodology employed in this research. Based on the proposed research model and hypothesis development in Chapter 3, this chapter seeks to develop and employ an appropriate research methodology so that the data collected is appropriate for testing the propositions. The first part of the chapter describes an overview of the research starting with identification of the type of research as this determines the method for data collection. The pilot research study is also discussed together with justification on the approach and the research instrument selected for the data collection. The procedure for selecting the research sample, development of the questionnaire, data collection procedures, operationalisation and measurement of the constructs and the corresponding issues of reliability and validity of data collected, are critically discussed. The rationale for the adoption of the methods selected is critically discussed together with the statistical tests administered to establish and validate the results. The intention of this chapter is to demonstrate the robustness of statistical tests that have been employed to undertake evaluation of the research results. This chapter concludes with brief descriptions for each analysis conducted in the subsequent chapters.

Chapter Five presents and discusses the first part of the survey questionnaire results collected from 143 organisations from the United Kingdom and 208 organisations from Malaysia. The development of a valid and reliable measure of the e-business capability concept is explained. Instruments are constructed in response to the findings of sophisticated analytical procedures addressing construct validity and internal consistency. These procedures have ultimately resulted in 41 valid and reliable items/variables instruments to measure the E-Business Capability framework. This chapter demonstrates the psychometric properties of the instrumentation utilised in this study. The presentation and discussion of statistical analysis for the conceptual model instrumentation is demonstrated to show the overall validity and reliability for both the samples collected.

Chapter Six discusses and analyses the second part of the survey questionnaire results. A comprehensive discussion of the data analysis technique (structural equation modelling, SEM) to test the hypotheses. This chapter seeks to test and investigate the impact of the relationships among e-business capability factors on the business performance for the survey companies. Through several analyses, this chapter identifies factors that shape and affect business performance.

Chapter Seven discusses and analyses the third part of the survey questionnaire results. In order to pursue the third research question in this research, multiple group comparison is conducted in which different parameters are constrained to be invariant (same weights) across the two sub-groups (adopter of e-business and non-adopter of e-business) for both samples. This chapter investigates the impact of e-business capabilities on firm performance, comparing between the adopters and non-adopters of e-business across four sub-groups for the UK and Malaysian samples.

Chapter Eight presents the summary of the research work, reviewing the different phases of the research process. The key research findings are presented and critically discussed, and areas for further research are proposed. The research viewpoint on the subject researched is reaffirmed at the conclusion of the chapter. In addition, the limitations and the contributions of the study are discussed, and areas for further research are proposed.

1.5 SUMMARY

This chapter began by discussing the issues that are raised and investigated in this research work. This was followed by presentation of a brief background concerning these issues and the context of this research work. This chapter then provided the overall aim and objectives of this research work and concluded by giving an organised structure for the rest of the thesis.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FOUNDATION

2.1 INTRODUCTION

This chapter provides a comprehensive and critical review of the available literature on e-business research to identify existing gaps that will provide an overall aim for this research work. Firstly, the theoretical and empirical bases for the present investigations are examined by providing an overview of the emergence of the Internet and e-business practices. The results of relevant studies are summarised and the implications for the present investigation discussed. Secondly, the three selected perspectives ("strategic", "operational" and "behavioural") are critically reviewed using relevant literature on the role of these perspectives to provide an overview of the theoretical and empirical bases for investigating the significant relationships of these factors on business performance. In addition, this study has also taken consideration of three main elements, namely "organisational", "people" and "technological" that are inter-dependent and have significant impacts on "strategic", "operational" and "behavioural" perspectives in the success of e-business adoption, hence, increasing the company's business performance.

Discussions of gaps and limitations within e-business literature are critically reviewed and assessed to provide the basis for the construction of a theoretical framework for this research. The research questions that specify exactly what is going to be investigated in this research work will be developed in this chapter based on the identified gaps in the literature. Discussions in this chapter will substantiate the view that the proposed theoretical framework needs to be accounted for in research investigations to assess and identify the gaps that exist in each of these perspectives and its relation to contributing to the success of a company adopting e-business (see Figure 2.1).

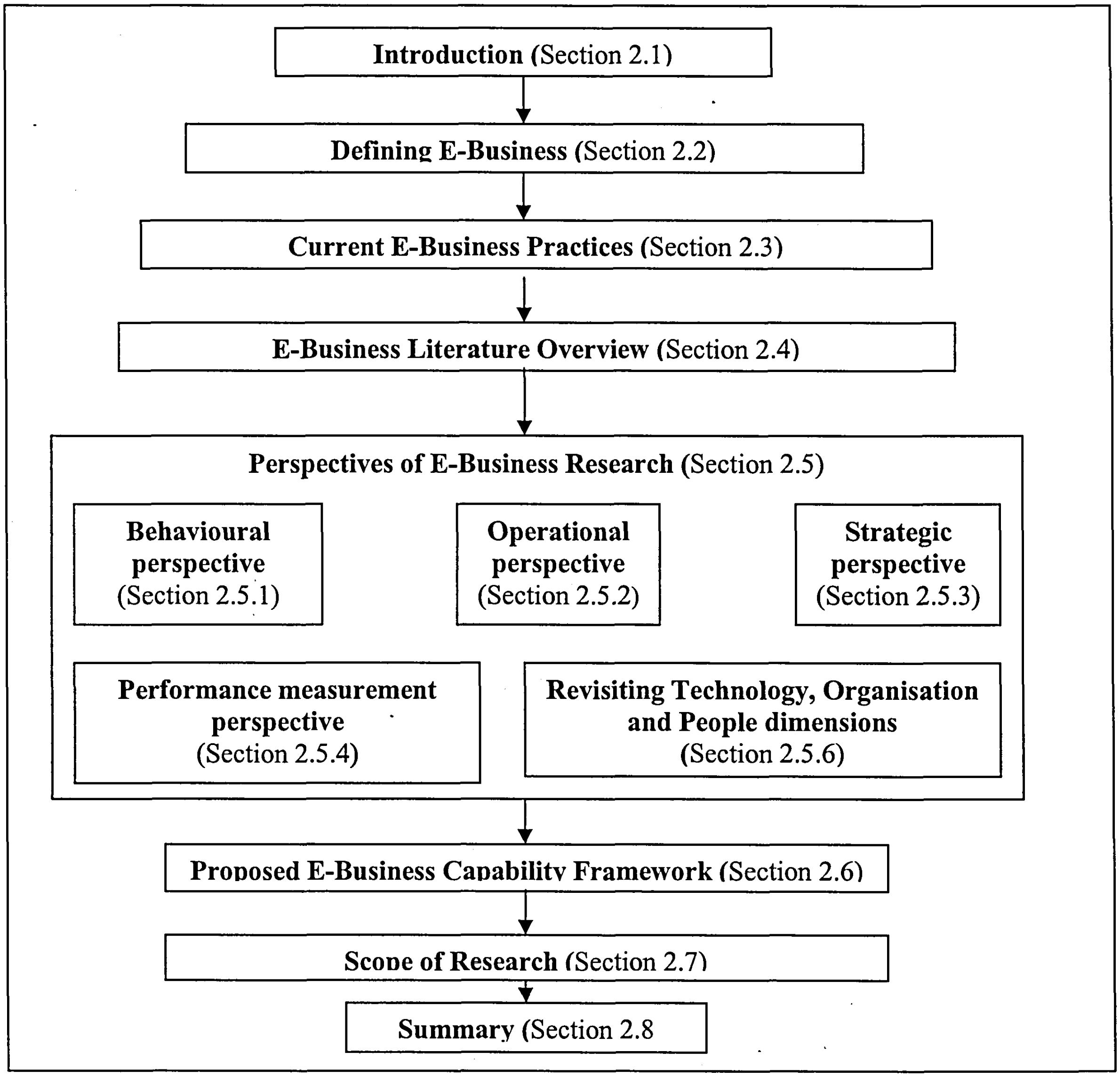


Figure 2.1 Flowchart of Chapter Two

2.2 DEFINING E-BUSINESS

McCole and Ramsey (2004, 2005) state that the emergence of the information economy and the challenges of the global market have secured a strategic place in all firms for electronic commerce (hereafter referred to as e-commerce). E-commerce has been adopted and implemented by companies that have proved its potential for streamlining central organisational policies and procedures. Maguire *et al.* (2001) state that in order for companies to remain competitive in global markets, e-commerce implementation has become an imperative process to consider. This encompasses activities such as; electronic data interchange, having a web site that is linked with key business processes, and capabilities to buy and sell online through front-end and back-end of the supply chain pipeline (Cagliano *et al.*, 2005; Croom, 2005; Fillis *et al.*, 2004; Watson *et al.*, 2000).

However, the subjectivity in the interpretation of the term "e-commerce" has been noted in literature (Hinson and Sorensen, 2006; Banaghan and Bryant, 1998; Malone *et al.*, 1987) and is reflected in widely varying past statistics on current and predicted e-commerce activity (OECD, 2000). As a result, firms are not able to evaluate effectively the need for e-commerce strategies in their organisation if they are not able to gain a grasp of what e-commerce is all about. This is further complicated by the failures of authors to define the term "e-commerce" (Plant, 2000; Maddox and Blankenhorn, 1998). Therefore, it is important to discuss the electronic commerce term to provide a general background before elaborating the electronic business term in more detail.

E-commerce is defined as the activities of buying and selling of goods and services on the Internet and it provides the ability to perform transactions involving the exchange of goods or services between two or more parties using electronic tools and techniques (Simpson and Docherty, 2004; Timmers, 2000). Turban *et al.* (2002, p. 23) define e-commerce as "an emerging concept involving the process of buying, selling, or exchange procedures, services and information via computer networks including the Internet". In addition, Tatnall and Lepa (2003) state e-commerce as the activities of buying and selling of information, products, and services using any one of the thousands of computer networks that make up the Internet. While DTI (2001) defines e-commerce as a means of trading involving the use of electronics, principally through the Internet, for the buying/selling process, including advertising, invitations to treat and the negotiation and conclusion of contracts and performance.

Kalakota and Whinston (1997) define e-commerce from four different perspectives:

- Communication perspective: e-commerce is the delivery of information, products and/or services or payments over a computer network, or any other electronic means.
- Business process perspective: the application of technology towards the automation of business transaction and workflows.
- On-line perspective: the capability of online buying and selling involving information sharing.
- Service perspective: a tool that addresses the desire of the organisation, consumers and management to reduce service costs while improving the quality and increasing the speed of service delivery.

It should be noted that there is a difference between e-commerce and e-business in terms of business benefits, extent of organisational change and sophistication, in that e-commerce is part of e-business (Simpson and Docherty, 2004; Searle, 2001). Searle (2001) states that e-commerce is firmly positioned as less sophisticated than e-business in the e-adoption ladder model - which is supported by Martin and Matlay (2001). Whereas e-business has a much wider integrative purpose within an organisation, linking business systems together and is more sophisticated than e-commerce (DTI, 2001a). According to the DTI (2001), e-business describes a greater degree of integration of communications technologies with business processes and management practices, often conducted via the Internet. It has implications that are inward as well as outward facing. Daniel (2003) also points out that there is a hierarchy of e-commerce integration and that the benefits to the firm are increased with advanced integration.

Researchers have used e-commerce and e-business interchangeably (Ramsey *et al.,* 2003). In practice, e-business may link to or incorporate other systems such as Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM) systems. As a result, it is not likely to have an exact distinct definition of e-business and e-commerce. As stated by Ahmed *et al.* (2003), there is no universal definition of e-commerce between the Internet as a marketplace, its participants are frequent, and their intricate relationships are evolving rapidly. For the specific purposes of this research, the term "e-business" will be used and conceptualised as:

(i) the application of information and communication technologies to facilitate the execution of related functions like marketing management, strategy leverage, information systems, logistic management, customer relationship management, and human resources management (Simpson and Docherty, 2004) and;

(ii) the utilisation of Internet technology not only limited to the selling or buying of goods and services, but include servicing customer, collaborating with business partners, and conducting e-transaction within an organisation that involve both business to consumer (B2C) and business to business (B2B) business environments (Turban *et al.,* 2002; Clarke, 2000).

Having defined the "e-business" and "e-commerce" terms, and made the decision to use "e-business" throughout the research, the next section will investigate and elaborate on the current e-business practices.

2.3 CURRENT E-BUSINESS PRACTICES

The Internet is a force changing and creating new business opportunities (Lambert, 2002) and altering considerably the world's economies (Rayport and Jaworski, 2002). The way Internet technology is used has evolved rapidly since it was offered to businesses for commercial use in the early 90s. However, at the time, most web sites developed were for the purposes of promoting their companies. According to Daniel (2003), approximately all of the Fortune 500 companies have commercial web sites, yet only 10 percent use them for on-line selling.

According to Charles *et al.* (2002, pg. 12), "E-business allows organisations to streamline production, reduce operational costs, expand markets, enhance collaborative business partnerships and strengthen customer and supplier relationships". Some of the existing products and services that are promoted and sold via e-business are; home banking, electronic bill payment, computer software and computer hardware, video, cable television, photographs, books, gifts, flowers, education, job training, travel services, health care services, customer service and on-line stock trading are the most widely utilised from e-business (Frieden and Porter, 1996).

Various authors have put effort into categorising business models, which may be referred to as taxonomies, categories, business types and business designs. The elements of a "business model" are critically appraised and presented in the e-business literature along with the designated business model attributes. A "business model" has been used extensively in the e-business literature by various authors (Rappa, 2003; Krishnamurthy, 2003; Kalakota and Robinson, 2001). Turban *et al.* (2002, p. 23) refer to business models as "...a method of doing business by which a company generate revenue to sustain itself. The model spells out how the company is positioned in the value chain".

However, Krishnamurthy (2003, p. 15) states, "a business model is a path to a company's profitability, an integrated application of diverse concept to ensure the business objectives are met." Ovans (2000) distinguishes between a business model, which is a general vision or strategy, and a business method, which is a specific way of doing business. As defined by Betz (2002), a business model is an abstraction of a business identifying how that business profitably makes money. A business model consists of business objectives, a value delivery system, and a revenue model.

Afuah and Tucci (2003) recommend that organisations that are affected by the Internet should have a dedicated "business model" with the justification of the complexity, speed and uncertainty of Internet trading. However, in the author's point of view, this is a rather relatively simplistic statement. As such, an effective business model depends heavily upon the effectiveness of organisational aims, human and physical resources, as well as market orientations (Lynch, 2003; Wheelen and Hunger, 2002; Leopold *et al.*, 1999).

In addition, strategic management appears to impact most significantly upon designing, resourcing and implementing a successful Internet business model (Matlay, 2004; Bateman and Snell, 2004). However, despite the mass growth of e-business studies, there has been a lack of empirically rigorous research in this important aspect of e-business development (Matlay, 2004). Similar to the problem in defining differences between e-commerce and e-business, there also exists confusion of meanings and an interchangeability of generic terms of business models that make it difficult to critically compare and contrast the various models that operate in the global e-economy (Wu, 2005; Matlay, 2003). In order to conduct an analytic assessment of e-business definitions, this author has selected a few definitions and has categorised these with a few well-known authors; these are selected ("no mention", "low emphasis", "medium emphasis" and "high emphasis") based on the six functions of a business model. Table 2.1 shows a compilation of the business model categories identified in the literature and indicates that different authors have taken different approaches to differentiate among elements of a business model.

The ability of the defined business model to:	Author(s)			
	[1]	[2]	[3]	[4]
• create value for users by the offering based on the technology	●	◑	●	●
• identify a market segment	◑	◑	◑	●
• define the structure of the value chain within the firm	◑	◔	◑	◑
• estimate the cost structure and profit potential of producing the offering	◑	◔	◑	●
• describe the position of the firm within the value network	◔	◔	◔	◑
• formulate the competitive strategy	◔	◔	○	◔

Keywords ○ **(No mention** ◔ **low emphasis** ◑ **Medium emphasis** ● **High emphasis**

[1] Weill and Vitale (2001), [2] Rappa (2003) and Bambury (1998) [3] Kalakota and Robinson (2001); [4] Krishnamurthy (2003)

Table 2.1 Comparative assessment of emphasis on six business model functions.

Some authors have broader categorisation of business models (Weill and Vitale, 2001; Schneider and Perry, 2000) while Rappa (2003) and Bambury (1998) distinguish business models on as little as one characteristic such as the pricing model or the nature of the products to offer. However, Kalakota and Robinson (2001) prefer not to use the term 'business model'; in which they list seven e-business designs that relate to business strategy, while Krishnamurthy (2003) distinguishes between pure-play and bricks-and-clicks business models and then identifies thirteen pure-play business models.

The recognised practices of e-business activities are based on the type of stakeholders involved in the transactions supported, automated, or integrated with information and communication technologies (Hinson and Sorensen, 2006; Wu, 2005; Gunasekaran *et al.,* 2002; Kalakota and Whinston, 1997). Consequently, e-business activities can be classified into seven main categories as shown in Table 2.2. Nevertheless, definitions and interpretations can still vary according to personal preferences or individual research design.

E-Business Practices	Definitions
Business to business (B2B)	Refers to involvement in e-business transactions between or among multiple business (Aljifri *et al.,* 2003)
Business to consumer (B2C)	Refer to involvement in e-business that focuses on direct transactions between businesses and end consumers (Ah Wong *et al.,* 2001).
Consumer to businesses (C2B)	Refers to involvement in transaction where individual sell products to business. It can also mean individuals seeking seller online to conduct transaction (Monica *et al.*, 2003)
Consumer to consumer (C2C)	Refers to virtual communities, enable consumers to sell goods or services, to share member-generated information, and to interact with each other (Hagel and Armstrong, 1997, p. 45)
Business to government (B2G)	Refers to involvement in designating online trade between government, businesses and/or consumers (Jeffcoate *et al.*, 2002)
Business to portal (B2P)	Refers to involvement in promoting a business to an Internet based portal that links buyers and supplier in one, sizeable marketplace (Cumming, 2001, p.56)
Business to affiliate (B2A)	Refers to involvement in marketing an affiliate's goods (Matlay and Addis, 2003)

Table 2.2 Main categories of e-business applications

2.4 E-BUSINESS LITERATURE OVERVIEW

Most large firms are still in the early stages of positioning themselves to fully utilise the business opportunities and improvements enabled by Internet technology. The review of the literature on e-business adoption of organisations has identified a number of central contributing themes. There have been many researches investigating the factors that will determine the success of e-business adoption within firms. However, researchers have difficulties in identifying the best method to measure e-business performance. Therefore, there is a need for a theoretical framework that will give this guidance. The first section begins with some theoretical background in framework development followed by the conceptualising of the proposed framework. Firstly, a critical assessment will be conducted in an attempt to distil and identify current research gaps that exist in the literature. These e-business gaps, which will be treated as the bases for the theoretical foundation investigating e-business adoption, will be discussed. Secondly, the development of the proposed conceptual framework will be presented to explain how this is distilled from the relevant theoretical perspectives in conjunction with existing literature.

A number of important empirical contributions have been undertaken relating to the reasons for e-business adoption and/or benefit/barrier perceptions, such as, investigation of the perceived advantages and disadvantages of interactive services across different product categories (Kangis and Rankin, 1996). For example, Katz and Aspen (1997) investigated the motivations for and barriers to Internet usage in a US-based survey conducted in 1995. While a survey conducted in Singapore by Teo *et al.* (1999), who drew on the widely recognised and used technology acceptance model (TAM) by Davis (1989), found that perceived usefulness is generally more important than perceived ease of use and perceived enjoyment in affecting Internet usage. Similarly, Fenech and O'Cass (2001) found that attitude and perceived usefulness do predict the adoption of the web for retail usage.

Additionally, growing bodies of qualitative and quantitative research have been used in e-business but the focus has tended to be on the larger firm, on developing new business models and positioning its development in the new economy (Drew, 2002). SMEs and small firms have been much slower to adopt e-business and relevant research has also been slow to develop. E-business themes that have been investigated include barriers to adoption (Walczuch *et al.,* 2000), benchmarking Internet use (Webb and Sayer, 1998), innovation and teaching (Chaston *et al.*, 2001), the micro-enterprise and Internet usage (Levenburg and Dandridge, 2000), and entrepreneurship and the Internet (Colombo, 2001). Some of the more specific e-business adoption issues have been investigated relating to competitive advantage, competencies, and technological, organisational and environmental factors.

Many authors have viewed e-business adoption as one of the most challenging research areas (Zhu *et al.,* 2004; Zhu *et al.,* 2003). Despite the burst of the dot-com bubble a few years ago, many companies are continuing to deploy e-business extensively in their business operations. However, research also indicates that the fear of lagging behind in adopting the technology (the Internet), has rushed many firms to blindly engage in e-business initiatives without deriving any benefits due to lack of strategic planning and objectives (Martinsons and Martinsons, 2002; Barua and Mukhodhyay, 2000). As a result, despite huge investments in e-business initiatives, academics and practitioners are still struggling to determine whether these investments deliver any value proposition in the first place (Barua and Mukhodhyay, 2000; Zhu *et al.,* 2003). In addition, there have been literature reviews indicating that some firms are concerned about lagging behind in the technology curve and engaging in e-business initiatives without deriving any benefits (Martinsons and Martinsons, 2002; Barua and Mukhodhyay, 2000).

Some of the obstacles firms are facing while adopting e-business strategies are technical, managerial, and cultural issues (Sato *et al.*, 2001). Therefore, it is important to identify and evaluate factors that may contribute to e-business value and affect the firms' business performance. A study conducted among 230 businesses in Malaysia, concluded that the strategic use of IT in the Malaysian organisations was necessary in order to gain competitive advantages (Valida *et al.,* 1994). Thong and Yap (1995) have developed an IT adoption model for small businesses, in which they concluded that innovative CEOs would have a more positive attitude towards the adoption of e-business.

At present, much of the existing e-business literature relies heavily on qualitative case studies, anecdotes and conceptual frameworks (Zhu *et al.,* 2003; Brynjolfsson and Kahin, 2000, pg. 43). Only a few studies have used quantitative data to characterise the Internet-based initiatives or gauge the scale of their impact on firm performance (Zhu *et al.*, 2004). This is due to the lack of theory to guide the empirical work and existing literature is weak in making the linkage between theory and measures, apart from subjecting proposed measures to empirical validation for reliability and validity (Straub *et al.,* 2002; Wheeler, 2002). Existing literature has suggested fragile connections between theory (e-business adoption factor) and measures (the success / failure of e-business adoption) (Zhu *et al.,* 2004; Kauffman and Walden, 2001). In addition, there is a lack of empirical research on the issues of proposed suitable measures to empirical validation for reliability and validity (Straub *et al.*, 2002; Zhu *et al.,* 2004; Xu *et al.,* 2004). Hence, there is a need for theoretical development. In particular, what is missing in the existing literature is: (1) a solid theoretical framework for identifying factors that shape e-business value; (2) a research model for studying the relationships of these factors to e-business value; and (3) empirical assessments based on a broad data set instead of a few isolated cases.

Extensive research has been conducted to investigate e-business adoption by using quantitative and qualitative research methods. However, most of the models are largely used to evaluate the e-readiness and are constructed based largely upon the experience of e-business adoption in developed countries (Huang *et al.,* 2004). Key differences exist between developed and developing countries such as in the availability, cost and quality of information and communication technology (ICT) networks, services and equipment (Dooley, 2002; UNCTAD, 2001). Hence, e-business adoption in developing countries could be different to that in developed countries. Tan (1997) has used the term "mature leopard" for countries of the Asia-Pacific region comprising of Australia, Japan and New Zealand. "Growing tiger" term was used for countries comprising of Hong Kong, Singapore, South Korea and Taiwan. The developing economies termed as "young lions" comprised of China, Malaysia, Brunei, Philippines and Vietnam. Comparatively, very little has been researched into the countries referred to as the "young lions" (Seyal *et al.*, 2000).

Despite the Internet being a global phenomenon, most of the existing studies have focused on developed countries (Watson *et al.,* 1997; Zhu *et al.,* 2004; Seyal *et al.*, 2000a), predominantly the United States and United Kingdom. There has been a lack of international studies conducted based on firm level data from multiple countries (Fjermestad, 2003; Grandon and Pearson, 2004; Zhu *et al.,* 2004*)*. In particular, previous research has discussed extensively, theories of e-business development in the context of mature markets and industrialised countries (UK and USA). Therefore, these theories need to be re-examined in the context of developing countries (Malaysian, Thailand), because these countries may have very different economic and regulatory environments (Austin, 1990; Dewan and Kraemer, 2000; Jarvenpaa and Leidner, 1998).

As discussed by Zhu *et al.* (2004), most of the existing studies in this area have focused on one country, predominantly the United States (Watson *et al.*, 1997, Zhu *et al.*, 2004). In the light of this absence of international study based on firm-level data from multiple countries, this research seeks to reduce the gap in present research by adding an international dimension to the investigation of e-business capability framework, extending beyond the developed country to investigate how the proposed strategic perspectives will be different for the organisations in developed and developing countries.

E-business development in the context of developing countries has attracted much researcher and practitioner interests. However, findings from this research in the context of a developing country have revealed some research limitations (Bridges, 2002; Choucri *et al.*, 2003; Molla, 2002; Molla, 2004a, 2004b):

- Firstly, most of the e-business adoption studies in developing countries focus on the national-level indicators. These studies are helpful in highlighting the legal, financial, physical, social and technological infrastructure limitations that businesses in developing countries need to transcend in order to implement e-business (Bridges, 2002). However, they have limited power in explaining the level of infrastructure and development affecting individual businesses' decisions to undertake e-business;

- Secondly, most of the research conducted tends to utilise a general set of requirements, which have a lack of in-depth and specific analysis, intended to investigate the specific needs of sectors, business organisations and e-business application (Bridges, 2002; Choucri *et al.*, 2003);

- Thirdly, although there have been claims that the e-business readiness of a country affects the e-business success, there is a lack of empirical studies and evidence to validate such claims. In addition, although developing countries have continued to address some of the infrastructure barriers, a proper investigation is needed to identify firm- and market-specific issues relating to barriers and drivers of e-business and its success (Molla, 2002; Molla, 2004a, 2004b);

- Finally, there is lack of clear theoretical foundation in the existing e-business implementation and adoption studies (Zhu *et al.,* 2004; Molla, 2002; Molla, 2004a, 2004b).

From the identified limitations of current research, this study will focus on the third and fourth limitations, which revolve around constructing a theoretical foundation in attempt to describe and identify factors, which will contribute to the success of e-business adoption in developing countries. In an attempt to develop a theoretical framework to explain the e-business adoption and business performance, this research seeks to test the applicability and robustness of the theoretical model in a developed (UK) and developing (Malaysia) country context.

Overall, the synthesis of the literature review in this chapter and the above discussion has identified "limitations" from the existing literature, which are:

1. lack of theoretical framework of critical success related factors and e-business success relevant to firms in the context of developed and developing countries.

2. lack of a firm level empirical assessment that elucidates such relationships using appropriate e-business growth framework.

This thesis aims to address these limitations by carrying out research to meet the following three conjectures that can empirically form part of the work to be carried out in order to achieve the three main objectives as in Section 1.3. The next section will attempt to assess and critique some of the existing e-business perspectives that have a significant impact on the success of e-business adoption. Elements that have been identified within each perspective will be used as the basis for constructing the theoretical framework and survey questionnaire for this research. Table 2.3 displays a summary identifying key authors in e-business literature for the purpose of critiquing and identifying elements that will impact on business performance following the adoption of e-business.

Perspectives in E-Business	Key Authors	
Strategic Perspective (Business Strategy)	[1] Lumpkin *et al.* (2002) [2] Kaefer and Bendoly (2004) [3] Porter (2001) [4] Chen *et al.* (2005) [5] Croteau *et al.* (2001) [6] Sameer and Petersen (2006) [7] Lumpkin and Gregory (2004) [8] Rivard *et al.* (2006)	[9] Wade and Hulland (2004) [10] Papazoglou and Ribbers (2006) [11] Lee and Tsai (2005) [12] Sahay *et al.* (2004)
Operational Perspective (Supply Chain Strategy)	[1] Karthik *et al.* (2004) [2] Graham and Hardaker (2000) [3] Gunasekaran *et al.* (2002) [4] Christopher (2005) [5] Sanders and Premus (2005) [6] Kotzab and Teller (2003) [7] Lemke *et al.*(2003) [8] Maheshwari *et al.* (2006)	[9] Rahman (2004) [10] Filia (2005) [11] Frohlich (2002) [12] Samaddar *et al.* (2006) [13] Patterson *et al.* (2003) [14] Sridharan *et al.* (2005) [15] Wilding and Humphries (2006)
Behavioural Perspective (E-Business Adoption)	[1] Hsiu and Lee (2005) [2] Bradford and Florin (2003) [3] Lewis and Cockrill (2002) [4] Beatty *et al.* (2001) [5] Teo and Pian (2004) [6] Hsieh *et al.* (2006) [7] Quayle (2002) [8] Zhu *et al.* (2004)	[9] Croteau and Bergeron (2001) [10] Kaplan and Norton (2004) [11] Mirchandani and Motwani (2001) [12] Riemenschneider and McKinney (2002) [13] Damodaran and Olpher (2000) [14] Grandon and Pearson (2004)
Performance Measures	[1] Hinson and Sorensen (2006) [2] Fillis *et al.* (2004a; 2004b) [3] Zhu *et al.* (2004) [4] Drew (2003) [5] Chaston (2001) [6] Shi *et al.* (2006) [7] Wagner *et al.* (2003) [8] Tracey *et al.* (2005)	[9] Sanders and Premus (2005) [10] Kent and Mentzer (2003) [11] Kaplan and Norton (2004) [12] Damaskopoulous and Ingenious (2003)

Table 2.3 Key authors contributing to e-business literature

2.5 PERSPECTIVES IN E-BUSINESS RESEARCH

Internet technology is known as a means to facilitate collaboration between members of supply chains, to result in cost savings, operations that are more efficient, improved customer service and potential for innovation, and new business opportunities (Wagner *et al.,* 2003, Hawkins and Prencipe, 2000; Baldwin *et al.,* 2001; Timmers, 2000). Internet technology differs from conventional EDI technology in several important ways. Firstly, it is relatively inexpensive. Secondly, it is based on open standards and therefore supports numerous applications, which can process small transaction volumes cost effectively and can be configured to accommodate changes in users with ease (Hawkins and Prencipe, 2000). Lastly, the Internet is also a public network that is globally available, providing access to customers and suppliers worldwide. Moreover, applications are not limited to inter-firm transactions (Baldwin *et al.,* 2001).

Barnes *et al.* (2003) state that businesses today operate in a fast-evolving environment where Internet-based technologies are not only ubiquitous but are having a fundamental impact on the way that businesses manage their operations and compete. However, Mariotti and Sgobbi (2001) note that most of the existing e-business literature remains prescriptive, often superficially so, concentrating on computer software and infrastructure solutions rather than focusing on strategy, which, is based on established theory and practice. Therefore, research on adoption of e-business can be examined from three perspectives, namely strategic, operational and behavioural perspectives. Each perspective is perceived to have an impact and influence on the success of adopting e-business regardless of geographical background or type of business (pure-play Internet based business or click and brick mortar businesses).

Operations management academics have always highlighted the strategic importance of operations, and its role in corporate success. The consideration of operation strategy is relatively as important in e-business operations as in operating in traditional environments. However, evidence from the literature suggests that many companies have adopted e-business without thinking through their strategic, operational and behavioural impacts (Marshall and Mackay, 2002; Gunasekaran *et al.,* 2002; Dutta and Biren, 2001), which subsequently led to e-business failure. This section considers the impact the Internet has on strategic, operational, and behavioural management perspectives and whether new strategic thinking is required in response to the powerful external forces that are re-shaping industry. This section also aims to support the significance of these perspectives by providing supporting evidence from the existing e-business literature.

On the basis of an extensive literature review, the works of various authors—believed by the present author to have had a major influence in developing the strategic, operational and behavioural subjects—have been selected. Through a careful content analysis, the important elements have been identified as contributing to the success of e-business adoption, and are presented in a comparison table for each of the perspectives. The table indicates the importance of each of these elements based on the present author's subjective assessment of the work of the well-known studies conducted in the e-business field. The level of measurement used to identify the element weighting is a five-point scale with no change, low, medium, high and substantially high which are 0.0, 0.25, 0.50, 0.75, and 1.00 respectively. The definition of each element is critically identified and gives a linear scale from 0.0 to 1.0. If a study does not study one element, it will score 0.0 (no mention). In case a where a study emphasises two critical factors, it will score 0.5 (medium emphasis). Similar rules are developed to identify the elements weighting.

2.5.1 Strategic Perspective (Business Strategy)

The concept of business strategy has been introduced to address the issue of how the Internet can reshape companies and provide competitive advantage (Porter, 2001). Studies have covered different perspectives of the problem, ranging from business models to organisation and from marketing to operations. In the specific context of supply chain management, business strategy refers to the way Internet tools are selected and used in relation to the needs of integration. A rational business strategy concerns both the right choice of tools and solutions according to the specific aims, goals and context of the application (Soliman and Youssef, 2001), and the coherence of these choices with other organisational and managerial tools used to integrate the company's processes (Graham and Hardaker, 2000). Business strategy helps firms develop business visions, redesign and align business operations, share knowledge about the business and its vision, and ensure the acceptance of business decisions through committing stakeholders to the decisions made (Stirna, 2001). The need to integrate organisation and technology is relevant, in general, for most technological innovations, in particular those related to information technology (Cagliano and Spina, 2000). This section will investigate how the role and elements in business strategy are considered to have a significant impact in ensuring the success when adopting e-business within an organisation.

Lumpkin and Gregory (2004) have investigated the unique features of Internet technology to create competitive advantages. Several business strategies have been proposed to improve company's value propositions using Internet-based businesses. Similarly, four "Internet technology-specific" competencies have been identified by various authors that are providing firms with new capabilities:

i. engagement and collaboration of individual in all aspects of IT (Lumpkin and Gregory, 2004; Croteau *et al.,* 2001);

ii. systems compatibility to support enterprise-wide application and inter-organisational systems (Sameer and Petersen, 2006);

iii. sensing and responding to the web based opportunities to create unique customer knowledge and customer based relationships (Lumpkin and Gregory, 2004; Porter, 2001);

iv. creation of a powerful set of new core operations capabilities in companies' core business processes (Chen *et al.,* 2005; . Lumpkin *et al.,* 2002)

These value-adding strategies are best understood in the context of business models that are specific to the Internet environment (Jeffcoate *et al.*, 2002). They propose that when implementing a business strategy, these four value-adding activities are often used in the context of the business models and strategic use of these attributes can help build competitive advantages and contribute to a firm's profitability (Marshall and Mackay, 2002). Similarly, Lumpkin *et al.* (2002) suggests that sustainability of competitive advantages is possible, but not with traditional strategies. Lumpkin *et al.* (2002) argue that by relying on a single form of competitive advantage—differentiations, overall cost leadership, or focus—will lead to the rapid erosion of advantages by competitors. Hence, by combining these strategies, companies would be able to capture market opportunities and make the best use of the new technology (Internet technology); whereby competitive advantages could be sustained (Ngai, 2003; Thornton and Marche, 2003).

In addition, studies conducted by various authors (Chan *et al.,* 1997; Croteau and Bergeron, 2001; Sabherwal and Chan, 2001 and Croteau and Raymond, 2004) argue that a 'strategic fit', that is, the alignment of internal (functional) business performance and "technology-driven" domains, is required in order to increase business performance. Business strategic fit reflects the need to harmonise internal (functional) and "technology-driven" business domains, i.e. organisational resources and competencies should be aligned with the firm's competitive strategy. A model proposed by Croteau *et al.* (2001) denotes four interrelated components that have an impact on strategic choice for adopting e-business namely; business strategy, Internet strategy, organisational infrastructure and processes, and infrastructure and processes. The study has emphasised the importance of strategic integration between business and IT strategies in order to be consistent with key environmental contingencies, including components such as strategic competencies and IT competencies, to allow successful e-business adoption.

From the organisational aspect, the Rivard *et al.* (2006) investigation on the contribution of e-business in business performance has been studied from two perspectives: a strategy as positioning perspective, which underlines a market power imperative (market orientation), and resource-based view perspective, which conceptualises the enterprise as a 'bundle of unique resources' (cost structure and profit potential). The study seeks to improve the understanding of the contribution of the Internet to firm performance in building upon the complement between the two perspectives. Several researchers have adopted similar studies to address the issue of the contribution of Internet technology to business strategy (Wade and Hulland, 2004; Melville *et al.,* 2004). This study has demonstrated that integrating the resource-based and competitive strategy-based views can provide a further understanding of Internet technology's contribution to firm performance.

In a recent article, Porter (2001) addressees how the Internet has influenced on the five competitive advantage and emphasises that the concept of "strategic" is still as important and as applicable, either in the past (before Internet) or present. In addition, Porter (2001) advises firms to shift in thinking from "e-business to business", from "e-strategy to strategy" in order to eliminate the confusion of adding "e" which could destroy the economic value during the Internet's adolescent years. In his article, Porter

(2001), and other authors, recommended the need to have four "organisational" factors within a business strategy for successful e-business adoption namely:

i. the ability to articulate the value proposition (market orientation) (Kaefer and Bendoly, 2004; Porter, 2001);

ii. the ability to estimate the cost structure and profit potential of producing the offering (Rivard *et al.,* 2006);

iii. the ability to restructure the organisation and behavioural drivers such as compensation and budgets (Lumpkin *et al,*. 2002; Croteau *et al.,* 2001);

iv. the ability to ensure departmental alignment and follow through an effective allocation of (e)-business strategy to the rest of the organisation (Chen *et al.,* 2005).

By gaining Internet-based competencies, the firm can overcome traditional business barriers such as physical distance between markets, allowing improved interaction between members of a network (Durkin and McGowan, 2001). Literature indicate that several "external" factors are the determinants of implementation success within business strategy in e-business adoption (Fjermestad, 2003; Grandon and Pearson, 2004; Iacovou *et al.,* 1995; Stockdale and Standing, 2004; Zhu and Kraemer, 2002). The factors that influence the strategic implementation of business strategy in e-business adoption can be classified in several ways such as:

i. integration and facilitation of customer requirements (Beveren and Thomson, 2002; Karimi *et al.,* 2001; Taylor and Murphy, 2004);

ii. involvement of customers in business decision to develop and maintain business relationships (Keeling *et al.,* 2000; Lewis and Cockrill, 2002; Moini and Tesar, 2005);

iii. acquiring new customers, to build relationships with customers (sharing responsibility in product development) (Papazoglou and Ribbers, 2006; Wade and Hulland, 2004; Dyche, 2001).

A study conducted to determine the success of adoption of e-business by Australian manufacturing SMEs revealed the strategic importance of the integration and facilitation of customer requirements and business relationships (customer involvement) within "external" factors of business strategy (Beveren and Thomson, 2002). The perceptions of external factors towards e-business adoption in business strategy have been examined in many studies (Taylor and Murphy, 2004). To further support the significant importance of the identified elements within business strategy, a model constructed by Moini and Tesar (2005) has identified that critical factors are necessary for the successful adoption of Internet technology to maximise the potential of this technology to facilitate customer requirements and their involvement in business decisions. Their results suggest that different business strategies should be employed, while organisations need to consider their existing organisational status and focus on this area externally (from the customers and business partner's perspective). This study provides useful guidelines for management to utilise the available resources effectively in the process of adopting web services technology.

In addition, Karimi *et al.* (2001) seek to investigate factors that will contribute to the successful implementation of business strategy from the perspective of the external environment. Strategic implementation of business strategy differs among firms where IT has a major role in transforming marketing, operations, or both, thus giving the firms advantage by affecting their customer service. They propose several predictors of e-business adoption including characteristics of organisation and characteristics of environment; these include the ability to integrate and facilitate customer requirements, customer involvement in maintaining business relationships and sharing responsibility in product development. The results clearly indicate that the firms have a higher success level of business strategy execution in the involvement of customers' participation (Lee and Tsai, 2005; Sahay *et al.,* 2004). Similarly, Berman and Hagan (2006) are able to empirically demonstrate how technology-driven business strategy can offer some distinct advantages in the participation of external members such as customers and business partners.

Papazoglou and Ribbers (2006) have identified two significant factors to drive the phenomenon of e-business;

i. competition in the marketplaces and
ii. the creation of new opportunities and challenges.

Therefore, in order to survive in the competitive e-business environment, they propose the need to have an understanding of business, organisation, management and technology that are crucial for creating awareness of the current e-business situation and how it is going to be shaped in the future. Kaefer and Bendoly (2004) have also investigated the impact of technological compatibility and operational capacity on the success of B2B e-business efforts over a range of business settings. The focus of their study was on the transactional efficiencies gained using B2B e-business by evaluating its current level of information technology sophistication. Their findings conclude that the intra-organisational context had a significant bearing on which constraints have a greater impact on the success of e-business efforts.

Table 2.4 indicates the importance of each of these elements based on the present author's subjective assessment of the work of the twelve of well-known authors in the business strategy field. The level of measurement used to identify the element weighting is a five-point scale with no change, low, medium, high and substantially high, which is 0.0, 0.25, 0.50, 0.75, and 1.00 respectively. Table 2.4 identifies the minimum and maximum ratings of these elements. The most important element is the cost structure and profit potential (7.00) and restructure of behavioural drivers (7.50). Successful execution of business strategy in e-business adoption, and achieving the objective, requires the organisation's ability to motivate and commit employees to adopt new skills and be able to estimate cost structure and profit potential to learning and acquiring new knowledge and skills. The elements of "external" factor scored relatively low (integrate and facilitate customer requirements: 3.50; business relationships in customer involvement; 3.25) providing the need to investigate why these elements remain distressingly low.

Elements of Business Strategy Investigated	Key Authors												Weighting (total = 12)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	
IT engagement and collaboration	◔	◑	◔	◕	◕	○	◕	◔	○	◔	◑	◑	5.75
Systems compatibility	◔	◕	◔	◕	◕	◕	◕	○	◔	◑	◑	○	5.50
Sense and response to the Web based opportunities	○	◕	◑	●	●	◕	●	◔	◔	◑	○	◔	6.25
Core operations capabilities	◔	●	◔	◕	◑	◑	◑	◔	○	○	◔	◔	4.50
Market orientation	◕	◕	◕	◑	◕	◔	○	◕	◔	◑	◔	◑	6.00
Cost structure and profit potential	●	◕	●	◑	◕	◑	◔	●	◔	◑	◑	○	7.00
Restructure of behavioural drivers	◕	●	◕	◕	●	◔	◔	◕	◑	◕	◑	◔	7.50
Effective communication throughout organisation	◑	◑	◕	◕	◑	◑	◑	◕	◔	◑	◔	◔	6.00
Integrate and facilitate customer requirements	◔	○	◔	◔	○	◑	◔	◑	◔	◔	◔	◕	3.50
Business relationships in customer involvement	◔	◔	○	◔	◔	◔	◑	◔	○	◕	◔	◔	3.25
Sharing responsibility in product development	◑	◔	◕	○	◔	◑	○	◔	◑	◕	◕	○	4.50

Key authors: ○ No mention (0.0) ◔ low emphasis(0.25) ◑ Medium emphasis (0.5) ◕ High emphasis (0.75) ● Substantially high emphasis (1.0)

[1] Lumpkin *et al.* (2002)
[2] Kaefer and Bendoly (2004)
[3] Porter (2001)
[4] Chen *et al.* (2005)
[5] Croteau *et al.* (2001)
[6] Sameer and Petersen (2006)
[7] Lumpkin and Gregory (2004)
[8] Rivard *et al.* (2006)
[9] Wade and Hulland (2004)
[10] Papazoglou and Ribbers (2006)
[11] Lee and Tsai (2005)
[12] Sahay *et al.* (2004)

Table 2.4 Assessment of key research elements identified in business strategy

2.5.2 Operational Perspective (Supply Chain Management)

The primary goal of supply chain management (SCM) is to integrate many of the aspects of total quality management (TQM) that contribute to increased manufacturing efficiency and quality while reducing costs and maintaining the customer as the end station of the production line (Landford, 2004; Zhu and Sarkis, 2004). SCM practices encompass a range of activities, some internal and some external to the firm, all with the primary goal of creating value to the end-customer (Christopher, 2005; Lambert and Cooper, 2000). This is accomplished through the coordination of activities between linked firms, and should result in reduced costs due to the elimination of operational duplication and resource waste (Stank *et al.,* 2001). SCM is the integration of key business processes among a network of interdependent suppliers, manufacturers, distribution centres, and retailers in order to improve the flow of goods, services, and information from original suppliers to final customers (Christopher, 2005; Simchi *et al.,* 2003).

Supply chain management is a set of approaches utilised to effectively integrate suppliers, manufacturers, logistics, and customers for improving the long-term performance of the individual companies and the supply chain as a whole (Zhao and Simchi-Levi, 2002; Chopra and Meindl, 2001; Lambert and Cooper, 2000). Supply chain management includes links upstream (e.g., supply and manufacturing) and downstream (e.g., logistics and distribution) value chain entities. Successful supply chain management requires the integration of these value chain entities to create cooperative and collaborative environments that facilitate information exchanges, materials, and cash flows (Christopher, 2005).

E-business is important for the supply chain literature because of the increasing need to integrate activities and information flows and to optimise the processes not only at the single company level, but also at the level of inter-company processes (Landford, 2004; Lattimore, 2001; Cagliano *et al.,* 2003; Stevens, 1989). The importance and role of web-based technologies to support company operations (e-business) is widely acknowledged by both practitioners and academics (Sanders and Premus, 2005; Porter, 2001; Skjoett-Larsen, 2000). Information is more readily available and easily dispersed throughout the organisation to communicate order, inventory, and delivery schedules among supply chain members (Grossman, 2004; Humphreys *et al.,* 2001). The implication and impact of e-business on supply chain processes has led to greater integration and collaboration across e-business supported supply chains (Chandrashekar and Schary, 1999; Marchewka and Towell, 2000; Johnson and Whang, 2002; Lancioni *et al.,* 2003; Cagliano *et al.,* 2003; McIvor and Humphreys, 2004). Frohlich and Westbrook (2001) in particular, claim that as supply chain integration increases because of e-business, stronger relational ties develop between the companies across supply chains.

Although research supports the idea of Internet technology as an enabler of SCM activities and documents its role in supply chain strategy, studies have not directly associated higher e-business usage with greater involvement in specific SCM practices (Feeny, 2001). Croom (2005) and Van Hoek (2001) further claim that there has been relatively little research carried out to look into contributing factors that have a significant impact on level of analysis issues in management research, specifically broadening the perspective to analysis of e-business and supply chain strategy. One of the primary objectives of supply chain management is to create greater levels of customer value and competitive advantage for organisations comprising the supply chain. While the linkage between SCM and e-business has been theoretically argued in the literature (Lambert, 2004) there has been limited empirical research in the area (Carter *et al.,* 2003; Narasimhan *et al.,* 2001; Tan, 2000).

In contrast to the growing research on traditional technologies such as electronic data interchange, (EDI) and electronic funds transfer (EFT) and performance (Ahmad and Schroeder, 2001), only a few studies appear to have focused on the operational advantages of Internet-based systems (Frohlich, 2002; Ronchi, 2003). Silveira and Cagliano (2006) note that there is a lack of research to compare the benefits of inter-organisational information systems (IOISs) using Internet technology in the context of supply chain relationships. Therefore, Silveira and Cagliano (2006) have attempted to reduce this gap by exploring the relationships between IOIS adoption in supplier coordination and operations performance improvements. Findings suggest that companies could benefit from considering the use of Internet technologies in the integration of operating and planning databases, and standardised and customised information among their supply chain members.

Similarly, studies conducted by Rowlatt (2001) and Gunasekaran *et al.* (2002) have developed a framework that provides significant support to contributions of Internet and web technology to be used within the organisation to manage workflow, co-ordinate activities and improve process efficiency through the sharing of information. Within these studies, significant results provide a valuable insight into a few key issues on using Internet technology in supply chain management, i.e. sufficient investments for supply chain systems and infrastructure to ensure the success of information sharing and distribution among supply chain members utilising the Internet technologies.

Much of the current interest in supply chain management is motivated by the possibilities that are introduced by the abundance of data and savings inherent in the sophisticated analysis of these data (Sridharan *et al.,* 2005). The primary goal of Internet technology in the supply chain is to link the point of production seamlessly with the point of delivery or purchase to allow planning, tracking and estimating lead times based on real data (Schneider and Perry, 2000). There has been extensive research to demonstrate the business value of IT investments in the supply chain especially in the use of Internet technology (Devaraj and Kohli, 2002; Davern and Kauffman, 2000).

There has been extensive research investigating the impact of organisational factors on innovation and technology adoption (Fjermestad, 2003; Grandon and Pearson, 2004; Iacovou *et al,* 1995; Stockdale and Standing, 2004; Zhu and Kraemer, 2002). The factors influencing Internet technology adoption within supply chain strategy can be classified in several ways such as internal and external environments, firm and individual conditions, and domestic and international involvement (Moini and Tesar, 2005; Lewis and Cockrill, 2002). The perceptions of management toward IT adoption are examined in many studies (Taylor and Murphy, 2004; Corbett, 2001). For example, Patterson *et al.* (2003) develop a model of the key factors influencing the adoption of supply chain technology to provide better understanding of the supply chain technology diffusion within the organisation.

Organisational structure has been considered an important factor to technology adoption (Beveren and Thomson, 2002; William *et al.,* 2002; Whipple and Frankel, 2000). Previous research, regardless of the measures used to evaluate size and adoption, has consistently indicated organisational structure positively correlated with technology adoption to provide integration of individual operations channels (Murillo, 2001; Poirier and Bauer, 2002). Studies examining individual technologies such as EDI (Shih *et al.,* 2002; Yurong *et al.,* 2002) also found standardised supply chain practices and operations to be an important factor to the adoption decision. Cragg and Zinatelli (1995) showed that a lack of technical knowledge and resources inhibit technology adoption in small firms. In addition, flatter organisations are expected to possess the financial resources and risk capacity necessary for new technology investments and will be associated with greater levels of supply chain technology. Kehoe and Boughton (2001) found that organisations with a centralised structure are more likely to adopt new technologies.

From a similar perspective, a study conducted by Samaddar *et al.* (2006) presents a theoretical framework to investigate the relationships between the design of a supply network and inter-organisational information sharing. They distinguish between four different types of inter-organisational information sharing using a two-dimensional classification scheme consisting of varying levels of the amount of information shared and the strategic importance of this information in an organisational context. Among the measures that have been used to assess inter-organisational information sharing are the degree or amount of information shared (Aviv, 2002; Gavirneni *et al.,* 1999), the scope of information shared (Spens and Bask, 2002), and the level of intensity of the relationship between partners (Deeter-Schmetz *et al.,* 2001; Spekman *et al.,* 1998). The arguments posited by Spens and Bask (2002) provide some insights on understanding how the scope of information shared can benefit the buyer/supplier relationship, but the role of the amount of information shared is unclear. This factor should be addressed as it relates to the information processing capacity of firms, which is considered an important dimension in the design and structure of organisations (Yu *et al.,* 2001).

Kwon and Suh (2005) define supply chain relationship as a strategic tool, which can minimise the operating costs and thereby enhance values for the stakeholders (customers and shareholders) by linking all participating players throughout the system; from supplier's suppliers to the customers. Effective supply chain planning based on shared information and trust between and among partners is an essential element for successful supply chain implementation. Information sharing (IS) using Internet technology is required to ensure financial safeguards and other strategic information to their partners who might have been and/or will be their competitors, and "effective information sharing is heavily dependent on trust beginning within the firm and ultimately extending to supply chain partners" (Bowersox *et al.,* 2000). "Issues of trust and risk can be significantly more important in supply chain relationships, because supply chain relationships often involve a higher degree of interdependency between companies" (La Londe 2002). Such a requirement (releasing and sharing information) is a challenging task, which requires a high degree of trust among and between the supply chain partners (Handfield, 2002). It is reported that the biggest barrier to success of strategic alliance formation is the lack of trust (Sherman, 1992), and subsequently trust is perceived as a cornerstone of the strategic relationships (Handfield *et al.,* 2000).

Research and knowledge based on supply chain relationships has grown at a rapid rate, driven by the increased use of partnerships in practice (Dennis and Kambil, 2003). However, most of the literature addressing supply chain partnerships is largely anecdotal in nature (Maheshwari *et al.*, 2006). It remains for researchers to establish how partnerships should be pursued in practice, and how various issues identified by research may affect management of supply chain partnerships. However, very few studies have focused on the process issues of managing relationships (Spekman *et al.,* 1998). Even when process issues in managing supply chain partnerships have been explored in the literature, efforts have not been comprehensive. Only a few studies have researched into the exact nature and meaning of supply chain relationships (Lemke *et al.*, 2003).

The primary purpose of the study conducted by Kwon and Suh, (2005) is to examine the relationships between the level of trust and several relevant constructs drawn from transaction cost analysis (such as asset specificity, behavioural uncertainty, and partner's opportunism) and social exchange theory (informational sharing). Their results revealed that a firm's trust in their supply chain partner is highly associated with both parties' specific asset investments and social exchange theory. Studies conducted by Sanders and Premus (2005) and Kotzab and Teller (2003) have developed a framework that provides a road map to manage and optimise the realisation of relationships benefits. Within these studies, significant results are to provide valuable insights on three key issues in managing supply chain relationships, i.e. the ability to define the roles and responsibilities for each of the supply chain members, the ability to develop a structure framework to maintain long term relationships and the ability to agree on the risks and rewards measurement systems among supply chain members (Christopher, 2005, p 35; Sanders and Premus, 2005; Kotzab and Teller, 2003).

Lemke *et al.* (2003) conducted a similar study and concluded that business organisations can improve the realisation of relationships benefits by focusing on these critical issues in the partnering process. Maheshwari *et al.* (2006) define supply chain relationships as resource-intensive investments, which involve both financial and strategic risks. They emphasise the importance of committing to these elements to develop joint activities in many functions that often overlap and the relationship causes substantial changes in each partner's organisation. Therefore, organisations must be aware of these critical issues (roles and responsibilities, maintaining relationships, risks and rewards) in the various phases of supply chain relationships and make systematic efforts to manage them better by providing training, incentives, leadership, and an overall environment that facilitates partnering and realisation of partnering objectives (Maheshwari *et al.*, 2006).

Table 2.5 indicates the importance of each of these elements based on the present author's subjective assessment of the work of the fifteen well-known authors in the supply chain strategy field. The level of measurement used to identify the element weighting is a five-point scale with no change, low, medium, high and substantially high, which are 0.0, 0.25, 0.50, 0.75, and 1.00 respectively. Table 2.5 identifies the minimum and maximum ratings of these elements. All of the identified elements display significant contribution towards success of supply chain strategy in e-business with the highest score of 10.00 in the integration of operating and planning database and relatively the lowest score of 6.25 in the information sharing and distribution across organisations. For e-business to succeed and achieve the objective requires all of the identified elements within the supply chain strategy ranging from technological, internal and external factors.

Elements of Supply Chain Strategy Investigated	Key Authors [1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	Weighting (total = 15)
Investments for supply chain system	◯	◔	◔	◯	◯	◑	◔	◯	◕	◕	◕	◯	◔	◕	◕	5.25
Integration of operating and planning database	◔	◯	◔	◔	◔	◯	◔	◔	◑	◕	●	◔	◯	◑	●	10.00
Standardised and customised information	◔	◑	◔	◔	◔	◔	◔	◔	◕	●	◕	◔	◑	◕	◕	7.00
Information sharing and distribution	◔	◔	◯	◑	◑	◔	◑	◑	◕	◕	◕	◯	◔	◕	◔	6.25
Organisational structure	◕	●	◑	◕	◔	◑	◔	◑	◑	◔	◔	◕	◕	◑	◔	7.75
Standardised supply chain practices and operations	◕	◑	◕	◕	◑	◯	◔	◔	◔	◑	◯	◑	●	◔	◑	6.75
Integration of individual operations channel	●	◕	◕	●	◔	◔	◑	◔	◑	◯	◑	●	◕	◔	◔	8.00
Time based logistics solutions	◑	◕	◑	◑	◑	◔	◔	◑	◔	◔	◔	◑	◕	◑	◑	6.75
Roles and responsibilities	◯	◔	◕	◕	◕	◕	◕	◕	◑	◔	◯	◕	●	◑	◔	8.00
Developing and maintaining relationships	◔	◔	◑	◕	◕	◕	●	◑	◔	◔	◑	◑	◕	◔	◑	7.75
Risk and rewards	◔	◯	◕	●	◑	●	◕	●	◯	◑	◔	◔	◕	◔	◔	7.50

Key authors: ◯ No mention (0.0) ◔ low emphasis(0.25) ◑ Medium emphasis (0.5) ◕ High emphasis (0.75) ● Substantially high emphasis (1.0)

[1] Karthik *et al.* (2004)
[2] Graham and Hardaker (2000)
[3] Wilding and Humphries (2006)
[4] Christopher (2005)
[5] Sanders and Premus (2005)
[6] Kotzab and Teller (2003)
[7] Lemke *et al.*(2003)
[8] Maheshwari *et al.* (2006)
[9] Rahman (2004)
[10] Filia (2005)
[11] Frohlich (2002)
[12] Samaddar *et al.* (2006)
[13] Patterson *et al.* (2003)
[14] Sridharan *et al.* (2005)
[15] Gunasekaran *et al.* (2002)

Table 2.5 Assessment of key research elements identified in supply chain strategy

2.5.3 Behavioural Perspective (E-Business Adoption)

There has been extensive literature on IT adoption in general, and on Internet and e-business adoption in particular (Dholakia and Kshetri, 2004; Karakaya and Khalil, 2004; Lucas and Spitler, 1999). For example, the Horner-Long and Schoenberg (2002) study concluded that the leadership characteristic required for e-business differed from those needed by traditional bricks and mortar organisations. In addition, Kendall *et al.* (2001) partially adapted the innovation diffusion theory of Rogers (1995) to investigate relative advantage and compatibility factors affecting the adoption of e-business by small and medium-sized enterprises (SMEs). Duffy and Dale (2002) suggest that IT encouraged information sharing across virtual teams and across processes in supply chains with suppliers, customers, and partners operating in a virtual network. The e-business adoption can facilitate communications among supply chain members and enhance internal communications, which further encourage information sharing. Similarly, a study conducted by Patterson *et al.* (2003) investigates the influence of organisational size, organisational performance, inter-organisational factors, and environmental uncertainty on the success of technology adoption.

E-business adoption is measured by the extent to which the Internet technologies have been diffused into the routine activities and processes of a business (Chatterjee *et al.*, 2002; Cooper and Zmud, 1990), for enabling customer-facing activities, including product or service sales, distribution, and after-sales support, and product testing, and market research (Chatterjee *et al.*, 2002). Although many of the studies are able to give significant insights of relationships between a mixture of factors and the adoption of e-business, there is lack of empirical study on the "behavioural perspective" within the organisation (i.e. learning and knowledge management; Hsiu and Lee, 2005) and among the business partners (i.e. collaboration, performance measurement; Grandon and Peason, 2004). This sub-section will attempt to identify elements that are perceived to have an imperative influence on the success of e-business adoption for the perspective of behavioural and the readiness mindset within the organisation and among business partners.

Technological sophistication of an organisation is considered an important factor for businesses' e-business adoption and implementation. There have been extensive results outlining important determinants of organisational factors on e-business adoption

(Tornatzky and Fleischer, 1990). The majority of organisational factors addressed involve such organisational characteristics as size, industry type and business scope (Zhu *et al.,* 2004, 2006). However, there is a lack of study addressing the relationship between information orientation / asymmetry and technological innovation / integration on e-business adoption (Hsieh *et al.,* 2006). Therefore, Hsieh *et al.* (2006) attempted to define the term "information orientation" and propose a model to investigate how information orientation influences information asymmetry and e-business adoption. Results suggest that information orientation and technological innovation could significantly reduce information asymmetry and significantly influence e-business adoption (Hult *et al.,* 2004). Companies are more capable of making appropriate decisions based on information which in turn would help the company to share information among supply chain members and among internal employees and thereby motivates the e-business adoption (Jayachandran *et al.,* 2005; Ko *et al.*, 2005). This study provides valuable insights for managers to understand that building stronger information orientation and technological innovation will motivate e-business adoption and improve information asymmetry, thus improving decision-making processes.

Within the technological perspective, a few important themes emerge within this body of literature including: the adoptability of technology infrastructures (Wang and Head, 2001), capabilities innovate and integrate e-business activities (Barlow *et al.,* 2004; Quayle, 2002) and the impact of the hardware and infrastructure on development of consumer trading (Lee and Brandyberry, 2003). Beatty *et al.* (2001) study the factors influencing e-business adoption from the perspective of technology compatibility and integration. Another significant theme in the literature addresses the cost-effectiveness of different technological platforms. For example, Tamimi *et al.* (2003) explore whether technology affects retail productivity and conclude that it can contribute as much to retail margins as investment in additional selling space.

Studies conducted by Croteau and Bergeron (2001) and Croteau *et al.* (2001) examine the strategic value and adoption of e-business as perceived by top managers in small and medium sized enterprises (SME). By adapting Tapscott and Caston's (1993) infrastructure themes, this empirical study seeks to investigate the impact of organisational infrastructure components (common vision, cooperation, empowerment, adaptability and learning) and technological infrastructure dimensions (user involvement, connectivity, distributed computing, flexibility and technology awareness) on the adoption of e-business. By identifying and understanding factors that are critical to the integration of e-business into their organisations, business owners and top managers can take a proactive approach and the necessary steps to ensure e-business success (Vijayasarathy, 2004).

Many studies have attempted to describe the organisational factors influencing the adoption of Internet technology. A recent study conducted by Hsiu and Lee (2005), examines the impact of organisational learning skills and organisational knowledge management processes (knowledge acquisition, knowledge application, and knowledge sharing) on an e-business system adoption level. The results showed that organisational learning factors and knowledge management processes are closely related to the level of e-business systems adoption. This result is supported by similar research conducted by Bradford and Florin (2003) in which they conclude that businesses considering e-business adoption would be best to focus on both social and technical factors, and their interaction within and beyond the organisation, rather than focusing exclusively on technological considerations. Both of the papers have provided implications for e-business managers or policy-makers in formulating policies and targeting appropriate organisational capabilities to ensure effective adoption of e-business.

Organisational learning factors include; training available, technical expertise, and knowledge levels referring to quantity of education available to technology adopters or users (Hsiu and Lee, 2005). Accordingly, the level of training that firms' employees undergo in Internet systems is positively related to adoption success (Bradford and Florin, 2003). Venkatesh and Speier (2000) found that training availability was positively correlated with technology use intention. Firms are more likely to adopt an innovation when technical expertise is available, and technical expertise thus can increase levels of firms' technology adoption (McGowan and Madey, 1998). Zhu *et al.* (2004) identified the lack of technical expertise as a key factor inhibiting e-business adoption. Moreover, Tiessen *et al.* (2001) found that technical capabilities facilitated firms' e-business adoption. Firms with high levels of technical expertise can be expected to master the technical aspects of e-business and adopt e-business systems more completely than firms with lower levels of technical expertise. Consequently, if firms' employees are knowledgeable about e-business systems, the firm may be more willing to adopt e-business systems. Additionally, two similar studies (Mirchandani and Motwani, 2001; Iacovo *et al.,* 1995) identify organisational readiness as one of the factors that influence technology adoption. Factors are investigated in these studies to access how compatible and consistent e-business is associated with a firm's culture, values, and preferred work practices; existing technology infrastructure; and top management's enthusiasm to adopt e-business.

Organisational knowledge management is emerging as an important concept and is frequently cited as an antecedent of improvement and in adoption of e-business (Hsiu and Lee, 2005; Darroch and McNaughton, 2002). Efficient knowledge management processes, such as knowledge acquisition, application, and sharing, are important for new technology adoption and recent studies stressed that in a context of rapid technological innovation, firms consider organisational capabilities through the knowledge accumulation, combination and dissemination (Grant, 1996). Darroch and McNaughton (2002) examine the link between organisational knowledge management practices and innovation types, and found that the likelihood of effective firm innovation increases with the extent of knowledge acquisition. Moodley (2003) notes that the employees of an organisation are not only driven by e-business infrastructure but also by acquisition of knowledge and skills through the success of e-business adoption.

Successful e-business adoption requires adjustments in the business processes and the ability of a firm to modify and master the technical aspects of Internet technology (Attewell, 1992). Despite the pervasiveness of IT in modern workplaces, there is growing evidence of failure to fully realise organisational effectiveness due to weak employee acceptance of new technologies (Johnson, 1997). Therefore, training availability and high level of technical expertise have been identified as a necessary and essential component of the firm's new technological adoption (Venkatesh and Speier, 2000; Robey *et al.,* 2002).

Mirchandani and Motwani (2001) investigate the factors that differentiate adopters from non-adopters of e-business in small businesses. The relevant factors include enthusiasm of top management, compatibility of e-business with the work of the company, readiness mindset of adoption of customers and supply chain members, relative advantage perceived from e-business, and performance measurement. Similarly, Riemenschneider and McKinney (2002) analysed the mindset of small business executives and their business partners on the adoption of e-business. They found that all the component items of the normative and control beliefs differentiated between adopters and non-adopters. In the behavioural beliefs (attitude) group, however, only some items (e-business enhances the distribution of information, improves information accessibility, communication, and the speed with which things are done) were found to differentiate adopters from non-adopters of e-business.

Many firms have relied on partners or contractors for their e-business design and implementation tasks. The outsourcing approach has been popular in driving the growth of applications service providers by relying on partners that may speed up the initial adoption of e-business, bypassing the potentially slow process associated with in-house development (Aubert *et al.,* 1999; Barua *et al.,* 2000). However, this may slow down an organisation's subsequent migration to e-business. Although, Chatterjee *et al.* (2002) suggest that outsourcing may seem to be a "shortcut" for e-business adoption, but business processes may not be fully aligned with the Internet; employees may not get the exposure of e-business and thus lack of "buy in"; and organisational culture may remain separated from e-business. Barua *et al.* (2000) further stress the importance of developing a standardised set of performance measurements among business partners in order to encourage internal and external collaboration and increase the readiness of e-business adoption among members.

From the behavioural perspective, Damodaran and Olpher (2000) have identified knowledge transfer, knowledge integration, and practical application of knowledge as the main elements for developing "external" capabilities. According to a study conducted by Caloghirou *et al.* (2004), the readiness, and openness towards knowledge sharing among business partnerships are important factors in improving business performance and encouraging the adoption of e-business. Establishing knowledge management mechanisms and advantage knowledge assets is essential for successful technological and organisational innovation (Hall and Andriani, 2003; Bong *et al.,* 2004). In addition, Johannessen *et al.* (1999) argue that knowledge integration and related applications have been developed as strategic competitive factors in modern organisations. Factors such as managing the internal and external collaboration and promoting the readiness mindset of e-business adoption infrastructures among business partners to form collaboration are essential in order to develop and maintain e-business performance measurement in supporting the adoptability of Internet technology. As stated by Fahey *et al.* (2001), a firm with enhanced and accurate leveraging of the strategic relevance of knowledge and knowledge management practices in these areas, is more likely to adopt e-business systems or increase the level of e-business adoption.

Table 2.6 indicates the importance of each of these elements based on the present author's subjective assessment of the work of the fourteen well-known authors in the e-business adoption field. The level of measurement used to identify the element weighting is a five-point scale with no change, low, medium, high and substantially high, which are 0.0, 0.25, 0.50, 0.75, and 1.00 respectively. Table 2.6 identifies the minimum and maximum ratings of these elements. The most important element is within the organisational readiness (organisational leaning factors; 6.00; organisational support and value; 7.47; organisational knowledge management; 7.00) and has been considered by various authors to have significant impact on the success of e-business adoption. However, Table 2.6 has shown lack of research conducted from the attitudinal aspect of e-business adoption (internal and external collaboration; 4.75; performance measurement: 3.25; readiness mindset of e-business adoption: 4.25). These elements appear to have scored relatively low in the e-business literature, which suggests the need to investigate further into these identified elements.

Elements of E-Business Adoption Investigated	Key Authors [1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	Weighting (total = 14)
Technological innovation and integration	0.0	0.5	0.25	0.0	0.75	0.75	0.5	0.75	0.75	0.25	0.5	0.75	0.25	0.25	5.50
Information orientation and asymmetry	0.25	0.25	0.0	0.25	1.0	0.5	0.25	0.25	1.0	0.25	0.25	1.0	0.75	0.25	4.25
Adoptability of technology infrastructures	0.25	0.0	0.5	0.5	0.75	1.0	0.0	0.5	0.25	0.75	0.0	0.75	0.25	0.75	5.50
Organisational leaning factors	0.75	0.25	0.5	0.25	0.75	0.25	0.0	0.75	0.75	0.5	0.5	0.25	0.5	1.0	6.00
Organisational support and value	1.0	0.0	0.75	0.75	1.0	0.0	0.25	0.5	1.0	0.25	0.75	0.25	0.75	0.75	7.47
Organisational knowledge management	0.75	0.5	0.25	1.0	0.75	0.25	0.25	0.25	0.5	0.0	0.25	0.25	1.0	0.75	7.00
Internal and external collaboration	0.25	0.0	0.5	0.25	0.0	0.25	0.5	0.75	0.25	0.25	0.0	0.5	0.75	0.5	4.75
Performance measurement	0.0	0.25	0.25	0.25	0.25	0.5	0.25	0.5	0.0	0.0	0.25	0.25	0.5	0.25	3.25
Readiness mindset of adoption	0.25	0.25	0.25	0.0	0.25	1.0	0.25	0.75	0.25	0.5	0.25	0.25	0.5	0.25	4.25

Key authors: No mention (0.0) low emphasis(0.25) Medium emphasis (0.5) High emphasis (0.75) Substantially high emphasis (1.0)

[1] Hsiu and Lee (2005)
[2] Bradford and Florin (2003)
[3] Lewis and Cockrill (2002)
[4] Beatty *et al.* (2001)
[5] Teo and Pian (2004)
[6] Hsieh *et al.* (2006)
[7] Quayle (2002)
[8] Zhu *et al.* (2004)
[9] Croteau and Bergeron (2001)
[10] Kaplan and Norton (2004)
[11] Mirchandani and Motwani (2001)
[12] Riemenschneider and McKinney (2002)
[13] Damodaran and Olpher (2000)
[14] Grandon and Pearson (2004)

Table 2.6 Assessment of key research elements identified in e-business adoption

2.5.4 Performance Measures

Marshall *et al.* (1999) describe performance measurement as "… the development of indicators and collection of data to describe, report on and analyse performance". Neely *et al.* (1995) see performance measurement as the process of quantifying action, and more specifically define it as "the process of quantifying the efficiency and effectiveness of action". They define a performance measure as "a metric used to quantify the efficiency and/or effectiveness of an action (p. 45)". Since the emergence of Internet technology, there has been a steady growth of research, which suggests that the impact of the Internet actually differs from other forms of information technology in terms of the capability to alter the way in which business is executed (Fillis *et al.,* 2004a; Abell and Lim, 1996; Fuller and Jenkins, 1995). The aim of this section is to give an analysis of measurement metrics that have been used to investigate the impact of the three strategic perspectives (business strategy, supply chain strategy, e-business adoption) on business performance utilising Internet technology.

Benefits accrue from an ability to fundamentally redefine inter-firm relationships and processes. Internet-enabled and other e-business mechanisms facilitate the integration and management of within firm and cross-firm business processes that produce value for customers (Graham and Hardaker, 2000; Lummus *et al.,* 1998). Process integration involves upstream and downstream coordination with supply chain partners. In these interactions, e-business helps minimize complexity and increase flexibility while contributing to high degrees of collaboration and operational efficiency (Graham and Hardaker, 2000; Morash and Clinton, 1998).

Neely *et al.* (2000) comment that large companies are still trying to develop and apply appropriate objective measures for their e-business activities (Neely *et al.*, 2000). There have been a few studies that adopted a similar approach (Poon and Swatman, 1999; Iacovou *et al.,* 1995; Zhu *et al.,* 2004; Mahmood and Soon, 1991). All of these studies stressed that it is the perceived benefits that should be measured since these are the benefits that are critical in the adoption and continuing use of Internet technology. The potential numerous benefits of e-business adoption have been cited extensively in the literature (Drew, 2002; Zhu *et al.,* 2004; Damaskopoulos and Evgeniou, 2003). According to Kline (1998), perceived benefits can be categorised into direct benefits (saving that come from direct reduction budget or costs) and indirect benefits (not directly measurable hence, more difficult to be measured).

The balanced scorecard approach provides a useful framework for defining a set of measures, which are comprehensive enough to guarantee performance and relevant to different stakeholder interests (Kaplan and Norton, 2004b; 1996). A set of measures developed on this basis might provide a richer picture of performance. The recognition of different stakeholder perceptions is the key to this approach, and helps to present the right measures to the right audience. The framework in the e-measures field can be categorised within five perspectives:

1. Financial perspective – those measures appropriate for funding stakeholders or financial managers (sales increased; transaction cost deceased; market share increased, procurement cost decreased; Filis *et al.,* 2004a, 2004b; Sanders and Premus, 2005);
2. Customer perspective – those measures appropriate and relevant to users interests (customer service improved, improved coordination with suppliers and business partner; Wagner *et al.,* 2003; Tracey *et al.*, 2005);
3. Process perspective – those measures relating to the management of internal processes associated with e-resources (internal processes more efficient; Hinson and Sorensen, 2006);
4. Staff development perspective – those measures relating to the development of individuals capability to work with e-resources (staff productivity increased; Hinson and Sorensen, 2006; Lee, 2001), and;
5. Organisational learning and development perspective – those measures relating to the broader organisational capability to manage and deliver e-resources (business efficiency and quality improvements; Damaskopoulous and Ingenious, 2003).

One of the more recently developed conceptual frameworks is the performance prism, which suggests that a performance measure system should be organised around five distinct but linked perspectives of e-business performance (Neely *et al.,* 2001):

1. Stakeholder satisfaction. Who are the stakeholders and what do they want and need? (Chaston, 2001; Kent and Mentzer, 2003);
2. Strategies. What are the strategies we require to ensure the wants and needs of our stakeholders? (Damaskopoulous and Ingenious, 2003; Shi *et al.,* 2006);

3. Processes. What are the processes we have to put in place in order to allow our strategies to be delivered? (Fillis *et al.*, 2004a; 2004b);
4. Capabilities. The combination of people, practices, technology and infrastructure that together enable execution of the organisation's business processes: what are the capabilities we require to operate our processes? (Hinson and Sorensen, 2006; Rahul *et al.,* 2001);
5. Stakeholder contributions. What do we want and need from stakeholders to maintain and develop those capabilities? (Sanders and Premus, 2005).

Zhu *et al.* (2004) stress the need for appropriate measurement systems to support the suggested wider range of performance measures. Performance measurement is a complex issue that normally incorporates at least three different disciplines: economics, management and accounting (Sanders and Premus, 2005). In order to select appropriate performance measures and design a suitable performance measurement system for a particular organisation, a number of factors must be considered. The choice of a suitable measurement technique depends on a number of factors, including (Tangen, 2002): the purpose of the measurement; the level of detail required; the time available for the measurement; the existence of available predetermined data; and the cost of measurement. However, based on the literature survey, the metrics used to investigate the impact of e-business on business performance can be conceptualised using a process orientation based on the "IT Comprehensive Model" (Mahmood and Soon, 1991; Mahmood and Mann, 1993) of performance measurement. In order to gauge the direct and indirect benefits from e-business adoption, three types of perceived benefit indicators have been identified:

(i) the impact on financial measures,
(ii) the impact on internal operation efficiency measures, and
(iii) the impact on coordination with business partners

These measurements have been broadly used in the literature to examine the perceived business performance which will be predictably be realised by businesses through e-business adoption (Zhu *et al.,* 2004; Mahmood and Soon, 1991; Willcocks, 1996; Grembergen and Amelincks, 2002; Rahul *et al.*, 2001; Jacobs and Dowsland, 2000; Eikebrokk and Olsen, 2005). Table 2.6 identifies the ratings of these business performance metrics indicating that all of the metrics have been used extensively to evaluate the impact to e-business on business performance.

Business Performance	Metrics	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	Weighting (total = 12)
		Key Authors												
Impact on Commerce	Sales Increased	0.25	1.0	0.25	0.0	0.25	0.0	0.75	1.0	0.75	0.25	1.0	0.25	5.75
Impact on Commerce	Customer Service Improved	0.0	0.75	0.0	0.25	0.0	0.25	1.0	0.75	1.0	0.25	0.75	0.75	5.75
Impact on Commerce	Market Share Increased (Market Expansion	0.25	1.0	0.25	0.0	0.25	0.0	0.75	1.0	0.75	0.25	1.0	0.25	5.75
Impact on Commerce	International Sales Increased	0.5	0.75	0.25	0.25	0.25	0.25	0.75	1.0	0.75	0.25	0.75	0.25	6.00
Impact on Efficiency	Business efficiency and quality improvements	0.75	0.25	1.0	0.25	1.0	0.75	0.0	0.25	0.75	0.25	0.75	0.5	6.50
Impact on Efficiency	Staff productivity increased	1.0	0.25	0.75	0.75	0.75	0.5	0.25	0.25	0.5	0.5	0.25	0.75	6.50
Impact on Efficiency	Internal processes more efficient	0.75	0.0	0.75	1.0	0.75	1.0	0.25	0.0	1.0	0.75	0.75	0.75	7.75
Impact on Coordination	Improved Coordination with and business partners	0.25	0.5	1.0	0.75	0.0	0.25	0.0	0.75	0.0	0.75	1.0	0.25	5.50
Impact on Coordination	Procurement Cost Decreased	0.0	0.25	0.75	0.75	0.25	0.0	0.25	0.75	0.25	0.75	0.75	0.25	5.00
Impact on Coordination	Transaction cost deceased	0.25	0.75	0.75	0.25	0.25	0.25	0.25	1.0	0.5	1.0	0.75	0.0	6.00

Key authors: No mention (0.0) low emphasis(0.25) Medium emphasis (0.5) High emphasis (0.75) Substantially high emphasis (1.0)

[1] Hinson and Sorensen (2006)
[2] Fillis *et al.* (2004a; 2004b)
[3] Damaskopoulous and Ingenious (2003)
[4] Drew (2003)
[5] Chaston (2001)
[6] Shi *et al.* (2006)
[7] Wagner *et al.* (2003)
[8] Tracey *et al.* (2005)
[9] Sanders and Premus (2005)
[10] Kent and Mentzer (2003)
[11] Kaplan and Norton (2004b)
[12] Zhu *et al.* (2004)

Table 2.7 Assessment of performance metrics used in e-business research

2.5.5 Revisiting Technology - Organisation – People (TOP) Dimensions

In a study conducted by Zhu *et al.* (2003; 2004), they have applied the elements of technology-organisation-environment (TOE) in their theoretical framework to investigate the level of adoption of electronic business at the firm level in eight European countries. Their study has showed the similarities of constructs used in various studies on EDI, and IS adoption by firms with e-business adoption, which justifies the use of this framework: e-business is enabled by the "technological" development of the Internet, and is driven by "organisational" and "environmental" factors. Factors such as technology competence, firm scope and size, consumer readiness, and competitive pressure are also defined as "significant facilitators" of e-business adoption.

In addition to the TOE framework, Stevens' (1989) model also provides a consistent empirical support, which provides a good base for comparisons. He (Stevens, 1989) outlines a sequence of moving from a poor supply chain performance towards the seamless supply chain. The Stevens Reference Framework divided supply chain evolution into four levels. Stevens' framework can be seen as comparable to the framework model proposed. In order for companies to achieve a full integration, they need to achieve all of the three dimensions; "technological dimension", "organisational dimension", and "people dimension" (Figure 2.2). The element, which is missing here, would be the integration or interface between these three factors, as it should be looked at as a single entity (Christopher, 1998, p. 34) rather than three individual functions.

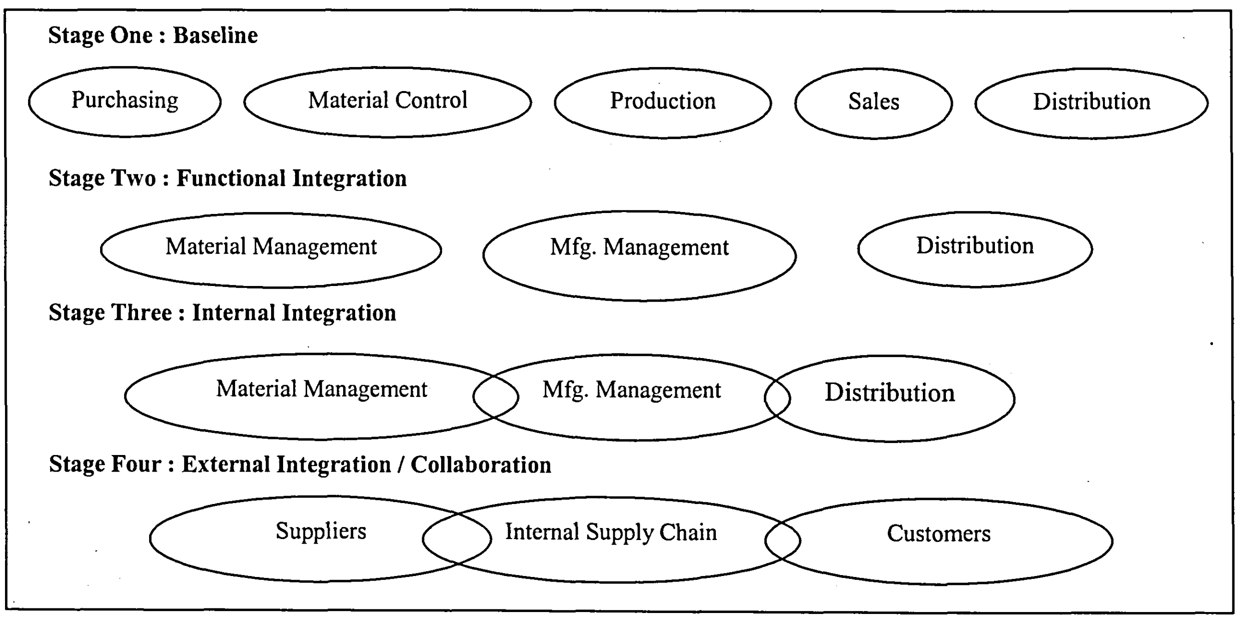


Figure 2.2 Supply chain transformation stages (Stevens, 1989)

<table>
<tr><th>Focus of Integration</th><th>Stages of Integration</th><th>Supply Chain Characteristics</th><th>Weaknesses/Strengths</th></tr>
<tr><td rowspan="4">People Organisation Technology</td><td>Baseline</td><td>Reactive short-term planning, fire fighting, large pools of inventory.</td><td>Vulnerability to market changes.</td></tr>
<tr><td>Functional Integration</td><td>Emphasis still on cost not performance, focus inward and on goods.</td><td>Reactive towards customer, some internal trade-offs.</td></tr>
<tr><td>Internal integration</td><td>All work processes integrated. Planning reaches from customers back to supplier, EDI widely used.</td><td>Still reacting to customer.</td></tr>
<tr><td>External Integration</td><td>Integration of all suppliers, focus on customer, synchronised material flow, and supply chain covers extended enterprise.</td><td>Proactive to customer demand, synchronised demand flow, less trade-offs</td></tr>
</table>

Figure 2.3 Supply chain integration framework (Stevens, 1989)

Stevens (1989) has differentiated contributory factors for supply chain integration into the 'hard' issues (such as technology) and the 'soft' (e.g. relations, attitudes, etc). Numerous studies suggest that many companies have not yet fully realised the technological integration of the available office technologies and software tools such as Material Resource Planning (MRP), Distribution Resource Planning (DRP), and Enterprise Resource Planning (ERP). Stevens, as early as 1989, advocated that in order to achieve full integration (from a baseline to external integration as illustrated in Figure 2.3); companies needed to focus on people dimensions internally as well as externally. This study argued the applicability of Stevens' (1989) integration framework in today's business environment where companies want to move from a traditional business to e-business. Therefore, the identified dimensions, namely technology, organisation, and people (TOP) are well suited for studying the success of e-business adoption.

Research has shown that the diffusion of the technological dimension in industries has not been an easy task (McCole and Ramsey; 2005; Ramsey *et al.*, 2005). However, it is acknowledged that the use of this new technology (Internet) is expected to increase in time due to different reasons (Rogers, 1995). The present level of adoption and diffusion into the whole economy influences one of the possible reasons for adopting a new technology within a firm in general or by the proportion of adopters in the same sector or sector related companies. Empirical studies also confirm that significant effects are powerful drivers of technology adoption (Canepa and Stoneman, 2004; Bertschek and Fryges, 2002).

The technological dimension provides the shared establishment of the technological capabilities for building business applications. This comprises of technological components and a group of set services such as management of data processing, provision of electronic exchange capabilities or management of database (Zhu *et al.,* 2004; Croteau *et al.,* 2001). Environmental uncertainties have raised the awareness to increase the need of flexibility to enable organisations to change more regularly than in the past and be able to adopt new opportunities. Technology awareness imposes genuine interests in IT both inside and outside the organisation (Croteau *et al.,* 2001). As new technological innovations appear in the market frequently, practitioners and researchers must maintain an awareness of each other's efforts by keeping up-to-date on the latest technology and having sufficient organisational knowledge and technology skills to make the best possible technological investments for their firms (Boynton and Zmud, 1987; Croteau and Bergeron, 1999).

The organisational dimension can be defined as the choice pertaining to the particular configurations and internal arrangements intended to support the organisation's chosen position in the market (Marton, 1991). Senior management commitment and alignment of compensation around e-business performance measures have a strong impact on a firm's e-business success (Ontario, 2001). Kaplan and Norton (2004) describe organisation capital as the company's culture, its leadership and how aligned its people are with its strategy goals and employees ability to share knowledge.

The organisational dimension also delineates choice in the decision-making processes and accountability appropriate to the strategy orientation of the firm (Broadbent and Weil 1997). It has emerged that providing e-business training for staff drives leading growth firms who then demonstrate a relatively high degree of e-business success. This was the strongest factor that differentiated the early adopters from the "late majority". A number of studies indicate that many companies have pursued external integration while ignoring the organisational dimension (Barratt and Green, 2001; Fawcett and Magnan, 2001; Christopher, 2005).

Organisational dimension may also be defined as the choice pertaining to a particular configuration and internal arrangement intended to support the organisation's chosen position in the market (Morton, 1991). According to Stevens (1989), organisational flexibility is necessary to move towards internal integration of disparate operation functions. This enables an organisation to move towards an integrated MRP, DRP or a fully integrated ERP system.

There are many studies suggesting an over emphasis on the technology, while the people issues have been completely ignored (Sabath and Fontanella, 2002; Barratt, 2002; Ireland and Bruce, 2000). Along with technological and organisational issues, senior management commitment towards e-business strategy and underlying performance measures are regarded as having a strong impact on e-business success (Ontario, 2001). Kaplan and Norton (2004) describe people as organisation capital and company's culture as its leadership, how aligned its people are with its strategic goals and knowledge sharing abilities of its employees. Achieving internal integration is not sufficient and could lead to creating larger organisation silos (Barratt *et al.,* 2001). According to Stevens (1989), attitudinal changes are necessary for a company to integrate with its customers and suppliers.

Market orientation within the "people" dimension is another factor that is likely to influence technology adoption for a company. Market orientation can be defined as the execution of a particular corporate philosophy, the marketing concept (Gray *et al.,* 1998, 2000; McCole and Ramsey, 2005). The activities of market orientation encompass activities such as responding to customers and "countering" to competitor actions. Empirical studies have supported the positive impact of market orientation to business performance across industries (Chang and Chen, 1998; Han *et al.,* 1998).

The discussion above has provided the support of significant important TOP dimensions within e-business research and impact on business performance. Following the critique from the literature and gaps identified, it can be seen that the context of operational and strategic management are still fit to investigate the success factor of e-business adoption. Through a careful content analysis, elements have been identified which in the present author's view contribute to e-business research. They can be generally categorised under the well-established operations research dimensions of technology, organisation and people. Hence, Table 2.8 displays the categorisation of the identified elements in

Business Strategy (Technological Infrastructure, Organisation Infrastructure, Partnership Strategy), Supply Chain Strategy (Technology Integration, Internal Integration, Supply chain Relationship) and E-Business Adoption (Technology Adoption, Organisational Capability, Attitudinal Capability) into TOP dimensions.

	Variables examined	**Dimension Defined**	**TOP Dimensions**
"Strategic Perspective" Business Strategy	• IT engagement and collaboration • Systems compatibility • Sense and response to the Web based opportunities • Core operations capabilities	*Technological Infrastructure*	*"technological"*
	• Market orientation • Cost structure and profit potential • Restructure of behavioural drivers • Effective communication throughout organisation	*Organisation Infrastructure*	*"organisational"*
	• Integrate and facilitate customer requirements • Business relationships in customer involvement • Sharing responsibility in product development	*Partnership Strategy*	*"people"*
"Operational Perspective" Supply Chain Strategy	• Investments for supply chain system • Integration of operating and planning database • Standardised and customised information • Information sharing and distribution	*Technology Integration*	*"technological"*
	• Organisational structure • Standardised supply chain practices and operations • Integration of individual operations channel • Time based logistics solutions	*Internal Integration*	*"organisational"*
	• Roles and responsibilities • Developing and maintaining relationships • Risk and rewards	*Supply chain Relationships*	*"people"*
"Behavioural Perspective" E-Business Adoption	• Technological innovation and integration • Information orientation and asymmetry • Adoptability of technology infrastructures	*Technology Adoption*	*"technological"*
	• Organisational learning factors • Organisational support and value • Organisational knowledge management	*Organisational Capability*	*"organisational"*
	• Internal and external collaboration • Performance measurement • Readiness mindset of adoption	*Attitudinal Capability*	*"people"*

Table 2.8 Incorporation of technology, organisation and people dimensions within each identified factor

2.6 SCOPE OF RESEARCH

In order to scope the research and provide an outline plan, the study restricts itself to the following "What" and "How" questions:

a) What are the effects of the proposed e-business capability factors (EBC) factors (business strategy (BS), supply chain strategy (SCS), e-business adoption (EBA)) in contributing to the success of e-business adoption and between adopter and non-adopters of e-business subgroups)?

- To examine the impact of EBC factors (business strategy (BS), supply chain strategy (SCS), e-business adoption (EBA)) on business performance for the UK and Malaysian samples.

b) What are the effect of "technological", "organisational" and "people" (TOP) dimensions on the e-business capability factors (BS, SCS, EBA) within UK and Malaysian companies across multiple industries (global sample; UK and Malaysia) and between adopter and non-adopters of e-business sub-groups)?

- To examine the impact of "technological", "organisational" and "people" dimensions on each of the e-business capability factors across global sample and sub-groups (adopters and non-adopters of e-business) by a series of second-order confirmatory factor analysis models.

2.7 SUMMARY

The main aim of this chapter was to review the available literature to identify existing gaps in the body of knowledge developed during previous work and then to develop, based on these gaps, the research questions that specify exactly what is going to be investigated in this research work. This chapter first gave an overview of the relevant literature on e-business in general and then—more specifically—from the strategic, operational and behavioural perspectives and how these can be perceived to have a significant impact on the success of adopting e-business within an organisation. The analysis of the literature review of e-business revealed some of the main characteristics and features in relation to business strategy, supply chain strategy and e-business adoption and more importantly its distinctive feature.

Firstly, a brief discussion of e-business, its definition, and its current practice was provided, followed by a critical review of the literature on the role of e-business in improving business performance. Several gaps in the literature were identified upon which several research questions were proposed. Overall, the synthesis of literature review in this chapter and the above discussion has identified "gaps" from the existing literature. Firstly, there was a lack of theoretical framework of critical success related factors and e-business success relevant to firms. Secondly, literature had shown the lack of a firm level empirical assessment that elucidates such relationships using an appropriate e-business framework. Therefore, this research seeks to reduce the gap in present research by adding an international dimension to the investigation of e-business capability framework, extending beyond the developed country to investigate how the proposed strategic perspectives will be different to the organisations in a multi-country context

By using the existing framework, this study had taken consideration of three main elements namely organisational, people and technological, that is inter-dependent and has a significant impact on "strategic", "operational" and "behavioural" management in the success of e-business adoption. Literature evidence was provided to support the need to perform a balancing act among these three elements by proposing the correlation among supply chain strategy, business strategies and e-business adoption and evaluating the direct link to business performance. Organisations need to access how the organisations react to the adoption of e-business (organisational), the support or reaction of their customers and business partners (people), and necessary infrastructure to serve each market (technological).

This chapter ended by proposing the research questions to examine the factors that influence the adoption of e-business and the evaluation of e-business adoption on organisations following the scope of research. Specific hypotheses will be proposed to test the proposed theoretical framework in the next chapter.

CHAPTER 3

E-BUSINESS CAPABILITY THEORETICAL FRAMEWORK

3.1 INTRODUCTION

As outlined in Section 1.3, the present study proposes to develop an e-business capability framework, specifically for UK and Malaysian companies, which is psychometrically sound. In addition, this study intends to test the impact of companies' e-business capability factors on business performance. This chapter begins with a discussion on the approach adopted to conceptualise the theoretical framework. The definitions, concepts, and themes drawn from the literature review are reaffirmed, the approach to operationalise the research is critically discussed, and the model to enable the research investigations, is presented (see Figure 3.1). Following the identification of research problems and the establishment of research questions, the concept of e-business capability (EBC) is introduced and explained. In addition, the research variables are elaborated and the dependent and independent variables are clearly distinguished. The construction of a theoretical framework in this chapter will be used in the subsequent chapters to develop the research design and questionnaire survey.

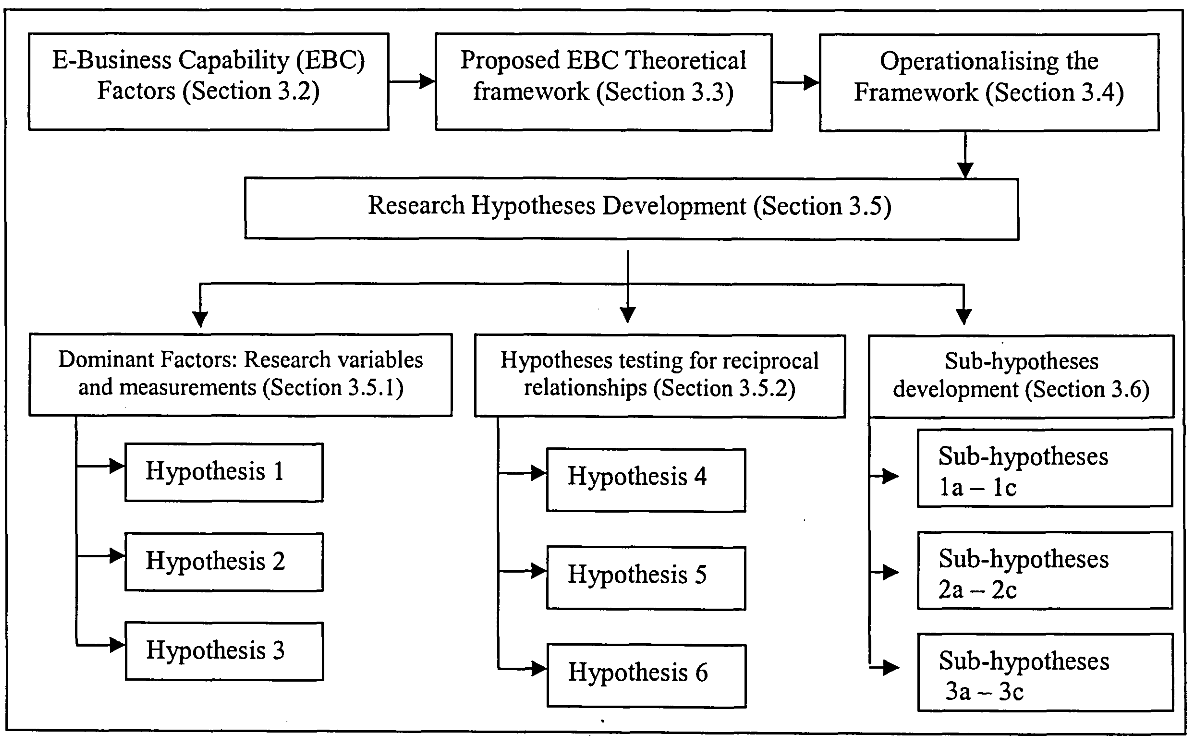


Figure 3.1 Overview of Chapter Three

3.2 E-BUSINESS CAPABILITY (EBC) FACTORS

In this section, salient features of the conceptual framework for this study are proposed. The previous chapter (Section 2.5) demonstrated that in order to ensure successful e-business adoption across all industry, three proposed success factors had been identified namely; business strategy, supply chain strategy and e-business adoption. These success related factors have been identified as E-Business Capability (EBC) factors. The framework articulates the adoption of e-business as three mutually dependent concepts representing business strategy, supply chain strategy and e-business adoption constructs. Within each factor, is further incorporated three sub-dimensions of "technological", "organisational", and "people". Subsequently, six main hypotheses and nine sub-hypotheses are proposed to be tested to show the relationships of EBC factors with business performance employing suitable statistical techniques.

3.3 PROPOSED E-BUSINESS CAPABILITY (EBC) THEORETICAL FRAMEWORK

The theoretical framework is determined by firstly specifying exactly what is to be investigated. This is undertaken by critically analysing the findings from literature to determine precisely the research problem and formulation of a clear research question in which Robson (2002) stress the importance during the development of the research design. Miles and Huberman (1994) state that a theoretical framework should be able to explain the main issues to be studied. Moreover, all variables should be described in detail with the assumptions laid out clearly and a good description of the structure of the model should be provided. The views in the literature by Naoum (2002) on 'critical appraisal of literature review'; Rossman and Rallis (1998) on 'conceptual framework'; Babbie (2004,); Nachmias and Nachmias (1992) on 'research problems'; Balnaves and Caputi (2001) on 'defining the enquiry'; De Vaus (2002) on 'the process of theory construction'; Babbie (2004), Maxim (1999) and Miller and Brewer (2003) on 'nature of causation', are drawn on to establish the approach from which to critically review the literature to develop the research framework.

In observing the procedure to support the external validity of the research, the theoretical framework for the research is firstly developed by conceptualising the phenomenon drawn from the literature review and by establishing the operational definitions for the research. This entails the critical review of the definitions and concepts derived from the primary and secondary literature findings, together with their causal relationships. E-business capability constructs are then developed reaffirmed and validated before being adopted to present a systematic observation of the theories within the theoretical framework.

In seeking the answers to the research questions, a critical analysis was conducted in the literature and the concepts proposed Stevens' (1989) framework utilising by the "technological", "organisational", "people" dimensions are well suited for to investigate the impact of EBC factors on business performance (Figure 3.2). To identify the specific factors within this framework, literature research of major journals was conducted. Previous findings revealed that most of the research and articles investigated were factors that shaped organisational usage of IT and the consequences (Landford, 2004; Lattimore, 2001). Among these articles , the "technological", "organisational", "people" dimensions incorporated into supply chain strategy and business strategy are two of the most commonly studied independent variables and thus are included in the research model (Filis *et al.,* 2004a, 2004b; Sanders and Premus, 2005; Wagner *et al.,* 2003; Tracey *et al.*, 2005).

Figure 3.2 illustrates that the E-Business Capability (EBC) theoretical framework includes business strategy, e-business adoption and supply chain management factors. E-business adoption is defined as the state of "readiness" of internal (within organisation) and external (business partners and customers) (by having appropriate attitudes, skills, knowledge and technology) to embrace e-business initiatives. Any investigation into e-business adoption must explore the three fundamental building blocks of "technology", "organisation," and "people" dimensions. Although each component focuses on a discrete aspect of a dimension, all are inter-related; changes to one dimension will have ramifications on others. In addition, the research design is cross-country in nature, which enables a comparison of developed and developing country context, as one of the research aims of this study. Hence, this capability (e-business adoption) is included as the third success factor in the research model.

As illustrated in Figure 3.2, all these components are inter-related (mutual dependency) i.e. any change in factor would have ramifications on others. Under the proposed of the conceptual model and aforementioned discussions, the next section will discuss the rationale of hypotheses development to measure e-business adoption related to positive business outcomes.

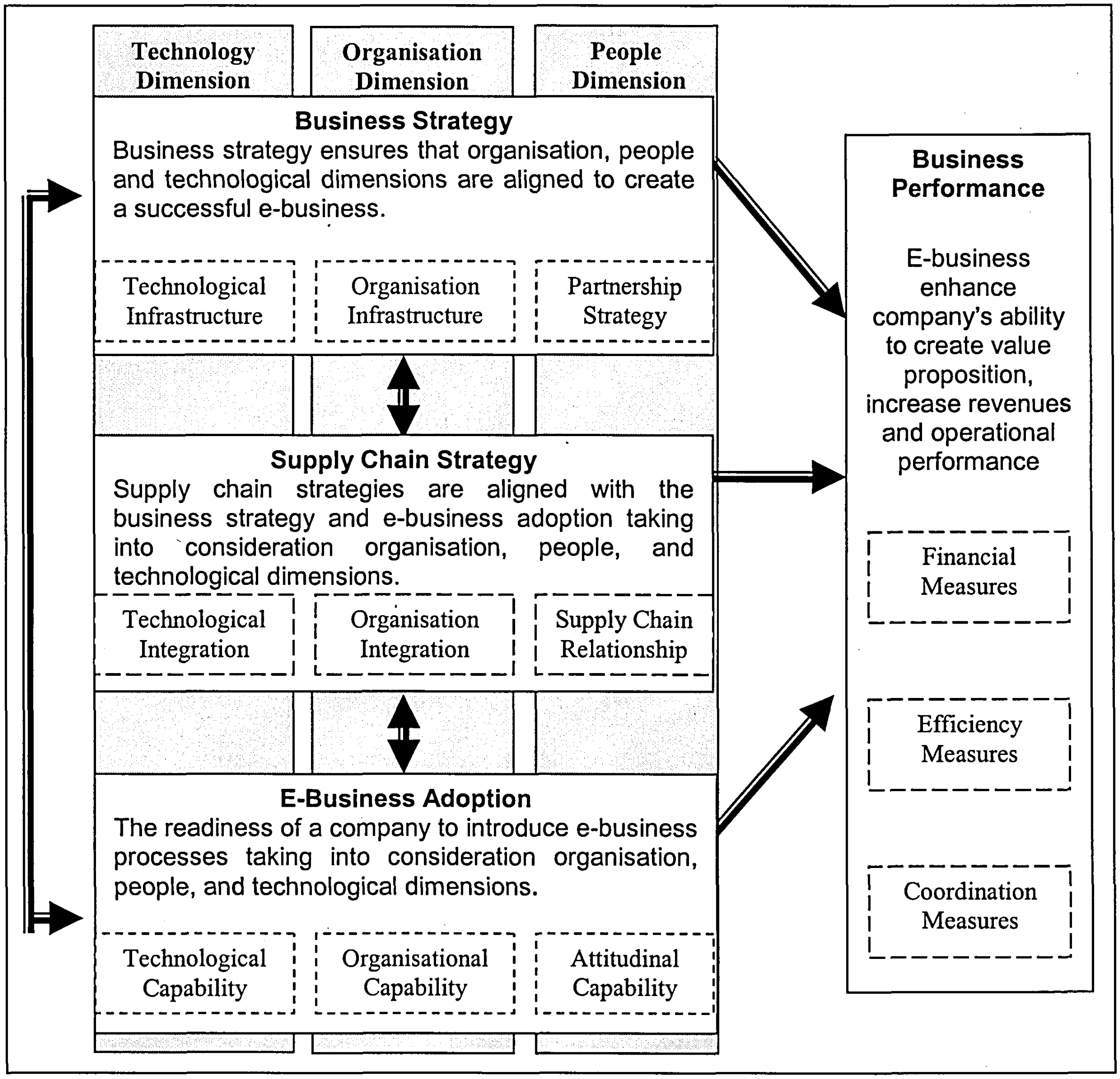


Figure 3.2 Proposed E-Business Capability theoretical framework

3.4 OPERATIONALISING THE FRAMEWORK

The views on research "positivism" and "instrumentalism" are considered in this study to acknowledge the importance of understanding the logic of philosophical thinking that underpins this research. The subsequent discussions will involve two types of "thinking" are taken into consideration by drawing on the views of various authors (Hindess, 1977; Maxim, 1999,; Babbi, 2004; Bouma and Atkinson, 1995). For the purpose of this research, an overall definition of positivist research thinking denotes that "reality can only be known on the basis of experience and that the object of knowledge can only be what is given or what can be given in experience" (Guba and Lincoln, 1994).

Positivism suggests the need to confirm theoretical assumptions, with empirical data and causality, should be fundamentally based on mechanistic causal models measured against facts of experience. On the other hand, "instrumentalist" research thinking argues that that a set of agreed criteria identified for research could also establish causal relationships. To circumvent the positivist argument on causation, which significantly determines the research epistemological and ontological elements, the research takes the view of Maxim (1999), Babbi (2004), and Bouma and Atkinson (1995) that suggest that causal models can be adopted as long as they can meet the three fundamental conditions of:

(i) regularity of occurrence or covariance between cause and effect;
(ii) asymmetry between cause and effect;
(iii) non-spuriousness within the cause-effect within the relationships is observed.

This is further reinforced by their views. They suggest that the logic causation in developing research hypothesis can be established when they can demonstrate that:

(i) the dependent and independent variables must be empirically related to one another;
(ii) the independent variable must occur earlier in time than the dependent variable;
(iii) the observed relationships cannot be explained away as the artificial product of the effect of another earlier variable when developing a hypothesis.

The following section will critically review the e-business conceptual research model following underlying research questions and propositions. The detailed discussion exemplifying the application of the concepts and development of E-Business Capability (EBC) framework will be discussed in the next section. This is followed by proposition of a series of research hypotheses to be formulated and, based on the research that related to the success of e-business adoption in different industries, related theoretical and empirical perspectives.

3.5 PRIMARY FACTORS (EBC FACTORS) HYPOTHESES DEVELOPMENT

A hypothesis is a suggested explanation of a group of facts or phenomenon either accepted as a basis for further verification or, accepted as likely to be true (Holt, 1997). In addition, Weisberg *et al.* (1996) conceive that a hypothesis is a statement of the causes of phenomenon and is necessary in research to understand how concepts can be operationalised. Whilst May (1997) sees hypothesis as a conjecture that is deducted from a theory, when if found to be true, will support the theory.

Many authors have similar opinions in describing a hypothesis as a statement that conjures a suggestive relationship between an independent and dependent variable (Fellows and Liu, 1997; Kinnear and Gray, 1994; Maxim, 1999). They are tentative, because they can only be confirmed after they have been empirically verified. Bouma and Atkinson (1995) suggest that a hypothesis is a statement that asserts a relationship between two or more concepts and is developed to order to focus the aim of the research. In judging the usability of hypotheses, Goode and Hatt (1952) suggest that they must be conceptually clear, should have empirical referents, and must be specific, related to available verification techniques, and related to a body of theory.

The distinction between quantitative and qualitative research is also drawn. Robson (2002) sees quantitative research as hallmarked with a very substantial amount of pre-specification of what has to be done and should take place before getting into the research study, which Maxim (1999) terms as '*hypothetic-deductive*'. Conversely, he sees qualitative research as the opposite and is characterised with much less pre-specification taking place and the research design evolves, develops and unfolds as the research proceeds. A more detailed treatise on the research methodology is given in Section 4.6.

Many authors agree that supply chain strategy should be given a higher level of strategic importance at the boardroom level (Meade, 1998; Philip and Pedersen; 1997; Damien, 2005). In addition, research has frequently identified that strategy development and business performance are inextricably linked to reap the actual value propositions from the e-businesses adoptions (Rosenzweig *et al.*, 2003; Vickery *et al.*, 2003; Damien, 2005). Drawing from the above, and mindful of the co-relational nature of the theory and propositions developed to achieve the aim and objectives set for the research, both quantitative and qualitative methods are built into the research design. Figure 3.5 illustrates the six main hypotheses proposed under the three e-business capability factors and business performance.

Following the extensive discussions of the proposed framework (see Figure 3.2) and aforementioned discussions, the following six main hypotheses are postulated to test the impact of these factors on business performance. From previous discussion in Section 3.4, it should be acknowledged that each of the proposed e-business capability factors has incorporated technology-organisation-people dimensions to ensure positive effect on business performance. To enable the research process six main hypotheses are then developed as follows:

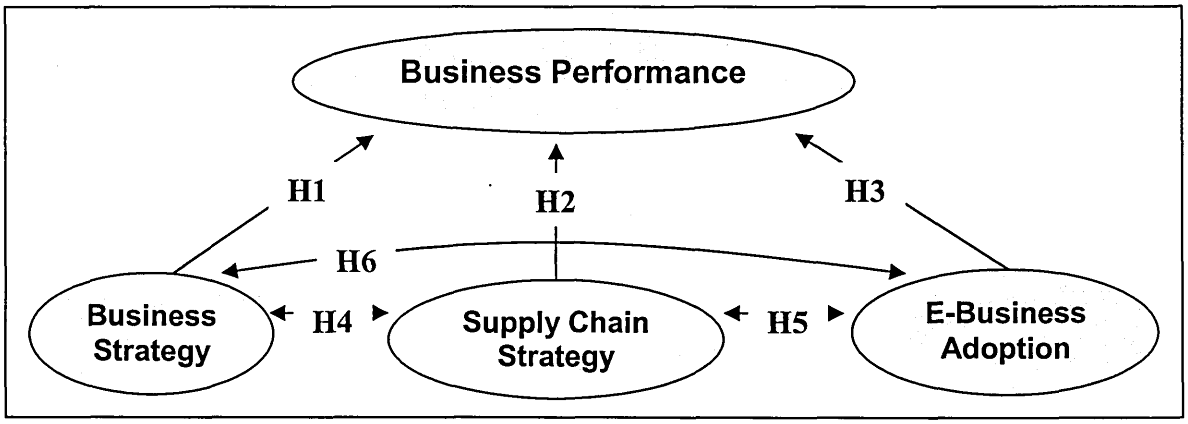


Figure 3.3 Hypothesised arrangements for the E-Business Capability framework

Path Coefficients

Hypothesis H1 : **Business strategy is a significant determinant of business performance**

Hypothesis H2 : **Supply chain strategy is a significant determinant of business performance**

Hypothesis H3 : **E-business adoption is a significant determinant of business performance**

The 'cluster-causation' nature of Hypothesis 1, 2 and 3, as conceived from Miller and Brewer (2003), presume that causes converge to produce a change. The substantial amount of theory developed during the literature review and during the conceptualisation of the literature framework preceding the development of Hypotheses

1, 2 and 3, suggest the 'theory-then-research' and quantitative approach to the research investigations.

This entails objective fact-finding investigations to confirm the theory and propositions developed by the hypotheses within the theoretical framework. The research approach will test the propositions; if the proposition is rejected by the empirical data, changes will have to be made to the theory; but if the theory is not rejected, the propositions may be selected.

The *business performance* i.e., financial measures, efficiency and coordination measures are referred to as the dependent variables for both Hypothesis 1, 2 and 3. Business strategy incorporating with TOP dimensions are the independent construct for Hypothesis 1 whilst supply chain strategy incorporating with TOP dimensions are the independent variables for Hypothesis 2 and e-business adoption incorporating with TOP dimensions are the independent variable for Hypothesis 3.

3.5.1 Dominant Research Variables and Measurements

Dominant factors are those that e-business finds it difficult to be implemented without. The factors are; business strategy, supply chain strategy and e-business adoption strategy. The design of the enquiry, which encompasses the variables and their measurements within the hypotheses and sub-hypotheses, are discussed as follows:

3.5.1.1 Hypothesis 1: Business Strategy vs. Business Performance

This hypothesis posits that there are 'inadequacies' or 'gaps' in considering the holistic managers' needs within the current business strategy formation and implementation. It is widely posited that in order for leverage with information technology (IT) and the Internet functionality, business operations and IT investments should be strategically coordinated and closely aligned (Agarwal *et al.,*1997; Broadbent and Weill, 1993; Earl, 1993; Henderson and Venkatraman, 1993; Lederer and Sethi, 1988; Premkumar and King, 1994; Star and Ruhleder, 1996; Venkatraman, 1989). To fully exploit Internet technology, the firm's business strategy must be integrated with its IT strategy. In addition, in order to fully leverage IT functionality within the business strategy formulation, organisational and technological and people (partnership) infrastructures should be integrated and aligned (Croteau *et al.,* 2001).

Although there have been lots of literature that reports empirical studies on the alignment between business and IT strategies (Chan *et al.,* 1997; Bergeron and Raymond, 1995; Croteau and Bergeron, 2001; Teo and King, 1996). The proposed research framework reinforces the current situation by encompassing the implementation of business strategy focusing on organisational and technological issues, such as technological infrastructure (Duncan, 1995; Star and Ruhleder, 1996), information systems and organisational design (Tavakolian, 1989; Brown and Magill, 1994) and external dimension such as partnership strategy (Larsen and McGuire, 1998, p. 21; Poon, 2000).

3.5.1.2 Hypothesis 2: Supply Chain Strategy vs. Business Performance

This hypothesis tests the proposition, which synchronised logistical activities among supply chain members will create value for end customers by reducing costs associated with redundancy and duplication. By integrating the logistics competencies and resources of diverse supply chain entities also positions the entire chain to serve better-selected customers (Stank *et al.,* 2001).

Supply-chain management (SCM) is known as a modern paradigm for improving competitiveness by coordinating different companies (Chopra and Meindl, 2001; David *et al.,* 2001; Lambert and Cooper, 2000). Recent developments in electronic business have furthered popularised this trend. E-business can be defined as the process of sharing business information, maintaining business relationships, and conducting business transactions by means of information and communication technology (Zwass, 1996).

The development of e-business has contributed to the development of Internet based solutions for supply-chain integration. Companies benefit from e-business because the management of their supply chains can be improved by better gathering and processing of information (Fraser *et al.,* 2000). As observed by Handfield and Nichols (1999), the major value of e-business to industry is in the generation of new and more profitable supply-chain networks.

Applying e-business to the supply chain is an attempt to increase the efficiency of coordination and resource integration among partners (Chin *et al.,* 2005) and thus its effectiveness depends on whether it can overcome the problems that disrupt the integration of the supply chain while improving business performance. From this perspective, analysing supply chain problems and identification of TOP dimensions embedded in strategy formulation is an important element in the deployment of e-business solutions.

Businesses utilising this technology in supply chain operations are able to improve services to customers and their operational performance in order to gain competitive advantage through customer self-service, quick response to customers, reduced product lead-time, and reduced inventory levels. Hsin and Shaw (2005) state that the widespread adoption of e-business technology has major implications for the engineering manager responsible for the operation of systems and processes that rely on electronic data interchange and supply chains. The proposed hypotheses in this study seeks to minimize supply-chain uncertainty, which has been discussed in the academic literature and includes factors that may affect supply-chain integration (Davis, 1993; Fisher, 1997; Gerwin, 1993; Lee and Billington, 1993; Lee, 2002; Strader *et al.,* 1998 and Vickery *et al.,* 1999) as the current studies do not offer help for companies in understanding their uncertainty problems.

Therefore, research hypothesis H2 emphasises the importance of appropriate implementation and formulation of supply chain strategy embedded in TOP dimensions with consideration of Internet technology is crucial for the success of e-business implementation in firms. As in Hypothesis 1, to facilitate the data collection and consequent testing of this hypothesis (H2), three sub-hypotheses are developed by identifying three critical areas of competence that top firms deploy to achieve supply chain logistics integration as characterized in a framework introduced by Bowersox *et al.* (1999). Steven (1989)'s supply chain integration model assists to identify issues for successful supply chain strategy implementation from the Internet technology.

Technological advances such as the Internet provide firms with the ability to be able to share information with forward visibility, improving production planning, inventory management, and distribution. Grover and Malhotra (1999b) and Kent and Mentzer (2003) in their articles added that information technology allows the collaboration of transmission and processing of information necessary for synchronous decision making. This can be viewed as the backbone of the supply chain business structure, which has been made possible by the existence of an efficient and effective information technology (IT) system. Based on this statement, it is appropriate to refer IT as an essential enabler of SCM activities (Mabert and Venkataramanan, 1998).

3.5.1.3 Hypothesis 3: E-Business Adoption vs. Business Performance

By utilising Steven's (1989) TOP dimension, the aim of Hypothesis H3 seeks to investigate the "e"-readiness of companies to support the IT-supported activities internally and externally that will allow them to approach e-business adoption. The third hypothesis started out from discussions in Chapter 2 concerning the importance of e-business competence to be successful in the transformation process towards e-business development. The research attention is aimed at micro, small medium and large businesses and how they can reach a greater global market with the use of IT. The use of IT offers a solution to some of the problems that companies encounter while approaching e-business. Therefore, part of the overall research question raised in this study is: How can e-business adoption strategy be used to support the "readiness" and transformation process of companies in e-business adoption?

Two aspects of conducting e-business successfully serve as a background for proposing this hypothesis development. Firstly, information technology (IT) has a massive impact on the way corporations conduct business (Kalakota and Robinson, 2001). This activity can be referred to as e-business / e-commerce. An effective use of IT (technological dimension) will be the major determination of competitive advantage for companies, as well as dealing problems that need to be aware and deal with. Secondly, the ability of employees to understand, having appropriate skills and experiences (organisation dimension) will determine the success of the business and competence of development and training efforts. It is often the main source for a corporation's competitive advantage (Argyris, 1991; Senge, 1990) coupled with the readiness of business partners and customers to conduct e-business. As discussed in Chapter 2 earlier, Kalakota and Robinson (2001)'s definition of e-business, as being a wider term than e-commerce, is used as a foundation throughout this article. "E-business is not just about e-commerce transactions; it's about redefining old business models, with the aid of technology, to maximise customer value. E-business is the overall strategy, and e-business is an extremely important facet of e-business" (Hafeez *et al.,* 2006; Senge, 1990).

Strategic implementation of e-business adoption is essential to ensure increase in business performance. There is a lot of literature supporting the advantages associated with adopting Internet-enabled technologies for business purposes (Quelch and Klein, 1996; Hamill and Gregory, 1997; Burgess and Cooper, 1998; Keogh *et al.,* 1998; Zampetakis, 2000). However, despite these much-publicised advantages, recent research has shown that a large number of small to medium sized enterprises (SMEs) have been slow to capitalise on this new mode of carrying out business (see for example Clark *et al.*, 2001, 2002; Smyth and Ibbotson, 2001). As micro and SMEs play a significant role in the economy regardless of geographical region, it is important to stimulate electronic business in order to promote competitiveness and economic growth. There is supporting evidence in articles, which indicates particular problems that hold them back in adopting e-business (OECD, 2000; European Commission, 1998; DTI, 2001).

3.5.2 Hypotheses Testing for Mutual Dependency (and Alignment) Relationships (H4 to H6)

Hypotheses 4, 5 and 6 are proposed to test the mutual dependency relationships among EBC factors that have direct impact on the business performance. The application of the term "*is directly related*" within the hypothesis is intended to explore the presumed relationship between the e-business capability factors. It is important to reveal and investigate the widening gap (between successful and failure of e-business adoption) that may be a result of the lack of strategy development among the responding companies.

The shortfall is especially clear when it comes to connecting the supply chain strategy with the business strategy. In a survey conducted by CSC in 2004 (http://www.csc.com) it indicated that just over half of all respondents in both North America and Europe report that their firms do not have a supply chain strategy or are just starting to develop one. Only about one in five respondents in both geographies report having a comprehensive strategy across the entire corporation. Additionally, respondents indicate that supply chain management is rarely integrated into the overall business. Just eight percent of respondents say supply chain strategy is fully aligned with corporate strategy, and 29 percent say it is mostly aligned.

Factor Correlations

Hypothesis H4 : **Business performance is directly related to the level of mutual dependency (and alignment) between business strategy and supply chain strategy**

Hypothesis H5 : **Business performance is directly related to the level of mutual dependency (and alignment) between supply chain strategy and e-business adoption**

Hypothesis H6 : **Business performance is directly related to level of mutual dependency (and alignment) between business strategy and e-business adoption**

These findings lead to the conclusion that without a strategy linked to the business plan, companies will not be in a position to capitalise on the sought-after business benefits. Survey results indicate that companies continue to chase cost savings rather than pursue the long-term benefits of an extended enterprise supply chain. Ultimately, the most effective supply chain networks will control the most attractive consumer groups.

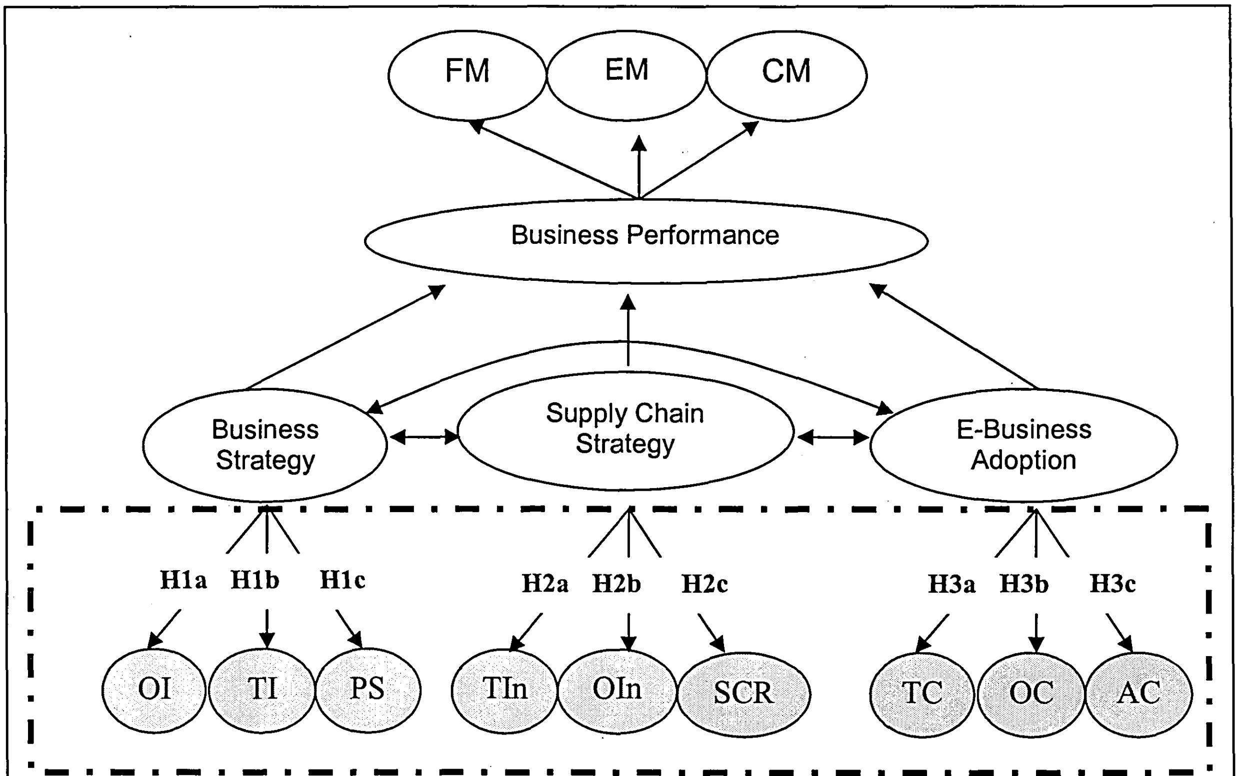
Organisations seeking to deliver value to the customer need to consider the benefits of aligning their operating strategy to their overall business strategy and the market place. Fawcett and Clinton (1997) compared managerial responses of a baseline group of companies with the responses from a group of high performing companies and gained insights into seven organisational strategies, structures, and process factors that can influence a firm's performance (as perceived by respondents). The results indicated that a combination of all factors contributed to performance.

Stank and Traichal (1998) have tested the relationships between a firm's logistics strategy, the organisational design dimensions used to implement the strategy, and the perceived performance outcome experienced as a result of strategy and design. The results from the study had confirmed a positive relationship between organisational design and performance, but failed to find a link between strategic choice and design.

As a result, from the above-mentioned literature, it is proposed that companies treating the proposed e-business capability factors, as distinct and non-dependent entities will not be able to achieve and fully optimise the business performance. Instead, they (e-business capability factors) should be treated inter-dependently with each other, indicating that changes of strategic implementation to one factor will affect the other two factors.

3.6 SUB-HYPOTHESES (TOP DIMENESIONS) DEVELOPMENT

The above discussions give an in-depth rationale of development for the six main hypotheses in the E-Business Capability (EBC) theoretical framework. Each of the proposed EBC factors that have incorporated TOP dimensions is perceived to have positive impact on business performance. Figure 3.4 details the E-Business Capability (EBC) model along with the associated TOP.



Legend

TI	Technological Infrastructure (IT)	TIn	Technological Integration (ERP, EDI)	TC	Technological Capability	FM	Financial Measures
OI	Organisation Infrastructure	OIn	Organisation Integration	OC	Organisational Capability	EM	Efficiency Measures
PS	Partnership Strategy	SCR	Supply Chain Relationship	AC	Attitudinal Capability	CM	Coordination Measures

Figure 3.4 Hypothesised arrangements for the E-Business Capability Framework incorporating TOP dimensions.

As illustrated the e-business performance factor is assessed under financial measures (FM), efficiency measures (EM) (or operational measures) and coordination measure

(CM) which are indirectly related to technology, organisation and people dimensions, respectively. Operationalising the inquiry through the formulation of sub-research questions to structure the inquiry as propositioned by Robson (2002), Naoum (2002), Nachmias and Nachmias (1992) and Flick (1998), three sub-hypotheses are developed to support each of the main hypotheses (Hypothesis 1 to 3).

3.6.1 TOP dimensions vs. Business Strategy

3.6.1.1 Sub-hypothesis H1a: Organisational Infrastructure vs. Business Strategy

The sub-hypothesis investigates the proposition that "a well defined and established organisational infrastructure (organisational dimension) of a firm is positively associated with the success of supporting the firm's business". The "organisational infrastructure" refers to choices pertaining to the particular configurations and internal arrangements intended to support the organisation's chosen position in the market (Morton, 1991). Organisational infrastructure also refers to the internal configurations and arrangements involving organisational structure, business processes, work design, training, and education that intend to support the firm's business strategy. It includes components proposed by Tapscott and Caston (1993), such as common vision, cooperation, empowerment, adaptability and learning. In addition, organisational infrastructure defined in this study also examined the organisation's ability to develop innovations including new products and services, and is measured in this study using a six-point scale wherein one items pertain to capabilities for market entry in product-markets with the questions of "articulate the value proposition, that is, the value created for users by the offering based on the technology".

The successful adoption of e-business within business strategy of the company can be measured, not only in increased efficiency and effectiveness, but also in the organisation's ability to adapt to radical change in operating procedures and project development (Amoroso and Vannoy, 2006). In additional, organisations deciding to adopt e-business must re-engineer their operating environments to utilise technologies and methodologies that allow business-to-business (B2B) connectivity, which requires the demise of current technologies within the organisation and the adoption of new technologies. Poltrock and Grudin (1994) found that organisational structure and process could hinder the successful application of good and acceptable design principles, resulting in poor design features. Lynex and Layzell (1997) found that in some organisations, the structure encourages people not to co-operate or share strategic information and instead promoted competition amongst the business units and this would inhibit e-business to be implemented at maximise level.

In the context of e-business, Grandon and Pearson (2003) explain that traditional organisation structures and approaches cannot provide the competitive basis that are required in the business environment, due to the break down of produce development across the specialist functional departments, which results in poor communication. To ensure the successful progression to B2B e-business, companies must incorporate e-business technologies that are aligned with the overall business strategy (Ranganthan, 2003) and organisations must not forego potential benefits associated with significant changes brought about by adopting new technologies (Cooper, 2000). As a result, Hypothesis 1a is proposed to investigate the effect of organisational infrastructure on business strategy.

3.6.1.2 Sub-hypothesis H1b: Technological Infrastructure vs. Business Strategy

The above sub-hypothesis belongs to Hypothesis H1 and states that "improving the approach to evaluate the technological infrastructure (technological dimension) strategy encompass in business strategy implementation will indirectly improve the business performance". When formulated, the firm's business strategy, consideration of technological infrastructure can be represented by the existing, planned and possible technologies (Internet) that can form part of e-business success. The current environmental uncertainties due to the emergence of Internet technology give rise to the need for flexibility in organisation infrastructure.

When formulating and implementing business strategy, organisations must have the ability to adapt to new opportunities compared to traditional style. Therefore, the emergence of Internet technologies is expected to exhibit more flexibility and versatility in information acquisition and processing, and in the reduction of response time required to adjust to changes in the company's definition of its markets (Das *et al.*, 1991). This sub-hypothesis is developed on the proposition that the objectives of business strategy can be achieved with the careful consideration of technological issues as part of the business strategy sub-components. As a result, Hypothesis 1b is proposed to investigate the effect of technological infrastructure on business strategy.

3.6.1.3 Sub-hypothesis H1c: Partnership Strategy vs. Business Strategy

The above sub-hypothesis belongs to hypothesis H1 and states "The better the well defined and identification of partnership strategy (people dimension) incorporated in the implementation of business strategy, the more likely that e-business will be implemented successfully". Sub-factor of "partnership strategy" incorporated in business strategy execution involves the competency of building lasting distinctiveness with customer choice and linking externally performed work into seamless strategic planning with internal work processes. Although business partners and customers (people dimension) play a significant role in the adoption of new technologies in firm's business strategy implementation, they are not included in many empirical studies (Larsen and McGuire, 1998). Iacavou *et al.* (1995) point out that the lack of mass consumer/suppliers over the Internet will discourage many businesses from adopting e-businesses.

Therefore, Poon and Swatman (1998) state that if a business retained a high percentage of customers and competitors on-line, this would increase the chance of adopting e-commerce. Moreover, companies may be forced to adopt an innovative strategy, simply because of their powerful partner's demands as opposed to their internal needs (Poon, 2000). Therefore, it is essential that the firms that are considering implementing e-business should consider the appropriateness of "people" strategy when formulating business strategy.

Iacavou *et al.* (1995) also propose that an imposition from trading partners is expected to be one of the most critical factors for innovative technology adoption in business strategy implementation. In the context of e-business processes, the consideration of "people" dimensions influence the introduction of new processes and the adaptation of existing approaches to e-business development (Grandon and Pearson, 2003; Scupola, 2003). As a result, Hypothesis 1c is proposed to investigate the impact of partnership strategy on business strategy.

3.6.2 TOP dimensions vs. Supply Chain Strategy

As in Hypothesis 1, to facilitate the data collection and consequent testing of this hypothesis (H2), three sub-hypotheses are developed by identifying three critical areas of competence that top firms deploy to achieve supply chain logistics integration have been characterised in a framework introduced by Bowersox, *et al.* (1999). Steven (1989)'s supply chain integration model assists in identifying issues for successful supply chain strategy implementation with assistance from Internet technology.

3.6.2.1 Sub-hypothesis H2a: Technological Integration vs. Supply Chain Strategy

This sub-hypothesis belongs to Hypothesis H2 and states that "the better the well defined and identification of technological integration (ERP, EDI) (technological dimension) incorporated in the implementation of supply chain strategy, the more likely that e-business / commerce will be implemented successfully. This "technology integration" sub-factor embedded in supply chain strategy is adapted from Bowersox and Closs (1996) framework in which they defined "the competency of maintaining information systems capable of supporting the wide variety of operational configurations needed to serve diverse market segments". Stank *et al.* (2001) further elaborated technology integration as "technology and planning integration focuses on the development of information systems capable of supporting the wide variety of operational configurations, needed to create supply chain solutions for specific customers".

Technological advances such as the Internet provide companies with the ability to share information with forward visibility, improving production planning, inventory management, and distribution. Gorver and Malhotra (1999) and Kent and Mentzer (2003) in their articles add that, information technology allows the collaboration of transmission and processing of information necessary for synchronous decision-making. It can be viewed as the backbone of the supply chain business structure and has been made possible by the existence of an efficient and effective information technology (IT) system. Based on this statement, it is appropriate to refer to IT as an essential enabler of SCM activities (Mabert and Venkataramanan, 1998).

A detailed analysis of IT literature provides a combination of mixed results with respect to the impact of IT on firm financial performance (Hu and Plant, 2001, Sanders and Premus, 2005). For example, findings conducted by Hitt and Brynjolfsson (1996) reveal that the inconsistencies observed among various studies have contributed to variations in methods and measures used in the analyses. Most recent studies have also supported the direct impact of IT on a company financial performance (Bharadwaj, 2000; Kearns and Lederer, 2003; Santhanam and Hartono, 2003). Based on these studies, it is proposed that "technology integration" capability to be significantly and positively related to firm performance (Kearns and Lederer, 2003; Sanders and Premus, 2005). As a result, Hypothesis 2a is proposed to investigate the effect of technology integration on supply chain strategy.

3.6.2.2 Sub-hypothesis H2b: Organisation Integration vs. Supply Chain Strategy

This sub-hypothesis belongs to hypothesis H2 and states that "the better the integration within organisation (organisation dimension), incorporated in implementation of supply chain strategy, the more likely that implementation of e-business will be successful". This hypothesis proposes that successful e-businesses implementation needs to consider the organisation dimension when formulating business strategy. Bowersox and Closs (1996) in their framework of assessing the impact of supply chain logistical integration on business performance define "internal integration" (organisation integration) as "the competency of linking internally performed work into a seamless process to support customer requirements". Successful internal organisational collaboration requires cross-functional planning, co-ordination and sharing of integrated databases.

A higher level of co-ordination is needed to contribute in improving organisational performance (Bowersox and Daugherty, 1995). Empirical evidence suggests a significant difference in the elements of customer service performance for firms with higher levels of integration (Stank *et al.,* 1999). In addition, Stank *et al.* (2001) article suggest the impact of internal collaboration to firm performance. As a result, Hypothesis 2b is proposed to investigate the effect of organisation integration on supply chain strategy.

3.6.2.3 Sub-hypothesis H2c: Supply Chain Relationship vs. Supply Chain Strategy

This sub-hypothesis belongs to Hypothesis H2 and states "Supply Chain Relationship (people dimension) has a direct and positive impact on supply chain strategy". Hypothesis H2c suggests that the proposed EBC theoretical model further posits supply chain relationship directly affects technological integration and organisation integration within supply chain strategy, which in turn directly influences firm performance. Supply chain relationship is defined similarly to internal integration, with the exception that the focus of collaboration is between two or more firms, rather than departments. The "Relationship Integration" sub-factor is defined as relationships among supply chain partners as the "willingness on the part of supply chain partners to create structures, frameworks, and metrics that encourage cross-organisational behaviour" (Stank *et al.,* 2001).

In order to have a successful supply chain strategy implemented within an e-business company, firms need to encourage and identify business partners and customers that share a common vision. At the same time, they need to pursue similar objectives pertaining to partnership interdependence and principles of collaboration. This type of collaborative perspective is important to develop an effective supply chain structure that aligns the functional operations of multiple firms into an integrated system (Stank *et al.,* 2001).

Following discussions from an earlier section, development and evolving technologies coupled with a change in relations and attitude facilitate the integration of the supply chain (Stevens, 1989). Co-ordination of business processes within and across organisational boundaries has been made possible through Internet technologies. Integration of supply chain relationship among business partners and customers was found to have the most challenges and issues arising in comparison with the other two dimensions in supply chain implementation in e-business or traditional companies (McCarthy and Golicic, 2002). Therefore, it is paramount to investigate the underlying issues firms in Malaysia and UK have in the consideration of "people" dimension. Hypothesis 2c is proposed to investigate the impact of supply chain relationship on supply chain strategy.

3.6.3 TOP dimensions vs. E-Business Adoption

3.6.3.1 Sub-hypothesis H3a: Technological Capability vs. E-Business Adoption

This sub-hypothesis belongs to Hypothesis H3 and states, "the strategic readiness of technological capability implementation will have positive influence on a company's e-business adoption strategy". The word "strategic" in this context concerns the adjustments of a plan to the anticipated reactions of those who will be affected by the plans, such as competitors, customers and the actual organisation. Often a plan can differ in structure, but a strategy commonly contains a mission, vision, values, strategic direction, objectives, key strategies, performance outcome, operational plans, and accountabilities (Drucker, 1990).

Hypotheses H3a proposes that it is vital for organisations to recognise and choose the appropriate project management and system development methodologies, in order to transform the e-business initiatives into direct measurable value. Research has shown that there have been many traditional development methodologies and these are perceived as being inadequate for dealing with the development of e-business systems (Standing, 2001). Grupta (2001) suggests that when organisations are considering adopting e-businesses, "they must consider that there may be many of the supporting technologies and approaches used to build e-business applications are either immature or painfully outdated".

Inherent in an e-business strategy is the formulation of e-business development methods, which can be quite different from traditional system and project development techniques (Amoroso and Vannoy, 2006). There have been many organisations blindly investing in e-business implementing without the proper formulations of e-business strategy (The Wisdom Exchange, 2001). It should be noted the importance of recognising that any IT project would involve complex, state-of-the-art technologies (Zmud, 1980). Hypothesis 3a is proposed to investigate the effect of technology capability on e-business adoption.

3.6.3.2 Sub-hypothesis H3b: Organisation Capability vs. E-Business Adoption

This sub-hypothesis belonging to Hypothesis H3 states that "The appropriate identification of organisational readiness (organisational capability) among employees within e-business adoption strategy will have a positive impact on company's business performance". E-Business adoption strategy in terms of "organisational capability" encompasses issues such as re-sourcing, work design, education, training, and human resource management policies (Beaumont and Sutherland, 1992). The adoption of e-business takes into account skills that indicate the choices about the capabilities of organisational members needed to accomplish the key tasks, which support a business strategy (Henderson and Venkatraman, 1993).

There have been studies which indicate that management and organisational factors have a strong influence on successful IT implementation (Ewusi- Mensah and Przasnyski, 1991; Jarvenpaa and Leidner, 1998). In addition, e-business implementations have the higher chance of success if there are good governance models, executive-level championship, and e-business-complimentary human, technical and business resources (Molla, 2004a, 2004b). This is supported by Powell and Dent-Micallef (1997) when they refer to the "fusion" perspective, which indicates the success of e-business development based on a combination of human, business and technology resources, with management commitment and governance to yield the best results.

Sub Hypothesis H3b proposes that organisations are likely to attain success of e-business development if the management and employees are able to understand the magnitude of the required organisational changes and prepare for dealing with these changes competently. The process would involve defining roles, responsibilities and accountabilities related to e-commerce initiatives and delegating the authority, but without withdrawing top management support, for those responsible for making decisions related to e-business (Willcocks and Griffiths, 1997). Iacovo *et al.* (1995) and Mirchandani and Motwani (2001) identify organisational readiness as one of the factors that influence technology adoption.

E-business connects critical business systems directly to customers, employees, suppliers, and distributors via the Web to improve time to market, access to a broader base of customers and suppliers, improve efficiency, and reduce costs (Vicnair, 2001). To achieve these benefits, existing businesses must transform their traditional business processes with e-business practices. Employing e-business requires not only the adoption of new technologies, but also a new set of personal, political and social issues, resulting in significant organisational change (Cooper, 2000).

3.6.3.3 Sub-hypothesis H3c: Attitudinal Capability vs. E-Business Adoption

This sub-hypothesis belongs to Hypothesis H3 and states, "The strategic recognition of readiness (attitudinal capability) among business patterns and customers in consideration of e-business adoption strategy will have a positive impact on company's business performance". Human (attitudinal capability), business and technological resources contribute to marketplace benefits. This is further supported with the reliable view of resource-based theory whereby the routines, processes, skills and other resources that the organisations build, would be able to provide competitive advantage in the marketplace (April and Cradock, 2000). It is important for the ability of organisations to maintain and manage their relationships with suppliers, customers and other partners engaged in a central role in e-business. The proposition reveals that building and maintaining trust and economically viable relationships and leveraging those relationships using e-business applications could contribute significantly towards ensuring better market performance (Molla, 2002). This in particular is a challenge to businesses in developing countries such as Malaysia that belong to international trade chains.

The proverb of "the whole is worth more than the sum of its parts" is especially valid and acceptable in the context of e-business adoption for companies in Malaysian and UK. Although is it important to note that the success of e-business initiatives of a firm depend on its efforts to digitize its value chain But it is also equally crucial to consider the readiness and willingness of its customers and suppliers to engage in electronic interactions and transactions. While it is tempting to think of this readiness as something external to an organisation, it is best considered as a value driver that requires a proactive commitment of resources (Barua *et al.,* 2004).

Without proper management of readiness of business partners and customer (external links), it can easily become the weakest link in the value chain. Therefore, sub Hypothesis H3c recognises the importance of readiness and willingness (attitudinal capability) among business partners and customers to engage in e-business initiatives (Murray and Sapsford, 2001). Table 3.1 provides the summary for each of the dimension constructed in this study.

Business Strategy scales "independent variables" in the research.
Organisational Infrastructure (BSO) Respondents' perceptions of their firm's choices pertaining to the particular configurations and internal arrangements intended to support the organisation's chosen position in the market
Partnership Strategy (BSP) Respondents' perceptions of their firm's competency of building lasting distinctiveness with customer choice and linking externally performed work into a seamless congruency with internal work processes.
Technological Infrastructure (BST) Respondents' perceptions of their firm's configuration of technologies, IT works processes, and shared services that build and sustain present and future business applications.
Supply Chain Strategy scales "independent variables" in the research.
Organisational Integration (SCSO) Respondents' perceptions of their firm's competency of linking integral performed work into seamless process to support customer requirements.
Technological Integration (SCST) Respondents' perceptions of their firm's competency of maintaining information systems capable of supporting wide variety of operational configurations needed to serve diverse market segments.
Supply Chain Relationships (SCSP) Respondents' perceptions of their firm's competency to develop and maintain a shared mental framework with customer and suppliers regarding inter-enterprise dependency and principles of collaboration.
E-Business Adoption scales "independent variables" in the research.
Organisational Capability (EBAO) Respondents' perceptions of how well the company can mobilize and sustain the organization change agenda and their ability to support e-commerce initiative.
Attitudinal Capability (EBRP) Respondents' perceptions of the readiness of the management and business partners to engage in e-business (business partners, customers).
Technological Capability (EBAT) Respondents' perceptions how well of the company's strategic IT portfolio of infrastructure and applications supports the critical internal processes.

Table 3.1 Summary of definitions for each of the TOP dimensions

3.7 SUMMARY

Success can look different when being examined from a different perspective in time, and on different dimensions. In this chapter, a hypothetical framework has been proposed to establish key factors contributing to success in e-business adoption for companies both in developed and developing countries. This chapter has also presented the aims, research questions, and hypotheses related to each of the three elements that encompass this research. A rationale was presented for each of the hypotheses and research questions that was supported by previous theories and research. The hypothetical framework was developed upon reviewing the extensive literature on existing frameworks and critical success factors model for e-business execution. This chapter was able to identify and clarify the inter-relationships, if any exist, among e-business capability factors and determine which factors would carry more importance.

The hypothetical framework was developed and comprises of three difference factors. Each EBC factor was further incorporated with three dimensions consisting of "technology", "organisation", and "people". This chapter also attempted to demonstrate the rationality behind choosing the performance measurement questions as an e-business performance measurement and its suitability against other performance measurements. Aims and hypotheses for this study had been explored in graphical and textual format. The hypotheses presented within this chapter predicted that: (a) companies' e-business capability factors can be accurately measured by a new multidimensional measure (b) multiple dimensions of e-business capability would demonstrate relationships with multiple dimensions of business performance. At this point, this chapter has successfully achieved Research Objectives 1 and 2.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

This chapter deals with the research design and procedures employed in this study. Based on the proposed research model and hypothesis as developed in Chapter 3, this chapter seeks to develop and employ an appropriate research methodology so that the data collected are appropriate for testing the hypotheses. This chapter is divided into two parts. The first part describes an overview of the type of research as this determines the method for data collection. This section also describes the population to be studied, development of the questionnaire, data collection procedures, operationalisation and measurement of the constructs, and the corresponding issues of reliability and validity of data collected.

The second part of the chapter describes the quantitative detailed analysis by means of coefficient alpha, descriptive statistics and Structural Equation Modeling (SEM) analysis using Analysis of Moment Structure (AMOS) software (Arbuckle, 1999) for the treatment of data in this study. The statistical analyses that are used to test each hypothesis and research questions are described and their appropriateness are demonstrated. The use of sophisticated and robust statistical methods employed throughout this study are defined and described as they relate to the results.

The purpose of the chapter is to demonstrate that a potentially strong intervention is devised and powerful statistical tests are employed to undertake evaluation of the research results. In addition, procedures are described in adequate detail to enable other researchers to duplicate the methodology employed in this research design. Within the second part of the study, brief descriptions for each analysis conducted in the subsequent chapters are presented. This includes: validation of e-business capability (EBC) model, hypotheses testing and multiple group comparison analysis to appraise the e-business adoption in the context of "technology", "organisation" and "people" dimensions and in the context of developed and developing country, followed by a summary.

4.2 THE RESEARCH PROCESS

The schematic view of the activities of the research process, to achieve the objectives of this research, is illustrated in Figure 4.1.

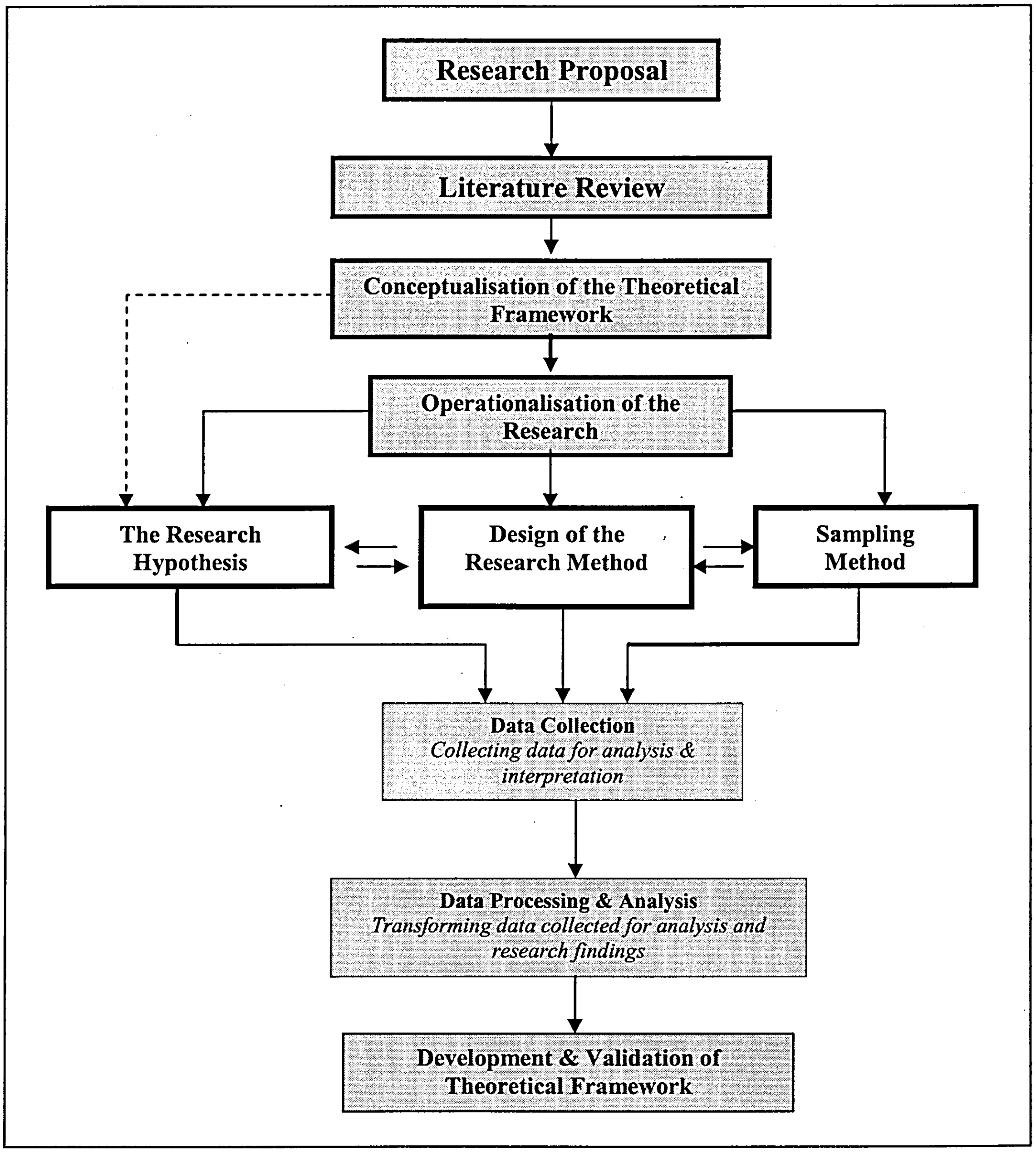


Figure 4.1 Overview of the research process

Based on the development of E-Business Capability (EBC) framework and incorporating the first two objectives, the present investigation seeks to achieve the third objective of empirically evaluating the EBC developed in the previous chapter:

- To develop the reliability and validity of established instruments that measure e-business capability (EBC) model and business performance (BP) with the use of statistical techniques.

- To examine the impact of EBC factors (business strategy, supply chain strategy, e-business adoption) on business performance for both samples.

- To examine the impact of EBC factors (business strategy, supply chain strategy, e-business adoption) on business performance across sub-groups (adopter and non-adopter of e-business) for both samples.

4.3 RESEARCH METHODOLOGY

4.3.1 Research Method

Sutherland (1975) describes theory as "an ordered set of assertions about a generic behaviour or structure assumed to hold throughout a significant broad range of specifies instances". Much of the research findings in logistics research are presented in qualitatively derived prescriptive findings (Dunn *et al.,* 1994). Therefore, it is important to have more clarity in research variables and be more rigorous in the methodologies (Dunn *et al.,* 1994). Knowledge will becomes more objective, more dependable and less value-laden when theory is presented in testable form and is eventually tested (Dunn *et al.,* 1994; Kerlinger, 1986). There have been many approaches suggested for the intention to create better assurances that variances are trait-related and not method-related (Eisenhardt, 1989; Jick, 1979; Campbell and Fisk, 1959).

Research methodology for this study takes into consideration of research paradigms developed by Meredith *et al.* (1989). As shown in Figure 4.2, the Meredith model has two continuums based upon the underlying principle of its methodology - the rational/existential (R/E) and the natural/artificial (N/A) (Dunn *et al.*, 1994).

Natural ⟷ Artificial

Rational ↕ Existential

	Direct Observation of Object Reality	People's Perception of Object Reality	Artificial Reconstruction of Object Reality
Axiomatic			Reason/Logic/Theorems Normative Modeling Descriptive Modeling
Logical Positivist / Empiricist	Field Studies	Structured Interviewing Survey Research	Prototyping Physical Modeling Laboratory Experiments Simulation
Interpretive		Historical Analysis Delphi Intensive Interviewing Expert Panels Futures Scenarios	Conceptual Modeling Hermeneutics
Critical Theory		Introspective Reflection	

Figure 4.2 Framework for research paradigms by Meredith *et al.* (1989)

The R/E continuum is based upon whether the research is independent of man (deductive) or relative to one's individual experiences (inductive) (Dunn *et al.*, 1994; Meredith *et al.,* 1989). Inductive research is rooted in the researcher's personal knowledge and experiences of the truth, whereas deductive research is based upon logic and structure Some researchers regard their work as the generation of theory (an inductive approach), whereas other consider that their research is used in order to "test" existing theories (a deductive approach) as can be seen from Figure 4.3.

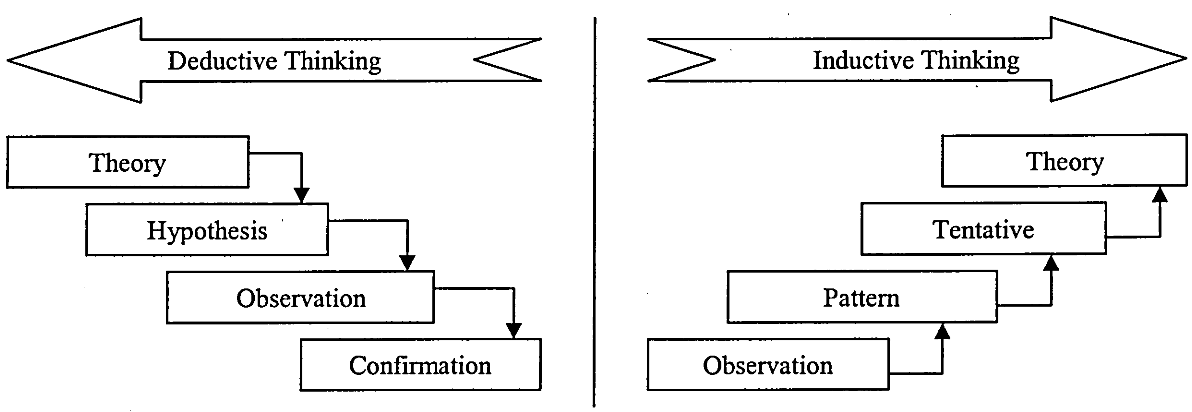
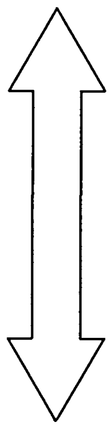


Figure 4.3 Deductive and inductive thinking (Trochim, 2001)

Yin (2003) argues that all research programs should start with a theoretical framework, regardless of whether the research is explanatory, descriptive, or exploratory. In Meredith *et al.* (1989) model, R/E continuum is partitioned into four categories: axiomatic, logical positives / empiricist, interpretive and critical theory. It ranges from deductive: rational (axiomatic) to inductive: existential (critical theory).

Rational
"Deductive"



Existential
"Inductive"

(a) axiomatic or the "theorem-proof world,"

(b) the most rational; logical positivist/empiricist, in which "the facts are assumed to be independent of the laws and theories used to explain them;"

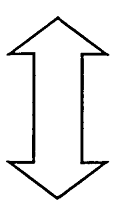
(c) interpretive, a more inductive approach in which researchers study people rather than objects, and where facts are not considered separate from the theory or observer;

(d) critical theory, the most subjective approach, which transcends the inductive/deductive argument and attempts to generalise the phenomena without scientific method

Figure 4.4 Meredith *et al.* (1989) model of rational/existential (R/E) continuum

The N/A continuum is concerned with the source of the information utilized in the research; in other words, its subjectivity or objectivity (Meredith *et al.,* 1989). This continuum is partitioned into three categories as in Figure 4.5. Research methods have variously been classified as objective versus subjective (Burrell and Morgan, 1979, p. 34).

Natural
"Objective"



Artificial
"Subjective"

(a) Object reality, is based on direct observation of the phenomena by the researcher.

(b) Peoples' perception of object reality, a less direct form of observation, utilizes the observations and values of other people.

(c) Artificial reconstruction of reality: attempt to explain reality by using a model

Figure 4.5 Meredith *et al.* (1989) model natural/artificial (N/A) continuum.

4.3.2 Rationale for the Research

Three types of methods are commonly used in research; exploratory, descriptive or casual/ explanatory research depending on the nature of the research problem and its structure (Babbie, 2004). This section will discuss the underlying rationale of using all of the three types of research in this study.

Firstly, descriptive research is used to identify and describe e-business and its characteristics, as well as factors that are believed to have an influence on the successful adoption of e-business and in turn, on the implementation of a company's business performance. Descriptive research can be used to generate hypotheses but it contains more information available than in exploratory research (Malhotra, 2004). In contrast to exploratory research, information obtained from descriptive studies is based on some previous understanding of the nature of the research problem (Zikmund, 2003, p. 66). This part of the study is mainly involved with a theoretical descriptions and discussions.

Secondly, exploratory research is utilised in this research to gain insight into research problems and to identify the main issues regarding business implementation and its influences on "technology", "people", and "organisation" dimensions respectively. The idea of exploratory research is to get a better understanding and to clarify the nature of an ambiguous research problem or investigating a new topic where little research is found on the topic and is aimed at generating hypotheses for other research types, like the descriptive and the explanatory (Trochim, 2001; Neuman, 2003). Exploratory research in this study has assisted in developing a theoretical framework, to explain the e-business adoption and business performance and proposed suitable hypotheses propositions.

These two types of research intertwined the thinking in both Chapter 2 and Chapter 3. In the latter, this study combined both types to develop and elaborate the theoretical e-business capability (EBC) framework.

However, exploratory and descriptive research have their limitations (Malhotra, 2004; Zikmund, 2003; Babbie, 2004). Descriptive research does not manipulate and determine cause and effect relationships but only describes them and their relationships as they naturally occur (Malhotra, 2004; Zikmund, 2003). Therefore, in combination with the two research types, casual / explanatory methods are included in the present study for investigating the cause and relationships among factors. Casual / explanatory research is used to test hypotheses that generate both from exploratory and descriptive research (Neuman, 2003). Casual / explanatory is used to test the applicability of theoretical model with underlying hypotheses on the samples to investigate how these EBC factors influence the adoption of e-business. This goes further in establishing an operational model for the successful of e-business adoption and its impact on various sectors through e-business capability framework, based on the casual relationships found during the explanatory phase.

4.4 RESEARCH DESIGN

The research design provides a conceptual framework for the study, while the methods are the tools that are used to evaluate each specific aim. It provides framework that guide data collection and data analysis. Yin (2003) defines research design as "the logic that links data to be collected and the conclusions to be drawn to initial questions of the study" and "a plan for assembling, organising, and interpreting information and its results in a specific product". Generally, a research design covers strategic decisions that encompass the choice of data collection methods and more tactical decisions regarding measurement and scaling procedures, questionnaire, sample, and data analysis (Zikmund, 2003). On the other hand, Cooper and Schindler (2003, p. 118) define research methodology as an approach to a problem to put into practice in a research process, which could be formally defined as an operational framework, within which facts are placed so that their meanings may be seen more clearly.

Based on the construction of theoretical framework with their underlying proposed hypotheses, the research seeks to investigate the impact of e-business success-related factors on the companies' business performance. The central aim of the study is to provide empirical evidence on the effect of implementing e-business when utilising the proposed EBC factors. This research has adopted an in-depth based theoretical framework with diverse views, to provide rigorous hypotheses testing (see Chapter 2 and 3).

This study also intends to investigate casual effects. The fundamental research is concerned with establishing a cause and effect relationship between the independent variables and dependent variables, rather than relationships among them. A change in a dependent variable is directly caused by a changing in another variable. An independent variable is not influenced by other variables (Bryman, 2004, p. 123). The independent factors identified for the study are the e-business capability factors and the dependent variables, which are the indicators of performance measurement, and TOP dimensions incorporating in the EBC framework (see Figure 4.6).

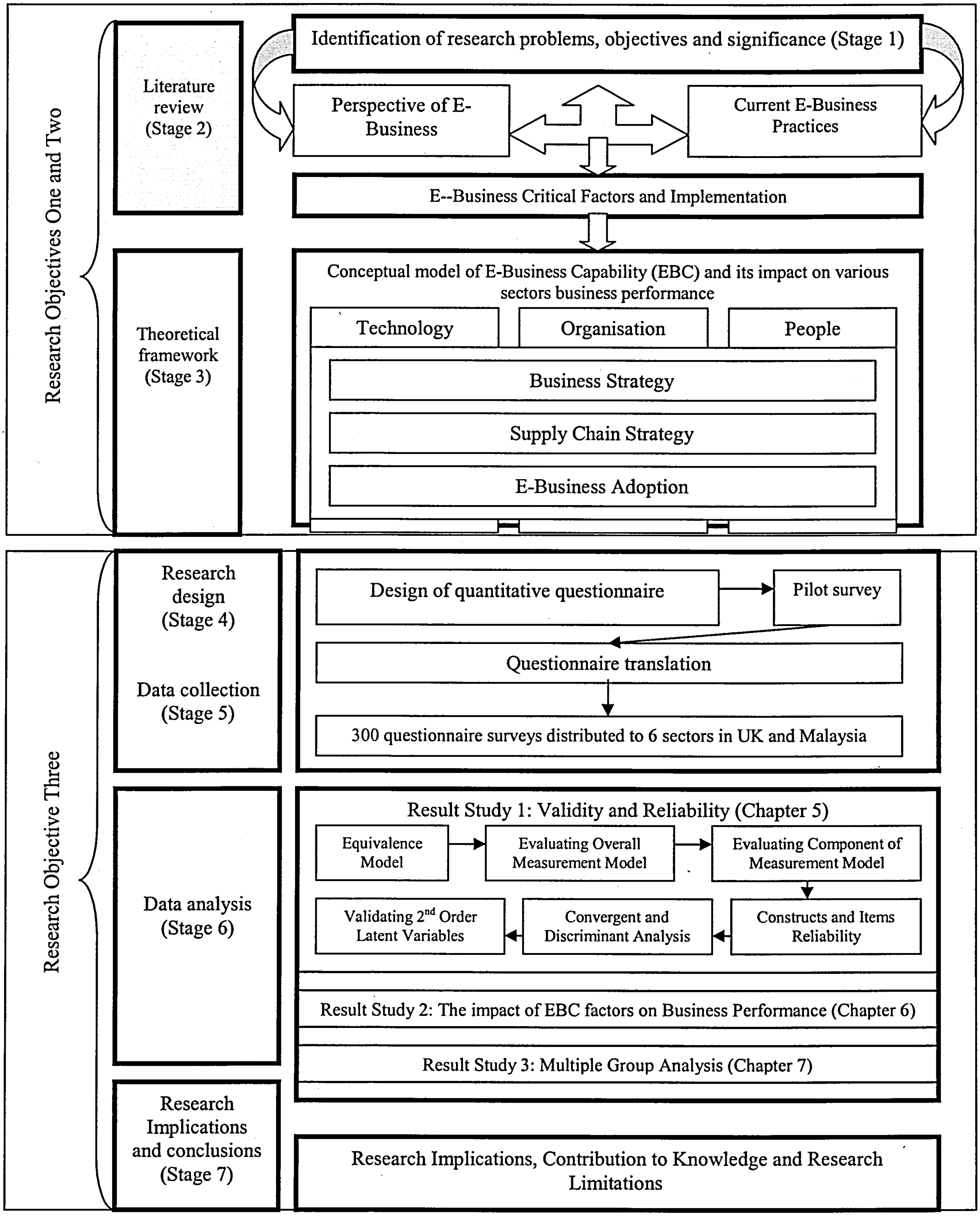


Figure 4.6 Research design and methodology

However, following the previous discussions, it can be concluded that the research process adopted in this study was mostly deductive (see Section 4.2) and can be confirmed from the tested models which consist of prediction about cause and effect relationships when the independent variables (EBC factors) and dependent variables (business performance) that are derived from theoretical EBC framework. However, this study also includes some elements of inductive process where a series of extensive literature review were included with the intention to collect the needed data to address the research problems and to make sure that the objectives of the study are successfully met.

4.5 SECONDARY DATA RESEARCH METHOD

Secondary research is based on secondary resources that already exist (Hakim, 1982). Some of the resources taken from secondary research method in this study include: financial services brochures, newspapers, magazine, articles, conference proceeding, reports, academic journals, books, unpublished manuscripts, statistics and the World-Wide Web (Internet).

Secondary data was used in this study to explore the research questions and meet the proposed objectives. In Chapter 2, by utilising the secondary research technique, investigations of current e-business situations in the context of success and issues surrounding their failure have been made possible. Secondary research involves re-analysing data that had already been collected (Hakim, 1982). By using this method, this study was able to provide the evaluation of information that exists before use, to reduce unsuitable data at an early stage (Stewart and Kamins, 1993). Hence based on critical evaluation during extensive literature review in Chapter 2, critical information was distilled which subsequently can be used in the construction of a theoretical framework and proposed suitable hypotheses propositions in Chapter 3.

However, Denscombe, (1998) states that secondary data has its limitation. Others design secondary research for a specific purpose, which may not be appropriate for the particular research questions or objectives of others. Therefore, in order to ensure the quality, validity and suitability of secondary data related to the research objectives of this study, two main criteria have been adopted as an evaluation measures of data resources (Saunders *et al.*, 2000) such as the suitability of secondary data in relation to research questions and objectives in this study (sources of secondary data in this study were from reputable source journals such as Business Strategy Review, Journal of Business Logistics and European Journal of Information Systems.

However, due to the limitations of secondary data, a methodology that relies largely on primary data is chosen for the research methodology on quantitative studies. This is explained in next section.

4.6 THE QUANTITATIVE RESEARCH METHOD

Quantitative methodology extracts data from respondents and converts them into statistical representation rather than drawing textual pictures of a phenomenon. The whole research processes in this study are objectively constructed and the findings are usually representative of the population being studied. The main advantage of using a quantitative approach in the study lie in precision and control (achieved through sample, design, and precise reliable quantitative measurement). In addition, a quantitative approach can relate to causation, where a systematic manipulation of one variable can be conducted to have a direct casual effect on another, when other variables have been eliminated or controlled (Babbie, 2004).

Naoum (2002) identifies quantitative research from its focus on objective fact-finding based on evidence and records, to test or confirm theory/concepts of the research with hard and reliable data. Whereas qualitative research is to measure attitude, opinions and perceptions with the theory/concepts emerging/developing during the research investigation. Meanwhile, Rossman and Rallis (1998) identify qualitative research as seeking to answer questions with the purpose of learning and generating new understandings that can be used in the social world. Nachmias and Nachmias (1992) typify a quantitative research approach as a theory-before-research and qualitative research approach as research-then-theory.

The 'realist' and 'instrumentalist' view of the validity of causality in verifying relationships in this study are also taking into consideration. In agreeing the limitations of the 'realist' approach of the need to confirm theoretical assumptions mostly with empirical data, and the notion that causality is based on mechanistic causal models, this study will take consideration the instrumentalist view (Maxim, 1999; Bunge, 1979, Holland, 1998) that a set of agreed identified criteria can establish the causal relationship. Athern (1994) further supports this view which concludes that researchers are faced with "stark options of mechanistic causal models or the abandonment of narrative explanation" if the total realist views are observed.

From previous discussions in Section 4.3.2, hypotheses constructed will be tested through a deductive approach and the use of quantitative data permits statistical analysis (Snow and Thomas, 1994). As a result, the methodology proposed in this study is able to provide answers that have a much firmer basis than a non-research background's common sense or opinion. The following sections will explain how the quantitative study will be adopted and applied in this research. Figure 4.7 outlines the procedure for this process.

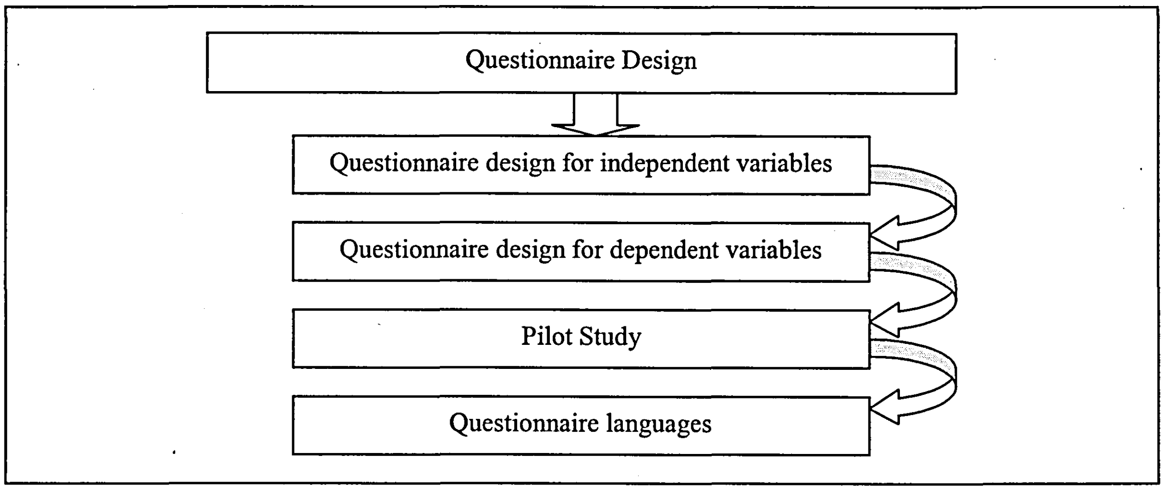


Figure 4.7 Flow chart of quantitative methodology used in the study

4.6.1 Issues Considered for Questionnaire Design

The first issue to consider was the structure of the questionnaire so that respondents were able to understand it and hence responding to the questionnaire would be easier. Items on a questionnaire should be grouped into logically coherent sections (Levine and Gordon, 1958; Robinson, 1952; Freed, 1964). For this research, to make it easier for the respondents to answer, the questionnaire was organised along four main sections. It consisted of an explanatory covering letter from the researcher stating the intention of the study and soliciting the help of the participants. Whilst simultaneously emphasizing the voluntary nature of the study, as well as ensuring complete anonymity and confidentially to all respondents. The questionnaire (see Appendix 4.1 for questionnaire design) consists of three sections, covering the following aspects:

- Section 1 – Seeking general information of the organisation.

- Section 2-A to Section 2-C- E-Business Capability factors (BS, SCS, and EBA). These are regarded as "independent variables in the research"
- Section 3: Business Performance factors. These are regarded as the "dependent variables in the research"

Questions on a six point, Likert scale was the main instrument used in this study to provide quantitative data analysis. This was used as a means of investigating the respondent's perception on a wide range of cause and effect variable. Questionnaire surveys, using the Likert scale, have been used widely by researchers in testing hypotheses regarding factors that affect the successful adoption of e-business (Tan and Teo, 1998; Tan, 2000; Tigre and Dedrick, 2002).

In comparison with other methods, questionnaire survey (postal and e-mail attachment) has the advantage of allowing the respondents to answer questions at times that are convenient to them to see the context of a series of questions, to take time to answer and to look up information (Pinsonneault and Kraemer, 1993). In addition, efficiency of response can be achieved in terms of speed in generating large amount of data to be used in statistical analysis (Snow and Thomas, 1994).

4.6.2 Independent Variables

The six-point Likert scale was used in Section 2-A to 2-C of the questionnaire survey to examine how strongly the respondent agrees or disagrees to statement concerning the formulation and implementation of strategies relating to e-business adoption in their companies. Multiple dimensions of established facets of e-business capabilities are measured by utilising selected scale from the existing literature and surveys (see Chapter 2 and Chapter 3) of which the instruments are specifically developed to measure EBC factors, consisting of supply chain strategy, business strategy and e-business strategy. The scale used in this study assesses the three dimensions for each of the capabilities; "technological infrastructure", "organisational infrastructure and "partnership strategy" for business strategy. "Technology integration", "internal integration", "supply chain relationship" for supply chain strategy. Lastly "technology capability", "organisation capability" and "attitudinal capability" for e-business adoption strategy. These dimensions of EBC are measured by using declarative statements that participants responded to using the 6-point Likert type scale (see Table 4.1 to Table 4.3).

Dimensions / Literature	Analyses
Section 2.5.1	Section 6.7.1; 7.4.1
Organisation Infrastructure (BSO)	Chapter 5; Section 6.1 - 6.6; 6.7.1.1; Section 7.1 - 7.4; 7.5.1
Respondents' perceptions of their firm's choices pertaining to the particular configurations and internal arrangements to support the organisation's chosen position in the market	
Partnership Strategy (BSP)	Chapter 5; Section 6.1 - 6.6; 6.7.1.2; Section 7.1 - 7.4; 7.5.1
Respondents' perceptions of their firm's competency to build lasting distinctiveness with customer into a seamless congruency with internal work.	
Technological Infrastructure (BST)	Chapter 5; Section 6.1 - 6.6; 6.7.1.3; Section 7.1 - 7.4; 7.5.1
Respondents' perceptions of their firm's configuration of technologies, IT work processes, and shared services that build and sustain present and future business applications	

Table 4.1 Section 2-A Business strategy scales "independent variables" in the research.

Dimensions / Literature	Analyses
Section 2.5.3	6.7.3; 7.4.1
Organisational Capability (EBAO)	Chapter 5; Section 6.1 - 6.6; 6.7.3.1; Section 7.1 - 7.4; 7.5.3
Respondents' perceptions how well the company can mobilise and sustain the organisational change to support e-business initiative	
Attitudinal Capability (EBRP)	Chapter 5; Section 6.1 - 6.6; 6.7.3.2; Section 7.1 - 7.4; 7.5.3
Respondents' perceptions readiness of customers and business partners to engage in e-business.	
Technological Capability (EBAT)	Chapter 5; Section 6.1 - 6.6; 6.7.3.3; Section 7.1 - 7.4; 7.5.3
Respondents' perceptions how well the company's strategic IT portfolio of infrastructure and applications supports the critical internal processes	

Table 4.2 Section 2-B E-business adoption scales "independent variables" in the research.

Dimensions / Literature	Analyses
Section 2.5.2	6.7.2; 7.4.1
Internal Integration (SCSO)	Chapter 5; Section 6.1 - 6.6; 6.7.2.1; Section 7.1 - 7.4; 7.5.2
Respondents' perceptions of their firm's competency of linking integral performed work into seamless process to support customer requirements	
Technology Integration (SCST)	Chapter 5; Section 6.1 - 6.6; 6.7.2.2; Section 7.1 - 7.4; 7.5.2
Respondents' perceptions of their firm's competency of maintaining information systems capable of supporting wide variety of operational configurations needed to serve diverse market segments	
Supply Chain Relationship (SCSP)	
Respondents' perceptions of their firm's competency to develop and maintain a shared mental framework with customer and suppliers regarding inter-enterprise dependency and principles of collaboration	Chapter 5; Section 6.1 - 6.6; 6.7.2.3; Section 7.1 - 7.4; 7.5.2

Table 4.3 Section 2-C Supply chain strategy scales "independent variables" in the research.

Appendix 4.2 provides the coding representation for each question concerning Business Strategy, Supply Chain Strategy and E-Business Adoption. The nine dimensions were selected for use in this study based on their relevance to evaluate the usefulness of these capabilities for e-business adoptions in firms. The questionnaire was designed for use with both information system (IS) managers and non-information system (IS) managers. Each dimension is measured by 3 - 4 items. Altogether, the section of the EBC for supply chain strategy and business strategy utilised in this study contains thirty-one items in nine dimensions.

There were no negative worded items in the final version of the e-business adoption measure. A score of "1" was given for disagreeing with the declarative statement and a score of "5" for agreement. A score of "0" indicated the item is not applicable to the respondent. The six subscales make up the first section of the survey. Participants were asked to respond to the 31 items with one of the six possible forced-choice responses, "not applicable", "strongly disagree", "disagree", "neutral", "agree" and "strongly agree". The respondents are expected to take between 15 to 20 minutes to complete the questionnaire.

4.6.3 Business Performance (Dependent Variables)

As discussed in Chapter 2, the potential numerous benefits of e-business adoption have been cited extensively in the literature (Drew, 2002; Zhu *et al.,* 2004; Damaskopoulos Evgeniou, 2003). Therefore, the EBC model seeks to appraise the impact of the EBC factors (business strategy, supply chain strategy and e-business adoption) incorporating TOP dimensions on business performance.

This section will explore the success of e-business adoption by companies via the benefits realised from this adoption. Following discussion in Chapter 2 (Section 2.5) it is hypothesised that these nine TOP dimensions embedded in EBC factors indirectly impact the business performance, which has been conceptualised, from a process orientation based on the "IT Comprehensive Model" (Mahmood and Soon, 1991; Mahmood and Mann, 1993). In order to gauge the direct and indirect benefits from e-business adoption, three types of perceived benefit indicators have been identified. The impacts of e-business success-related factors on each of these three dimensions are based on the surveyed companies from the UK and Malaysia samples (see Table 4.4). This approach is used in the questionnaire survey to measure:

(i) the impact on financial measures (FM),

(ii) the impact on internal operation efficiency measure (EM), and

(iii) the impact on coordination with business partners (CM)

Business Performance Measures
Impact on Financial Measures
• Sales Increased • Customer Service Improved • Market Share Increased (Market Expansion) • International Sales Increased (Sales area widened)
Impact on Efficiency
• Reduced costs by electronic order taking over the Internet • Staff productivity increased • Internal processes more efficient
Impact on Coordination (Upstream and Downstream)
• Improved Coordination with Suppliers and business partners • Decreased Procurement Cost • Transaction cost with business partners deceased

Table 4.4 Business performance measures

The Likert-scale used in Section 3 of the questionnaire was to determine the level of impact of e-business on the surveyed companies, based on the "IT Comprehensive Model" (Mahmood and Soon, 1991; Zhu *et al.,* 2004). Respondents were asked to show their level of agreement with these statements according to a five-point scale (1 = "very low"; 2 = "low", 3 = "average"; 4 = "high"; 5 = "very high). Once again, respondents could indicate if any of the statements were not relevant to them (0 = "not applicable"). With regard to the length of the survey instrument, single statements (or items) were used to measure the perceived benefits and process changes associated with e-commerce. Such scales also reflect the exploratory nature of this study. Questionnaire designed in Section 3 mirrored in Section 1 and Section 2 where the variables will be coded for subsequent data analysis (see Table 4.5).

Dimensions / Literatures	Analyses
Section 2.5.4	
Impact on Commerce (FM)	Chapter 5; Section 6.1 - 6.6; 6.9; Section 7.1 - 7.4; 7.5.4
Respondent's perceptions of the benefits of Internet technology to increases the company financial outcome in terms of traditional and e-business measures	
Impact on internal efficiency (EM)	
Respondent's perceptions of the potential of e-business to improve staff productivity and operational efficiency when complementary resources exist.	Chapter 5; Section 6.1 - 6.6; 6.9; Section 7.1 - 7.4; 7.5.4

Impact on Coordination (Upstream and Downstream) (CM)	
Respondent's perceptions of the benefits of broad interactivity and connectivity of the Internet can facilitate firms' coordination with business partners and reduce transaction costs which can be enhanced and made more efficient by the Internet.	Chapter 5; Section 6.1 - 6.6; 6.9; Section 7.1 - 7.4; 7.5.4

Table 4.5 Section 3 Business performance "dependent variables in the research"

4.6.4 Questionnaire Distribution Procedures

The concept of a questionnaire denotes a set of questions with a fixed working and a sequence of presentation, as well as precise indications of how to answer each question (Bless and Higson-Smith 2004; Baker, 1999; Miles and Huberman, 1994). The standard questionnaire is presented to different respondents to enable them to give responses without intervention from the researcher. During the construction of the questionnaire, for this research study, some guidelines were followed to ensure that the objectivity of the study was met. This was applicable to both respondents from the UK and Malaysian whereby similar approach had been used.

The first step was to ensure the willingness of the target sample to participate and cooperate in sharing their knowledge and experience. This was done by informing them (through post or email) of the intention to conduct this research survey four weeks before the questionnaire was sent to them. They then had to reply (by email or through prepaid envelope) as to whether they were willing to participate in the survey. A prepaid envelope was included to increase response rate of replies to the letter.

Once the target sample (through email or post) had expressed their interest to participate, the questionnaire was sent (snail mail or electronic mail) to them. In order to increase the response rate, a prepaid envelope was included if the target sample preferred to receive the questionnaire as a hard copy. The structure and presentation of the questionnaire is important to ensure that the respondents should be able to give responses, which are consistent with reality and not what they think reality should be. This was done by ensuring that the way the questionnaire asked questions was clear and precise, and did not confuse the reader. To improve validity, a pilot questionnaire was conducted before the real questionnaire was sent out for validation purposes.

Lastly, it was necessary to ensure that the respondents would be clear and conscious of their feelings about issues and would be able to voice what they thought could be done about them to align with normality. Issues such as language had to be considered since a country such as Malaysia uses English as their second language, while the UK as their first language. Issues such as language or the structure of the questions were critical issues to be considered in order for meaningful information to be communicated through the respondents to form a basis for decisions, conclusions, and recommendations.

4.6.5 Pilot Study

Prior to distributing the finalised questionnaire, a pilot study was conducted to discover errors, ambiguities, inadequate response alternatives, and confusing questions. A pilot study is a good way to uncover errors and problems beforehand instead of discovering them during the real study (Daly *et al.,* 1995). A pilot questionnaire was sent to ten pilot respondents, comprising of academics and managers from UK and Malaysia respectively. They were contacted before hand and requested to respond to the questionnaire as logically as possible. The respondents were asked to complete a form to comment on the clarity of the wording, ambiguity, validity, and consistency of the questionnaire, the difficulty in completing the questionnaire and the time required to complete it.

Feedback was collected either verbally via face-to-face arrangement, or by e-mail. Based on their feedback, the questionnaire was modified accordingly. Suggestions received were carefully evaluated. However, it should be noted that the responses from the pilot study were not included in the analysis.

4.6.6 Language Consideration

English language was used throughout the questionnaire while distributing to respondents in both countries. As discussed in Section 4.6.1, choosing appropriate language is important to ensure that the respondents are able to answer the questionnaire based on their understanding and experience. Since English is the common international business language used in both countries, respondents would not have difficulty in understanding e-business terminology and other technical terms. This was an added advantage as only one language was used throughout the study instead of translating the questionnaire into other languages which would be time consuming and errors could occur within the translation.

4.6.7 Quantitative Sample Design and Sample Method

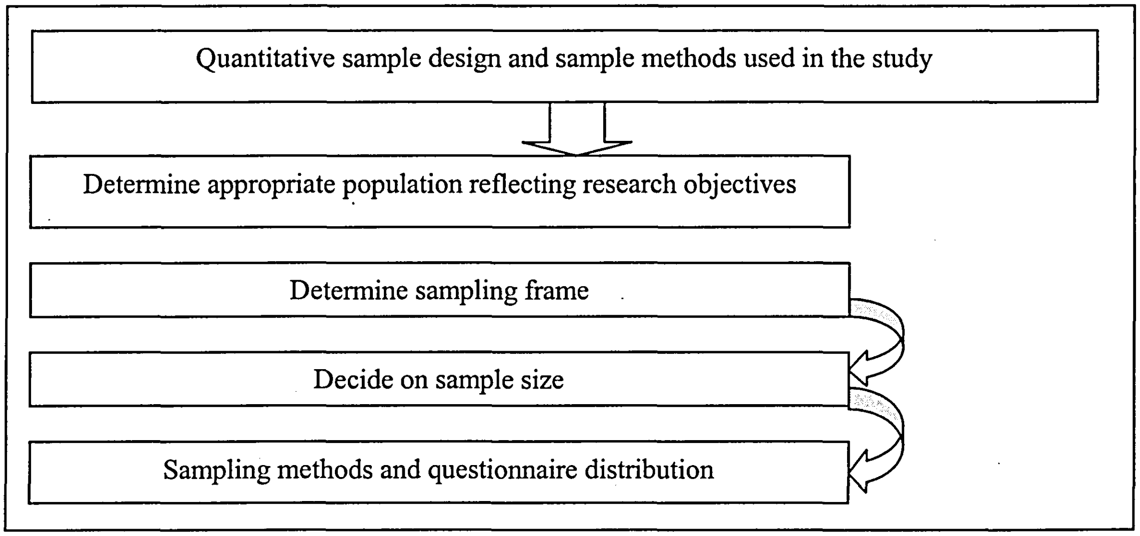


Figure 4.8 Quantitative sample design and sample methods

In the sampling procedure, it is important to ensure that it should be assembled in such a way as to be representative of the population from where it is taken (Malhotra, 2004). It is critical to determine the appropriateness of the area where the questionnaire will be distributed, to obtain appropriate information for the research problems. The steps in selecting subjects for the research were based on Malhotra's (2004) work – see Figure 4.8.

Mark (1996) defines population as the collection of all individuals, families and events that researchers are interested to investigate further. The participants for the study consist of two samples (Malaysia and United Kingdom). To have a broad representation and understanding of proposed framework, the survey was conducted in the context of developed (United Kingdom) and developing (Malaysia) country, which reflected the third research aim for this study. In this sub- section, brief descriptions will be given to explain current e-business situation in country context.

4.6.7.1 Developed (UK) Country Context

A research survey suggested that two thirds of the UK businesses are online, whilst further growth is forecast (UK Online, 2002). Current e-business development in the UK also indicates that the larger size businesses will adopt twice as many e-business activities, in comparison with small and medium-sized enterprises (SMEs) (Haig, 2002 cited in Simpson and Docherty, 2004). In addition, the UK government also acknowledged the slow take-up of e-business amongst SMEs, particularly amongst micro-businesses (UK Online, 2002). Some of the reasons for slow adoption are ignorance about e-business benefits and a shortage of relevant skills (DTI, 2002b).

In UK business environments, companies are utilising e-business with almost 92 percent of medium seized firms and 62 percent of small firms connected to the Internet (Oftel, 2002). However, it is observed that the UK's SME's and small business sectors' failure rates are noted to be six times higher compared to large counterparts (Storey, 1994). With the significant impact that e-business has, such failure rates may increase if the UK's SMEs and small businesses do not develop efficient e-business adoption (Daniel, 2003). Therefore, it is important for UK companies to acknowledge the integration of Internet with existing systems and treat it as an essential factor for e-business effectiveness (Keeling *et al.*, 2000; Melymuka, 2000; Haapanniemi *et al.*, 2000; Von Hoffman, 2001).

This research study seeks to investigate the impact of the proposed EBC factors on business performance in the context of developed (UK) country. Results obtained from this analysis will be compared against the Malaysian sample (developing country) to determine and investigate any similarity or difference, which occurs in successfully implementing e-business in their companies. This is inline with the Research Aim 3 of this study, which is to test the applicability of theoretical EBC framework incorporating TOP dimensions and appraise e-business adoption in a developed (UK) and developing (Malaysia) country context.

4.6.7.2 Developing (Malaysia) Country Context

With the investments of RM40 billion for the establishment of a Multimedia Development Corporation (MDC), e-business has been a major attraction in Malaysia from 1997 (Low *et al.,* 2000). In addition, the launching of the Malaysian Super Corridor (MSC) and other government incentives is a clear indicator that much has been invested to promote e-business in this country. The establishment of Multimedia Super Corridor (MSC) in the year 2000 has established six flagship projects as electronic government, multipurpose card, smart schools, tele-health, R&D clusters and e – business. The purpose of the MSC is to "enable Malaysia to leapfrog into the information age and to create an ideal environment that will attract world class companies to use it as a regional multicultural information age hub" (Mohammad, 1998, p. 55).

The launch of the Malaysian Super Corridor (MSC), government incentives and other encouragement is a clear indicator that much has been invested to promote e-business in Malaysia. Previous studies have indicated that e-business technologies provide effective and efficient ways, in which buyers gather information rapidly about the availability of the product or services (Keeling *et al.*, 2000; Melymuka, 2000). This enables them to evaluate and negotiate with vendors. Nevertheless, previous studies on small and medium sized enterprises (SME's) have shown that the application of e-business is still in its infancy due to certain factors. In this context, the increasing usage of e-business will encourage and contribute to the growth of businesses particularly in Malaysia. Evidence comes from the proliferation of homegrown internet-driven business. According to Oh (2000), the registration of Malaysian commercial websites has doubled. Table 4.6 shows the internet business revenue in Malaysia, starting at 1997 and projected until 2004.

Year	Total Revenue (USD million)
1997	6.31
1998	18.01
1999	58.89
2000	164.15
2001	426.72
2002	993.68
2003	2,066.40
2004	3,469.85

Table 4.6 Internet Commerce Revenue in Malaysia (1997-2004) (Source: International Data Corporation, 1999; Hamid and Baharun, 2002)

However, a survey of e-business readiness and impediments had identified some problems preventing small medium enterprises adopting e-business initiatives. Primary barriers to implementation are high set-up costs, lack of technical knowledge to implement e-business, lack of critical mass, inadequate legislation protecting IP rights and lack of standards of conducting trade nationwide and globally (Keeling *et al.*, 2000; Melymuka, 2000). Given the lack of empirical research in this area especially in Malaysia, the proposed EBC framework in this study will be able to investigate the impact of EBC factors on the success of e-business adoption. In addition, this study also seeks to investigate the impact of "technology", "organisation" and "people" issues embedded in each EBC factor on the strategic adoption of e-business, which would be determined the success or failure of any e-business initiatives in the context of developing country (Malaysia).

4.6.8 Sampling Method

Sampling is a method of using observations (of a sample) to give satisfactory explanations and robust inferences of the population. The sample is expected to be representative of the population. The types of sampling can be grouped into two main categories - probability sampling and non-probability sampling. In probability sampling, a sample is selected in such a way that every case has a known chance of being selected. Probability samples allow for computation of the "confidence" that the sample and the findings drawn from it are representative of the larger population. Probability methods include random sampling, systematic sampling, and stratified sampling. However, in a non-probability sampling, a sample is drawn in a way that does not give every member of the population a known chance of being selected. In other words, members are selected from the population in some non-random manner. Non-probability methods include convenience sampling, judgment sampling, quota sampling, and snowball sampling. In non-probability sampling, the degree to which the sample differs from the population remains unknown.

4.6.8.1 Non-Probability Sampling Method (Non-Proportional Quota Sampling)

Before deciding which non-probability sample technique is best suited for this study, it is crucial to understand the difference between non-probability and probability sampling. Non-probability sampling does not involve a random selection and probability sampling does. However, this does not necessarily that mean that non-probability samples are not representative of the population, but it does mean that non-probability samples cannot depend upon the rationale of probability theory. By using probability sampling, the probability that the study represents the population is known because the confidence intervals for the statistic can be estimated. However, the non-probability sampling technique may or may not represent the population well, and it will often be difficult to know how close it is to representing the universe. In general, researchers prefer probabilistic or random sampling methods to non-probabilistic ones, and consider them more accurate and rigorous. However, in applied social research there may be circumstances where it is not feasible, practical or theoretically sensible to do random sampling. It is therefore necessary to consider a wide range of non-probabilistic alternatives. Figure 4.9 illustrates the types of available sampling methods.

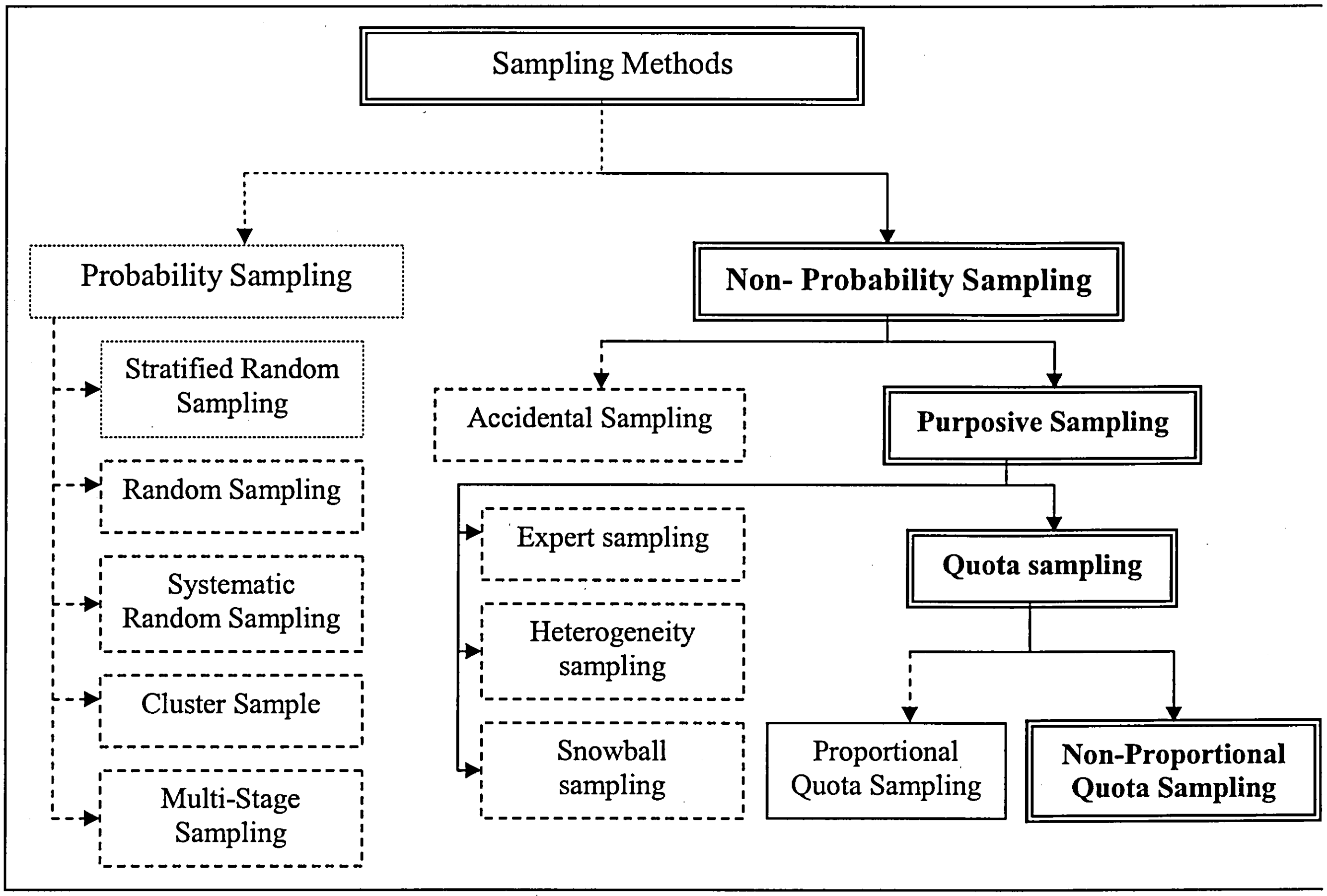


Figure 4.9 Sampling method employed in this research

In this study, non-probability sampling method was applied in the selection of respondents for the UK and Malaysian samples. There are two types of quota sampling: proportional and non-proportional. In proportional quota sampling, the expected outcome is to represent the major characteristics of the population by sampling a proportional amount of each. In a non-proportional quota sampling technique, the minimum number of sampled units required for the overall sample, and perhaps for sub-groups, are specified. The numbers of respondents are sought until the required quota set, has been reached.

Within the non-probability sampling technique, this study has applied a non-proportional quota sampling technique, which is a little less restrictive compared to other non-probability techniques. In this method, the number of sampled units the study requires will be specified in each category. In this technique, the primary concern is to obtain a sufficient target sample size in the population and it is not concerned with having numbers that match the proportions in the population. This method is the non-probabilistic analogue of stratified random sampling in that it is typically used to ensure that smaller groups are adequately represented in the sample.

From the above discussions, it is appropriate to identify that this study has employed a non-proportional quota sampling technique. By rationale, the samples from the UK and Malaysia were "grouped" into a few key industry sectors. Within each industry, lists of sampling "frames" were identified, from which the desired sample of specified size was selected by systematic sampling with a random start

4.6.8.2 Industry Sectors and Target Samples

For this study, the variable of interest was to proportionally represent (and generalise) the full range of organizations in a specified set of sectors. This study has chosen to focus the attention on a number of specific sectors that were previously identified in the published literature as key or leading sectors in e-business adoption. Therefore, this research surveyed the "cutting edge" rather than including many industries where there is little or no adoption. This restricted the range of generalization, but allowed a focused study of the issues in industries where e-business is, or is rapidly becoming, institutionalised. Six leading sectors were selected and identified from the literature including business press as key or leading sectors and these consisted of; "Manufacturing", "Services", "IT", "Finance, Insurance and Real Estate"," Wholesale, and Retail Trade", and "Others" (agriculture, communication, utility services, non classifiable establishments). These sectors have been traditionally strong or have potential for rapid growth especially in e-business adoption (UNCTAD, 2002; Daniel *et al.,* 2002; Daniel, 2003).

While there are different numbers of enterprises in the six sectors, this research seeks to obtain results that will give equal weight to each of the leading sectors. Hence, equal numbers of cases (fifty) were selected from each sector in each country. The number of fifty per country for each sector was arrived as follow. In general various rules can be referred to in the literature to specify the minimum number of cases required to ensure adequate power and validity for a particular form of multivariate analysis (Arbuckle, 1999). The analysis approach selected was SEM In this research the strategy was to partition the overall sample into two groups (UK and Malaysia) that would be analysed separately and compared. This suggested a minimum bound of 100 be targeted for the responses in each of the country samples. From similar surveys a minimum response rate of 33% was anticipated (Dawson, 1998; Fan *et al.,* 1997; Thompson, 1998). This therefore led to a selection of 300 per country i.e. 100/33%. With six equally-weighed sectors this means that 50 questionnaires should be administered in each sector, i.e.

300/6.Within each sector, the sample was randomly selected. Therefore, by definition, the entire sample is a random sample; specifically, this research employed non-proportional sample sizes in the selected six sectors. As discussed in the previous section, this research has applied non-proportional quota sampling in which companies were randomly selected within each industry sector. Three hundred questionnaires recipient were selected and questionnaire distributed across six key industry sectors in each of the UK and Malaysia. The target sample for the UK was obtained through sources such as; Business Link and Yorkshire Forward, British Companies Directory (http://www.britishcompanies.co.uk/), UK Business Directory (http://www.business-directory-uk.co.uk), UK Small Business Directory (http://www.uksmallbusinessdirectory.co.uk/) Free UK Business Directory (http://www.kyotee.co.uk/). While the target sample for Malaysia was obtained through sources such as Malaysia Online (htttp://www.malaysia.asiadragons.com/), ABLY Internet Communication Business Directory (http://www.ablynet.com/), Export Directory of Manufacturer (http://www.export-directory.net/), Malaysian Business Directory (http://www.webportal.com.my/search/), and Ipoh Online (http://www.ipoh-online.com.my).

The survey was directed to qualified and experienced individuals with a good business understanding, through postal and email methods. The questionnaire survey design was applied as a way to examine e-business adoption among companies in the UK and Malaysia. Eligible respondents were the individuals in each sector qualified to complete the questionnaire and aware of the company's business activities. In addition, the respondents were divided into information system (IS) and non-IS managers. Appendix 4.3 outlines the detail for each of the sectors in this study.

In summary, the approach of non-proportional quota sampling technique was employed by selecting particular industries, and drawing samples, independently, within each industry sector. The reason was to focus the attention on a number of specific sectors that have been previously identified in the published literature as key or leading sectors in e-business adoption. Within each industry, this research had a list of identified sampling “frames” (six key leading sectors); from which the desired sample size was decided (fifty questionnaire per country for each industry sector) by using non-proportional quota sampling.

4.6.8.3 Categorising Adopter and Non-Adopter of E-Business sub-Groups

In the study, respondents were also required to answer a set of questions to identify if the respondent's company was 1) either fairly advanced in their e-business adoption; 2) or had only just begun to adopt, or had not yet adopted e-business (e-business practices). Table 4.7 lists the questions, which assisted in categorising between adopter and non-adopter of e-business. They were categorised as "Implemented already (coded as 1)" or "Plan to implement within the next 6 - 12 months (coded as 0)" from their response to the question "Has your business implemented or planned to implement any of the following E-business practices"?

Respondents that had not yet adopted e-business within their business were still asked to answer questions on e-business adoption strategies, based on their opinion for the in future plan (Their statements on the issues subject of investigation are thus conjectural and/or based on secondary opinions; questions answers by managers are based on their views of the business implications of e-business, his or her knowledge of underlying technologies, and his or her understanding of required investments and future plans). Based on elementary analysis, respondents were divided into non-adopter of e-business sub-groups; ≤3 items ("code value =1") in secondary e-business activities and 0 item ("code value = 0") in primary e-business activities) and adopters of e-business sub-groups; all of the 3 items ("value =1") in secondary e-business activities and ≥1 item ("value =1") in primary e-business activities) based on the questionnaire they responded to. Respondents that "had only begun to adopt" were grouped as "adopter of e-business sub-group". Respondents that answered based on their expertise would be known as the "non-adopter of e-business sub-group".

Secondary e-business activities	**Coding**
• Marketing/Advertising goods and services over Internet	• Implemented already (coded as "1")
• Basic communication i.e. emails, fax, telephone	
• Searching for/evaluating suppliers over Internet	
Primary e-business activities	
• Selling goods /or services over a Internet (inc. EDI)	
• Buying from suppliers over Internet (inc. EDI)	
• Sharing information with partner organisations over Internet (e.g., jointly working on a technical documents, or CAD files)	• Plan to implement within the next 6 - 12 months (coded as "0")
• Providing customer support/aftercare over Internet	

Based on elementary analysis, respondents were divided into • Non-adopter of e-business sub-groups; ≤3 items ("code value =1") in secondary e-business activities and 0 item ("code value = 0") in primary e-business activities). • Adopters of e-business sub-groups; all of the 3 items ("value =1") in secondary e-business activities and ≥1 item ("value =1") in primary e-business activities)

Table 4.7 List of E-business practices questionnaire

4.6.8.4 Questionnaire Distribution and Collection

After several reviews with the pilot and finalising the questionnaire (Section 4.6.1), target respondents from Malaysia and UK who agreed to participate in the study were posted or sent by e-mail(copies of the questionnaire) if requested, accompanied by a covering letter from the researcher, stating the aims of the study and soliciting the help of the participants. Approximately fifty target respondents were obtained from each sector for the questionnaire to be posted or emailed to companies from UK and Malaysia. The participants were given the options of submitting the survey either by post or through email. In order to increase the response rate, a strategy of following up on the progress of participants was used, as suggested by Malhotra (2004) and a prepaid envelope was included to enable them to post back the questionnaire.

4.6.8.5 Limitations of the Questionnaire

Although the questionnaire survey was selected for this study, it may impose potential weaknesses that should be addressed and acknowledged. Problems such as low response rate could create a problem as they reduce the reliability and the extent to which survey finding generalise to the population from which the survey is drawn (Snow and Thomas, 1994). To increase the response rate; questionnaires can either be posted using the prepaid envelops or e-mailed. Mail surveys that include a self-addressed stamped reply envelope get better response although will increase the costs of the study (Brook, 1978; Gullahorn and Gullahorn, 1963; Harris and Guffey, 1978; Jones and Linda, 1978; Peterson, 1975; Wiseman, 1973).

Another minor problem would be the response error, because of ambiguous wording and the inherent lack of interactivity (Pinsonneault and Kreamer, 1993). In order to solve this problem, a follow up phone call was made to potential respondents from UK and Malaysia to enquire about their progress of completing the questionnaire and if any addition information was required. Again, this increase the cost of the study but will ensure the chances of an increased response rate. The time zone difference in Malaysia (add 8 hours) would also imposed a problem in contacting companies in Malaysia but was considered as a minor drawback.

Total response collected from each country indicated a sufficient response rate to perform quantitative data analysis using Structural Equation Modelling (SEM) to test the proposed hypotheses. Kline (1998) maintains that sample sizes less than 100 should be considered "small", between 100 and 200 should be considered "medium" and over 200 should be considered large. Based upon this recommendation, the achieved sample sizes of 208 (Malaysian sample) and 143 (UK sample) have been considered reasonable for this study and what it hopes to achieve.

4.7 ADMINISTERING THE SURVEY

4.7.1 Paper Version

Participants were asked to complete a paper version of the survey questionnaire comprising of an introductory front page and questions. The survey was divided into Part A and Part B. The purpose and aims of the study were outlined for the participant on the front page. Confidentiality and anonymity was explained on the front page.

4.7.2 The E-Mail Version (Word Document)

The set up of these questionnaires mirrored the paper versions of the survey, so that only the mode of completing the survey differed. Questionnaires were sent in Microsoft Word format and participants were able to click the value of their choice by using a pull-down menu for each item in each questionnaire. A suggestion was implemented that the Likert style scales for each section of the survey could be 'floated' so that the scale appeared to be hung above every item for easy consultation (Lakeman, 1999). The aim was to achieve a survey that could mimic the paper version in every way, but reduce time and non-response rate for the survey that enabled participants to access the scale on each page on the survey.

4.7.3 Data Management

All completed surveys were allocated a code number (Malaysia: M1 - M208; UK: UK1 - UK143) that could be used to identify the responses for analysing the results. The code number also ensures anonymity for all participants. Following Section 4.6.8.3 each sample was categorised into adopter and non-adopter of e-business, using a column called E-Business Group (EBG) consist of code 1 for adopter for e-business and code 2 for non adopter of e-business for the both samples. Once coded, all data in the questionnaire was entered into a data analysis program, SPSS 11.1 (Statistic Package for the Social Sciences). SPSS 11.1 was used to perform data analysis to validate and assess construct validity for Malaysia and UK samples. To test the proposed hypotheses and multiple group comparison between samples and e-business sub-groups, SPSS AMOS 4.0 software was used.

4.8 DATA ANALYSIS PROCEDURES

Two separate statistical techniques were used at various stages of the study to assess the validity and reliability of data collected and the suitability of the proposed EBC theoretical model, by performing construct validity and internal consistency tests. The established instruments that measure business strategy (BS), supply chain strategy (SCS) and business performance (BP) will be reviewed. Figure 4.10 outlines the schematic diagram for each analysis conducted in the subsequent chapter.

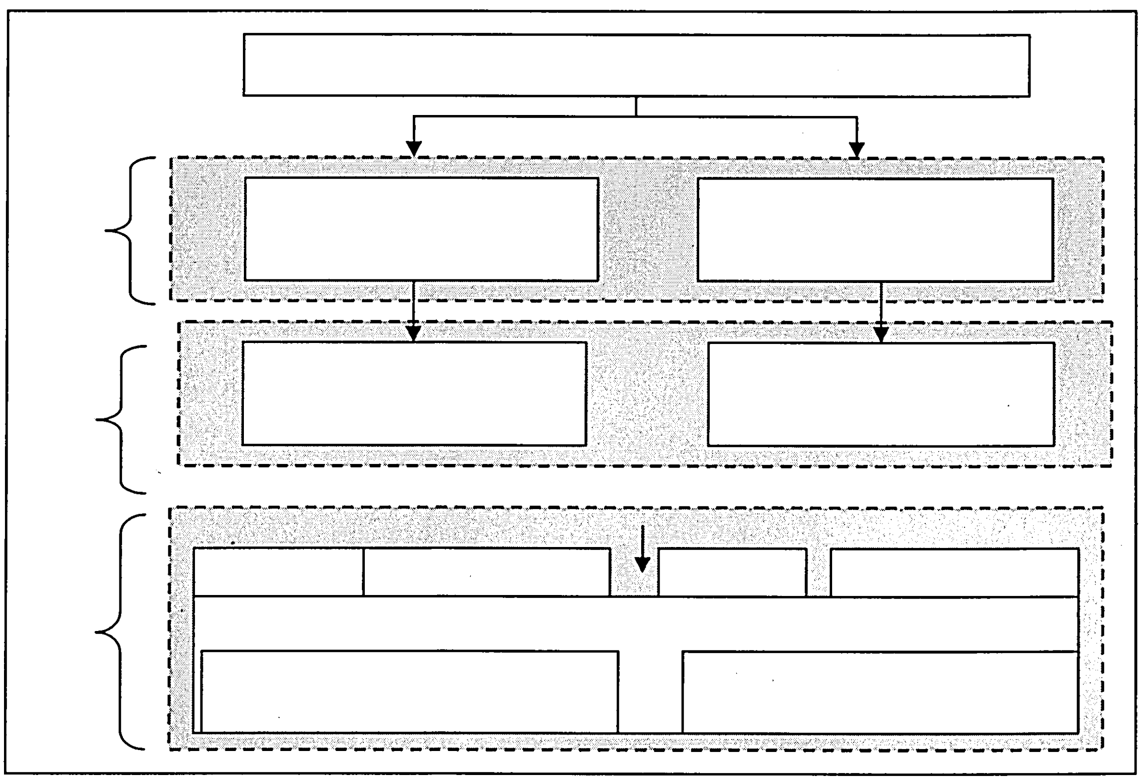


Figure 4.10 Statistical analysis employed throughout the study

Analysis was carried out using the statistical package for social sciences (SPSS), which is configurable for Windows. Then, structural equation modelling using analysis of moment structure (AMOS) software was used to perform hypotheses testing and multiple group comparison across sub-groups (adopter and non adopters of e-business sub-groups) and across the UK and Malaysian samples. Structural equation modeling is a new technique known as "second generation" regression analysis.

Descriptive statistics is part of the statistics family that deals with organising and summarising possibly large collection of experimental measurements, in order to obtain one or more meaningful values that summarise the major characteristic of the data (Nachmias and Nachimias, 1992). Descriptive statistics are used throughout the subsequent chapters (Chapter 5, 6 and 7) and such as averages and percentages are used in this study for purposes of reporting the characteristics of the surveyed companies and simultaneously providing adequate statistical support to the findings.

In order to ensure that the appropriate technique had been employed in SEM analysis, this research has sought advice from Professor Robert Hanneman from University of California, Riverside, USA. His expertise in the area of quantitative data analysis specialising in structural equation modelling (SEM) technique has been invaluable. He has provided exclusive guidance (see Appendix 4.4). Each of these methods will be briefly discussed in the next sections.

4.8.1 Result Study 1: Validity and reliability

Analysis performed in the next chapter (Chapter 5) includes reliability and correlation analysis, confirmatory factor analysis (CFA) and model estimation. The following sub section will explain, in brief, methods that had been employed for the validation of EBC measurement model with data collected from both samples. The EBC measurement model was assessed by using structural equation modelling (SEM), which is also known as a covariance structure analysis (Dawson, 1998; Thompson, 1998). SEM has derived from the combination of statistical techniques such as factor analysis, regression structure and path analysis (Byrne, 1998).

In order to test the hypotheses from the EBC framework developed in Chapter 3, two analyses were performed consisting of measurement model validation and structural model evaluation. The measurement model aims to evaluate how the hypothesised factors / constructs are measured by the observed variables refers to relations on the constructs (Byrne, 1998; Dawson, 1998). Meanwhile, the structural model allows the specification of the direct and indirect effects of the constructs and explores multiple indicators of the constructs (Bollen and Long, 1993). In Result Study 1, rigorous procedures were utilised for the purpose of examining and validating the measurement models of the e-business capability model. As suggested by Kline (1998) in the technique of "Two-step modelling", it is always best to test the measurement model underlying a full structural equation model first, and if the fit of the measurement model is found acceptable, then to proceed to the second step of testing the structural model, by comparing its fit; with that of different structural models in Chapter 6 and Chapter 7. The following will describe, in brief each of the analyses taken in order to validate the measurement EBC model for the respective samples.

Equivalence Model

In order to validate that the proposed measurement model was valid and applicable to both Malaysian and UK samples, four competing confirmatory factory (CFA) nested measurement models were tested using data collected from Malaysia and UK. The analysis of equivalence model (Section 5.2) was conducted to investigate if the proposed EBC model fit exclusively for each of the country.

Having demonstrated that the dimensions identified were empirically distinct, the next step is to demonstrate that each of the measures of each dimension form a measure that represents the single core meaning of the desired concept. Construct validity depends on how well the scale of a construct actually measures the construct. However, a scale cannot have construct validity unless it is unidimensional (Anderson and Gerbing, 1988).

Unidimensionality

This section systematically guides the refinement and modification to ensure that the EBC factors incorporating with TOP dimensions will possesses both internal and external consistency (Gerbing and Anderson, 1988; Kumar and Dillon, 1990). Confirmatory Factor Analysis (CFA) process for refining and testing for unidimensionality constructs should first be done independently with factors / dimensions (Garver and Mentzer, 1999). The confirmatory factor analysis relates to the placing of predetermined constraints on the data such as which variables belong to what factor and how these are correlated (Dawson, 1998).

To assess the construct unidimensionality (Section 5.4) in CFA, Steenkamp and Trijp (1991) criteria was used to assess the overall measurement model fit. Once the model fit produced satisfying results, then attention shifted to analysing the fit of the components of the measurement model (factor analysis using CFA for both samples).

Reliability

Reliability can be defined as an instrument to evaluate the consistency of the measurement (Premkumar *et al.,* 1997). In this section, two reliability approaches were conducted to test the scales. Firstly, the reliability was examined using traditional Cronbach coefficient alpha because it is the most commonly used index of scale reliability (Section 5.5.1). Coefficient alpha is recommended as the first test of internal consistency in assessing the reliability of a multiple-item variable (Nunnally, 1978). Some of the limitations using the approach were discussed which led to the alternative method of using SEM Reliability measures to overcome the limitations associated with traditional coefficient alpha (Section 5.5.2).

SEM approaches were used to further reinforce the measurement reliability to overcome limitations associated with coefficient alpha to estimate reliability and internal consistency of the scales in the EBC measurement model, (Steenkamp and Trijp, 1991; Medsker *et al.,* 1994; Bollen, 1989; Joreskog and Sorbom, 1993).

The analysis was divided into two parts and consists of:

a. SEM item reliability using squared multiple correlations (R^2).
b. SEM scale reliability measure using composite reliability and average variance extracted (AVE).

Construct Validity: Convergent and Discriminant validity

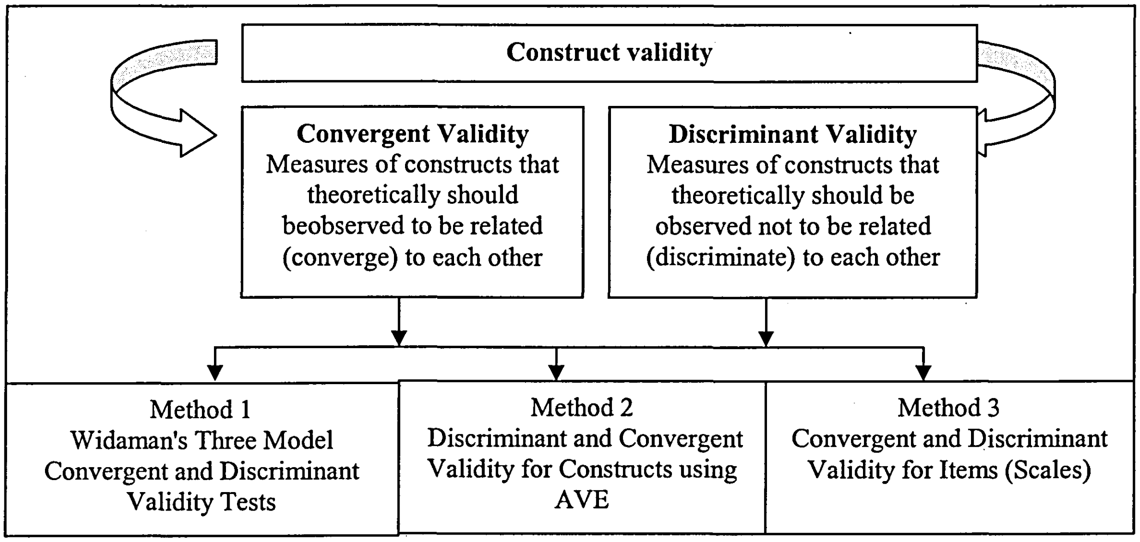


Figure 4.11 Methods employed for assessing construct validity

Construct validity refers to the degree to which inferences can legitimately be made from the operationalisations in this study to the theoretical constructs on which those operationalizations were based. The researcher subjectively evaluates it and represents the adequacy with which a specific domain of contents has been sampled (Nunnally, 1978). Two types of validity analysis were conducted, namely convergent validity and discriminant validity. Figure 4.11 shows a summary of analysis conducted for construct validity. Convergent validity is to which varying approaches to construct measurements yield the same results (Anderson and Gerbing, 1988). While convergent validity evaluates whether all the items measuring a construct cluster together to form a single construct, discriminant validity assesses the degree to which a construct differs from other constructs and is indicated by a measure not highly correlated with other measures from which it should theoretically differ (Kerlinger, 1986).

Three types of convergent and discriminant validity tests were conducted in this study:

- Firstly, procedure to test the convergent validity and discriminant validity of scales were adopted in this study using Widaman's (1985) three comparison.
- Secondly average variance extracted (AVE) was used to measure discriminant and convergent validity by empirically testing each of the distinct construct. The construct will achieve its construct validity if the average variance is greater then the construct's shared variances with every other construct (i.e. the square of the inter factor correlations between any two constructs (ϕ^2)). The value of 0.50 or higher is

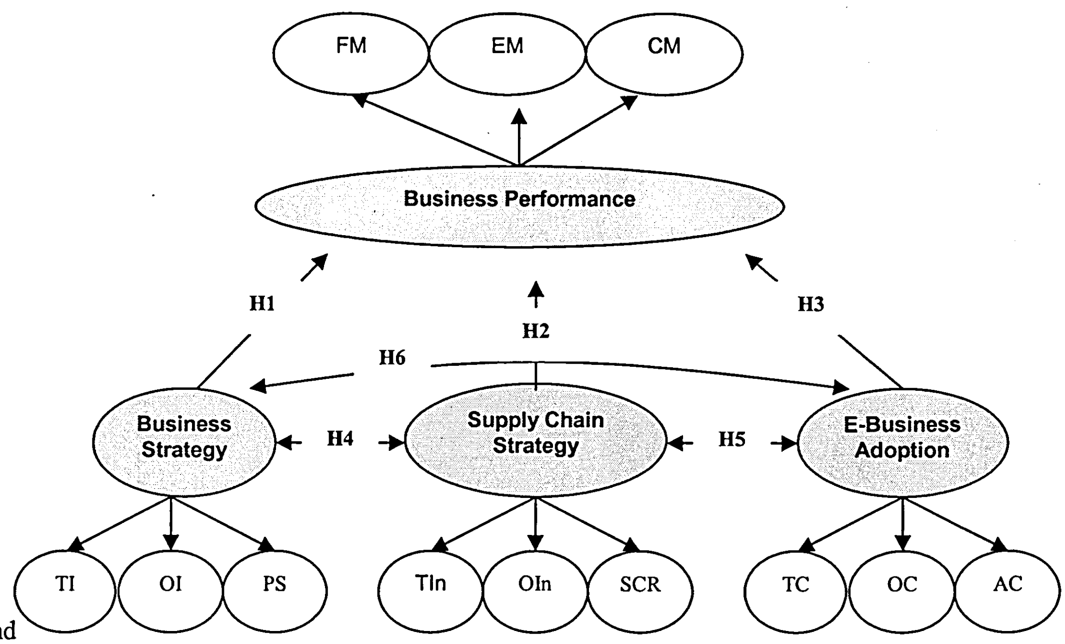
recommended to provide for convergent validity (Fornell and Larcker, 1981; Chin, 1998). Evidence of convergent validity can be obtained by examining the correlation of different instruments designed to measure the same construct.

- Last method that employed was using inter-item correlation (between items within the same construct). In this case, items that load on the same construct would provide convergent validity if the items are highly inter-correlated. Whilst providing discriminant validity if items are not correlated highly with each other.

Validation of the Primary EBC Factors

Last section of the analysis was to assess the validity of s*econd* order constructs (Section 5.7). In order to test the validity of the four second order constructs (e-business readiness, supply chain strategy, business strategy and business performance), a second order factor analysis is conducted (Hair *et. al,* 1995). Each of the second order factor models consists of three first-order factors. The measurement model fit is assessed along with their standardised coefficient, observable indicators and measurement errors.

4.8.2 Result Study 2: Hypotheses Testing Utilising SEM



Legend

TI	Technological Infrastructure (IT)	TIn	Technological Integration (ERP, EDI)	TC	Technological Capability	FM	Financial Measures
OI	Organisational Infrastructure	OIn	Organisation Integration	OC	Organisational Capability	EM	Efficiency Measures
PS	Partnership Strategy	SCR	Supply Chain Relationship	AC	Attitudinal Capability	CM	Coordination Measures

Figure 4.12 Hypotheses arrangement for the EBC structural model

A measurement and structural model were constructed for Result Study 2 (Chapter 6) by utilising SEM. Following the validation of the measurement EBC model in Result study 1, the structural component of the EBC model estimated the impact on business performance of EBC factors (supply chain strategy, business strategy and e-business adoption) incorporated with technological-organisation-people dimension ("technological infrastructure", "organisational infrastructure and "partnership strategy" for business strategy; "technology integration", "internal integration", "supply chain relationship" for supply chain strategy and "technology capability", "organisation capability" and "attitudinal capability" for e-business adoption strategy) (see Figure 4.12 for a pictorial presentation). In this section, brief descriptions of SEM will be provided.

4.8.2.1 Rationale for Selecting SEM

Structural equation modelling is recognised as a more comprehensive and flexible approach to research design and data analysis than any other single statistical model in standard use (Hoyle, 1995). Rather than an exploratory approach, SEM takes a confirmatory approach that specifies inter-variable relations *a priori*, and estimates measurement errors explicitly (Suhr, 1999). Structural Equation Modelling (SEM) techniques such as LISREL, Partial Least Squares (PLS) and Analysis of Moment Structures (AMOS) are known as second generation data analysis techniques (Bagozzi and Fornell, 1982). The use of these enables Information System (IS) research to better meet the recognised standards for high quality statistical analysis also known as statistical conclusion validity (Cook and Campbell, 1979).

The most obvious difference between SEM and other multivariate technique is the use of separate relationships for each set of dependent variables (Hair *et al.,* 1995). SEM becomes a very useful tool when one dependent variable needs to be treated as an independent variable in a subsequent analysis. For instance, business strategy, supply chain strategy and e-business adoption factors are treated as initial dependent variables, which in turn become independent variables in terms of their influence on the surveyed companies' business performance.

Multivariate method such as regression analysis is too simplistic and does not allow analysing between independent variables. In comparison to other multivariate method, the SEM applies only the variance/covariance or correlation matrix as its input data.

Therefore, the focus of SEM is not to understand an individual relationship, but on the pattern of relationships across the samples (Hair *et al.,* 1995). In addition, SEM is a comprehensive statistical approach to test hypotheses about relations among observed and latent variables (Hoyle, 1995). The unobserved (latent) variables is linked to one (variable) that is measurable, thus making its measurement feasible (Bryrne, 2001). Due to the complex theoretical EBC model which includes first level of factors (TOP dimensions incorporated into each of EBC factors) and second level of factors (the EBC factors and business performance). The first generation of statistical tools (regression, linear regression, LOGIT, ANOVA and MANOVA), were not applied in this study because of the following reasons (see Table 4.8):

Second generation data analysis	**First generation data analysis**
LISREL, Partial Least Squares (PLS) and Analysis of Moment Structures (AMOS)	Regression, linear regression, LOGIT, ANOVA and MANOVA
• Performing SEM enables the investigation of a set of interrelated research questions in a single, systematic and comprehensive analysis by modelling the relationships among multiple independent and dependent constructs simultaneously.	• First generation regression models analyse only one level of linkages between independent and dependant variables at a time
Application to current study: AMOS is used throughout the analyses of this study	
• SEM permits complicated variable relationships to be expressed through hierarchical or non-hierarchical, recursive or non-recursive structural equation and present a more complete picture for the entire model (Hanushek and Jackson, 1997; Blalock, 1969)	• Using first generation regression models two unrelated analysis are required
Application to current study: • For example in the EBC model, the outcome of business performance (BP) is determined by the strategic implementation of business strategy (BS), supply chain strategy (SCS) and e-business adoption (EBA). But the EBC model also posits that BS, SCS and EBA are mutually dependent and belong to a non-recursive model. Using SEM, these paths can be modelled in one analysis (see Figure 4.12) • In comparison with using first generation data analysis, the intricate casual networks enabled by SEM characterize real-world processes better than simple correlation-based model, and SEM is more suited in this study to serve both theory (Blalock, 1969) and practice (Dubin, 1976).	

• SEM utilises two types of models; structural model (the assumed causation among a set of dependent and independent constructs) and the measurement model (loading of observed items (measurements) on their expected latent variables (constructs)). • In SEM, factor analysis and hypotheses are tested in the same analysis. SEM technique also provides fuller information to which the research model is supported on the data rather than the regression techniques.	Through first generation regression techniques requires looking at the way the items load on the constructs via factor analysis, and then independently of these factor loading, a separate examination of the hypothesized paths.
Application to current study: • Four EBC measurement models consist of BS measurement model, SCS BS measurement model, BP measurement model and BP measurement model. EBC structural model is the impact of the three measurement models (BS, SCS, EBA - independent constructs) on business performance (BP) measurement model (dependent construct) (see Figure 4.12). • The combined analysis of the measurement and the structural models enables the measurement errors of the observed variables to be analysed as an integral part of the model and to combine factor analysis with hypothesis testing.	

Table 4.8 Comparisons between SEM and first generation of regression techniques (adapted from Gefen *et al.*, 2000).

One significant difference between SEM and the first generation regression techniques, beside the nature of the analysis performed is the special diagrammatic syntax used in SEM. Latent variables (constructs) cannot be measured directly. Therefore, the arrows connected to latent constructs in Figure 4.13 point away from the latent constructs.

A syntax presented in the EBC theoretical model is shown in Figure 4.13. In AMOS terminology, the structural model contains the following:

- Exogenous latent constructs called Xi or Ksi (ξ).
- Endogenous latent constructs called Eta (η).
- Paths connecting ξ to η represented by as Gamma (γ) coefficients
- Paths connecting one η to another as Beta (β) s.
- Shared correlation matrix among ξ; called Phi (ϕ).
- Shared correlation matrix among the error term of the η called Psi (ψ).

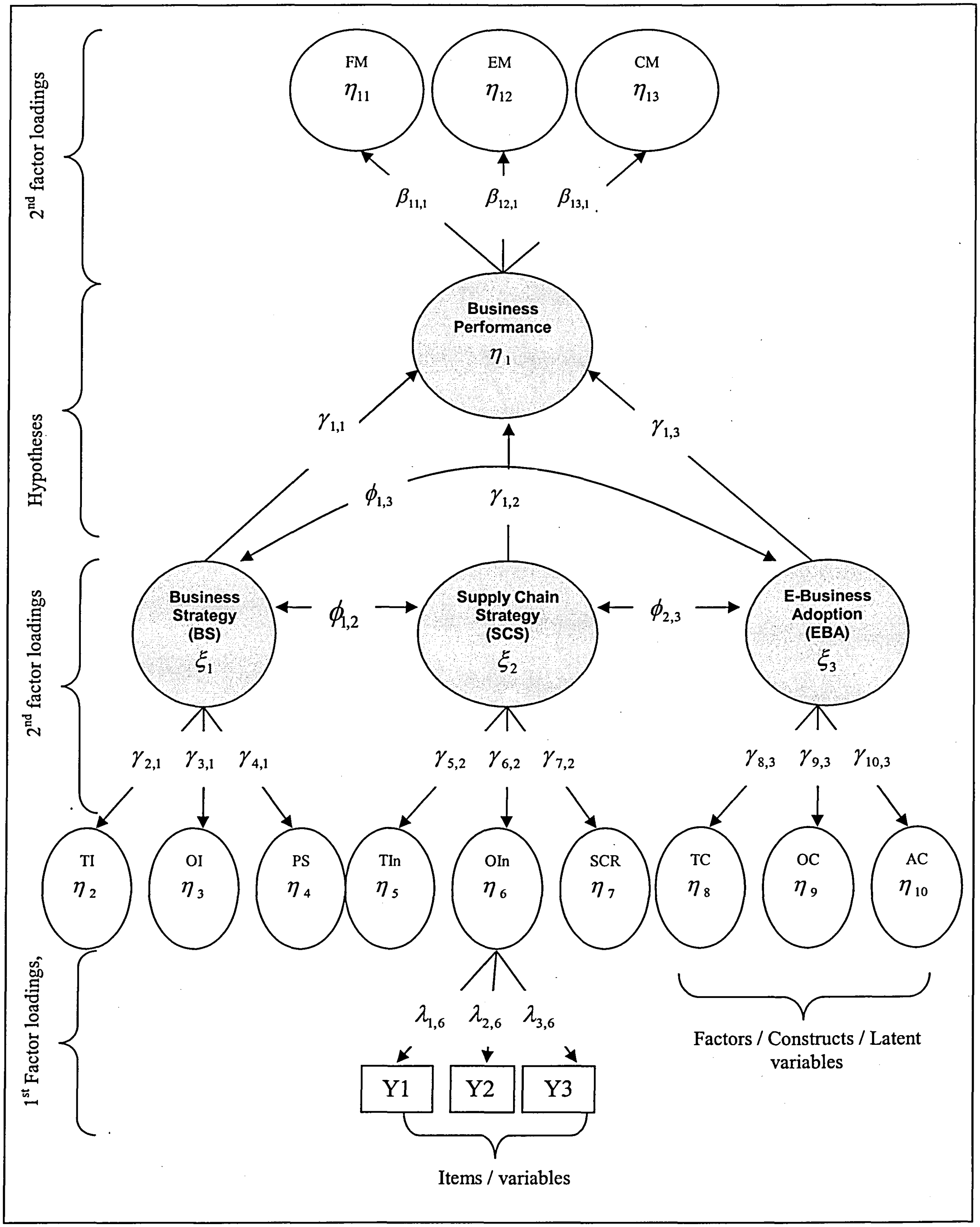


Figure 4.13 Graphic representations for SEM EBC model

To illustrate, business performance (BP) construct would be considered endogenous construct in the EBC model predicted by one or more other variables or latent constructs. BS construct however would be considered an exogenous latent construct in that no other variable in this model predicts it. The casual path, BS (ξ_1) to BP (η_1) was estimated as a $\gamma_{1,1}$ coefficeint.

The measurement model consists of:

- X and Y variables, which are observations or the actual data collected. These are the measures of the exogenous and endogenous constructs Each X should load onto one ξ and each Y should load onto one η.
- Lambda X (λ_X) representing the path between an observed variable X and its ξ, i.e. the item loading on its latent variable.
- Lambda Y (λ_Y) representing the path between an observed variable X and its η, i.e. the item loading on its latent variable. For example, in Figure 4.12, variable Y1 load on the OIn (η_6) construct has factor loading of $\lambda_{1,6}$.

4.8.2.2 Statistical Analysis: Structural Equation Modelling (SEM)

In this study, the hypothesised relationships among factors (independent and dependent) were assessed by utilising structural equation modelling (SEM), also known as covariance structure analysis (Dawson, 1998; Thompson, 1998). The term structural equation modelling conveys two important aspects of the procedure: (a) the casual processes in the study which are represented by a series of structural (i.e., regression) equations and these structural relations can be modelled pictorially to enable a clearer conceptualisation of the theory (Byrne, 1998); (b) estimation of unequal (freely estimate) weighting of path coefficients (H1 to H3) and factor correlations (H4 to H6) of second-order factor analysis.

It should be noted that the use of SEM is a statistical tool for model creation and testing, whether the theoretically and statistically proposed model is reasonable (Byrne, 1998; Hoyle, 1995). SEM is a generalisation of many familiar techniques including (Byrne, 1998):

- Regression
- Path Analysis

- Discriminant Analysis
- Canonical Correlation
- Confirmatory Factor Analysis

4.8.2.3 Test of Goodness Fit

Traditional statistical results usually only utilise one statistical test to determine the significance of the analysis. However, with SEM, it relies on several statistical tests to determine the adequacy of the model fit to the data. The purpose of SEM is to test the fit between the theoretical model and the empirical data (Byrne, 1998; Dawson, 1998). SEM technique uses absolute fit of chi-square statistic (χ^2) test to assess the degree of difference between the original sample covariance matrix and a reconstructed covariance matrix based on the model that is specified (Hair *et al.,* 1995; Byrne, 2001; Fan *et al.,* 1997). However, the use of $\chi2$ as assessment of fit leads to difficulty in the interpretation of statistical significance, as the sample size will greatly affect the results (Anderson and Gerbing, 1998). For example, a large sample size could be the cause of model rejection rather than poor model fit (Kline, 1998).

Given that the chi-square is not very good measure of fit as they are affected by the sample size and model size (Hair *et al.,* 1995) relative fit indices have been developed to "describe the fit, rather than to test fit statistically" (Fan *et al.,* 1997). There has been an increased wide range of indices available and the justification of which indicator to use still remains unclear (Dawson, 1998; Fan *et al.,* 1997; Thompson, 1998). However, most of the key characteristics of these indices are threefold, a range between 0 and 1 with 0 indicating no fit, independence from sample size issues and "distributional properties to assist interpretation" (Fan *et al.,* 1996).

There are three types of fit indices, absolute fit, incremental fit and indices of model parsimony (Holmes and Smith, 2000). The χ^2 statistic falls into the absolute fit along with the Goodness-of-Fit Index (GFI) which is a measure of the "absolute discrepancy between the matrix of implied variances and covariances to the matrix of empirical sample variances and covariances" (Holmes-Smith, 2000).

Tucker-Lewis Index (TLI) and the Comparative fit index (CFI) are grouped as Incremental fit indices. TLI measure the difference between the fitted (proposed) model and a baseline model such as the null model where no relations between the hypothesised variables exist. CFI index ranges from zero to 1.00, with values close to 1.00 indicative of a good fit (Hair *et al.,* 1998). CFI estimate the comparative difference in non-centrality between proposed and baseline models (Hair *et al.,* 1995). The CFI provides a measure of complete co-variation in the data i.e. index close to one indicate a good fit (Hair *et al.,* 1995).

Model parsimony refers to how likely a model can be generalised to the population (Holmes-Smith, 2000). These indices impose penalties upon a model that is over specified in the attempt to achieve a good model fit. The rationale of using a model parsimony as a fit measure is, that the more simple the model the more likely it is to replicate (Fan *et al,* 1997). The value of model parsimony indices utilised in this study includes TLI and Root Mean Square Error of Approximation (RMSEA) (Brown and Cudeck, 1989). Models that demonstrate a score less than 0.05 in this study is considered to exhibit a good fit however, a range between 0.05 and 0.08 are considered to be acceptable (Hair *et al.,* 1995) (see Table 4.9).

Comparison fit measures	Recommended level	Indication of fit
1. Absolute fit measure		
Chi-square ; *df* (p-value)	$P > 0.05$	
Root mean square (RMESA)	< 0.08	
2. Incremental Fit Measures		Very Good Fit > 0.90
Tucker-Lewis index (TLI)	> 0.90	0.70 < Good Fit < 0.89
Comparative fit index (CFI)	> 0.90	0.50 < Reasonable Fit < 0.69
		Poor Fit < 0.49

Table 4.9 Recommended value for measures of good fit

There are a number of methods utilised to test for higher order factors and these have mostly included regression and factor analyses that include confirmatory factor analysis. The generalised path analysis of structural equation models are expressed through the development of matrices that are derived from a set of equations that are generated when analysing the relations between the variables in the path diagram (see Figure 4.12). Structural equation modelling programs such as AMOS (Arbuckle, 1999) graphically map out the first order multiple indicators and factors then mathematically determine the higher order ('*a priori*') factors by testing model fit criteria. Prior to structural equation modelling, a multivariate multiple regression may have been utilised to determine the strength of relationships. However, multivariate multiple regression fails to allow for a full exploration of the relationships between the dependent variables. The path analysis created by multivariate multiple regressions is complex and less flexible (Byrne, 1998; Dawson, 1998).

4.8.3 Result study 3: Multiple Group Comparison (MGC)

A critical question when performing SEM using the global sample (Malaysian = 208 and UK = 143) is whether EBC structural model is still appropriate and how well the results can be compared across the two sub-groups (adopter of e-business and non-adopter of e-business). In order to pursue this question, nested multi-group confirmatory factor analysis (CFAs) and SEMs were conducted in which different parameters were constrained to be invariant (same weights) across sub-groups for the Malaysian and UK samples (Chapter 7).

Multiple group comparison (MGC) testing is used to assess a measure that has been used for more than one group in order to discover if the measurement is equivalent and if it remains invariant (same) across groups (Byrne, 1994; Marsh, 1994; Mavondo and Farrell, 2000). When parallel data exists for more than one group, multiple group test using a CFA approach provide a way of assessing the equivalence of solutions across multiple groups (Marsh, 1994, 1993, Marsh and Hocevar, 1985). Any one, any set, or all parameters will be constrain to be invariant across multiple groups (Marsh, 1993; 1994; Marsh *et al.,* 1994a; Marsh *et al.,* 1994b). In this study, it is of interest to evaluate the invariance of the parameters across the sub-groups comprising adopters and non-adopters to investigate if these parameters were invariant across the sub-groups. The aim of the MGC testing was to establish that when the multiple indicators (i.e. items) within the EBC (see Chapter 5) and in higher order multiple measurement models (see Chapter 6) were held invariant, the scales (multiple dimensions of e-business capability and business performance) could be confidently compared between groups.

4.9 SUMMARY

The present program of research is epistemologically situated in the scientific realism paradigm, which provides a sound basis for both theory testing and theory development. This chapter had outlined the methods used in this study aimed at measuring companies' EBC factors incorporating TOP dimensions and business performance by describing the participants of the study, instrumentation, research design, procedures undertaken and the analysis techniques to be used.

The sampling and demographical information of participants were explored. The instrumentation created and adopted for this study was briefly introduced and the presentation within the survey explained. The development of the e-business capability measure, in relation to conceptual development, was discussed and the definitions of the components are explained. The steps undertaken to pilot these measures were demonstrated and finally the statistical measures undertaken are defined and discussed. The methods employed in this thesis provided the potential to explore, explain and describe the important features of e-business capability factors and business performance.

In addition, the rationale of choosing structural equation modelling method as a data analysis technique has been extensively discussed. Brief description of each analysis and steps taken in the subsequent chapters are also discussed to give an overall view of the methodology and data analysis employed. Equipped with the methodology developed in this chapter and the awareness raised of issues, such as response rate and bias in survey and the reliability and validity of instrument, the study is ready to process onto the actual findings. Further data analysis and discussions will be presented in the following chapters.

CHAPTER 5

RESULT STUDY 1: VALIDITY AND RELIABILITY ANALYSIS

5.1 INTRODUCTION

A fundamental aspect in the undertaking of any analysis of relationships or change is the ability of the measurement tool or instrument to accurately capture the underlying constructs. The purpose of this chapter is to explain the development of the E-Business Capability Questionnaire (EBCQ), report the psychometric properties of the EBCQ, and clarify the structure and nature of firms' e-business capabilities. Psychometric properties are defined as "the elements that contribute to the statistical adequacy of the instrument in terms of reliability, validity, and internal consistency". This chapter tests the psychometric properties of the instrumentation utilised in this study. Analysis is performed by utilising data collected from two countries (Malaysia and UK) separately for the psychometric tests. Firstly, it is verified that the proposed measurement model is the best model by analysing alternative equivalence models using goodness of fit. Secondly, psychometric properties (construct validity and internal consistency) that measure business strategy (BS), supply chain strategy (SCS), e-business adoption (EBA) and business performance (BP) are tested in relation to the population sample utilised in the present investigation.

Lastly, tests are conducted to establish that the three second order constructs (SCS, BS, and EBA) are conceptually distinct, however closely related to each other. Figure 5.1 depicts an overview for this chapter.

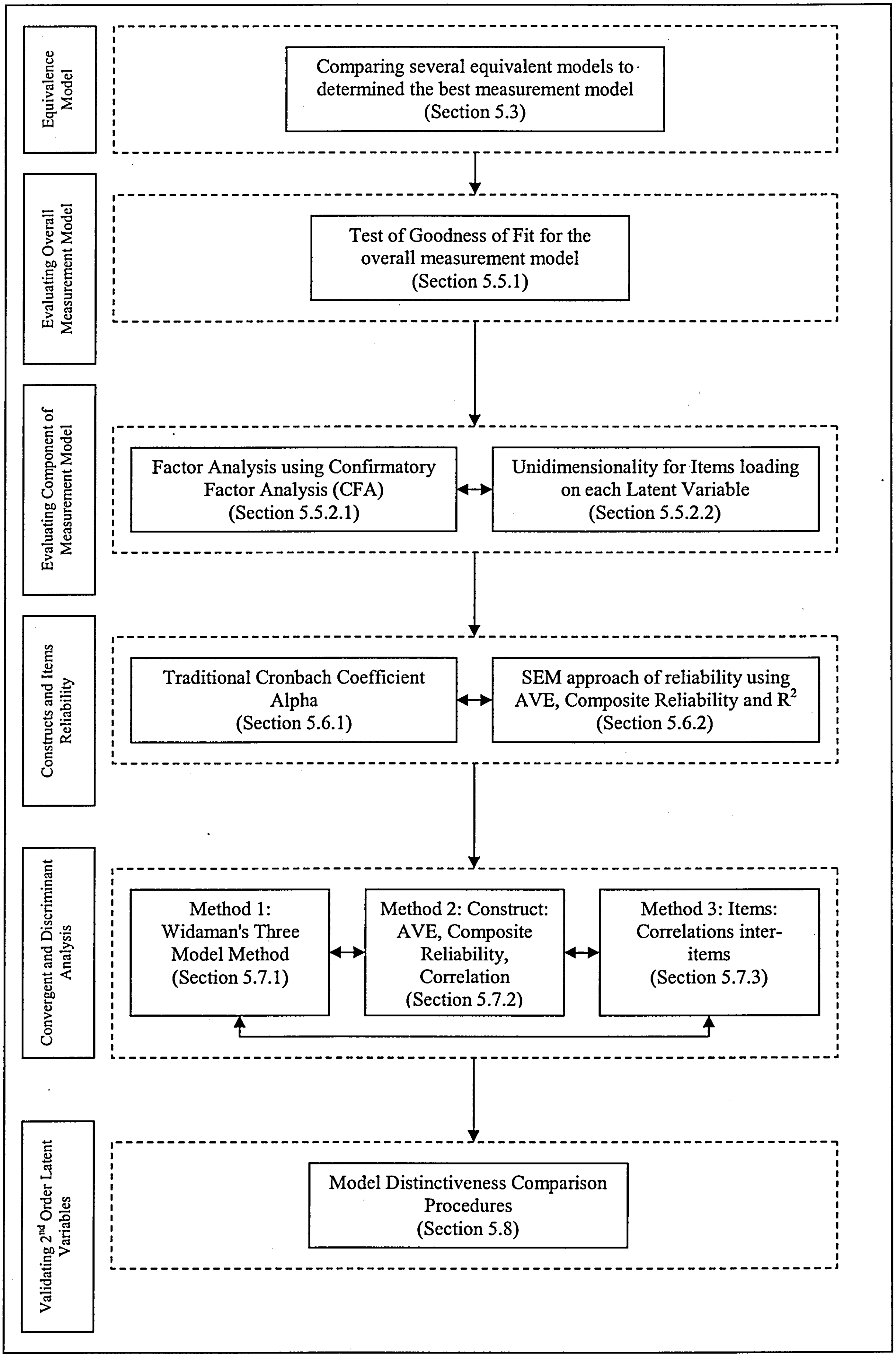


Figure 5.1 A flowchart for validating the EBC measurement model

5.2 SAMPLE PROFILE

The survey was targeted at management level personnel that actively engaged in decision making and have influence relating to implementation of e-business within their organisations. From a total of 300 questionnaire mailed / posted in each country, the empirical research in this study is based on the sample of 208 respondents from Malaysia and 143 respondents from UK, representing a response rate of 69.3 % for the Malaysian and 47.7 % for the UK sample. A breakdown of the sample characteristics is illustrated in Table 5.1.

Industries	Malaysian sample	UK sample
	Respondents (out of 50)	
Manufacturing	30	25
Services	28	20
IT`	43	30
Finance, Insurance and Real Estate	35	20
Wholesale and Retail Trade	32	23
Others (agriculture, communication, utility services, non classified)	40	25
Total number of respondent (out of 300)	208	143
Response Rate (%) (out of 300)	69.3 %	47.7 %

Table 5.1 Break down of sample by industry sectors.

As discussed in Chapter 4, the initial target responses for both samples were fifty for each of the industry sector. As showed in Figure 5.2, the percentages of responses for the Malaysian for each industry sector are higher in comparison with UK's responses. Table 5.1 illustrates a higher interest in Malaysia, as a developing country to participate in this research. This study would be beneficial to them if the empirical results would provide some guidelines to assist them into e-business implementation. In addition, some companies who responded in this survey expressed their interests to participate in further research For instance face-to-face interview or longitudinal case study if requested. The turnaround time from sending the questionnaire to receiving the completed questionnaire for the Malaysian companies was approximately four months. Although due to the location of Malaysia (13 hours direct flight from UK) and time differences (plus 8 hours UK time), the high response rate demonstrate the willingness and eagerness of companies to participate as they would benefit from the study.

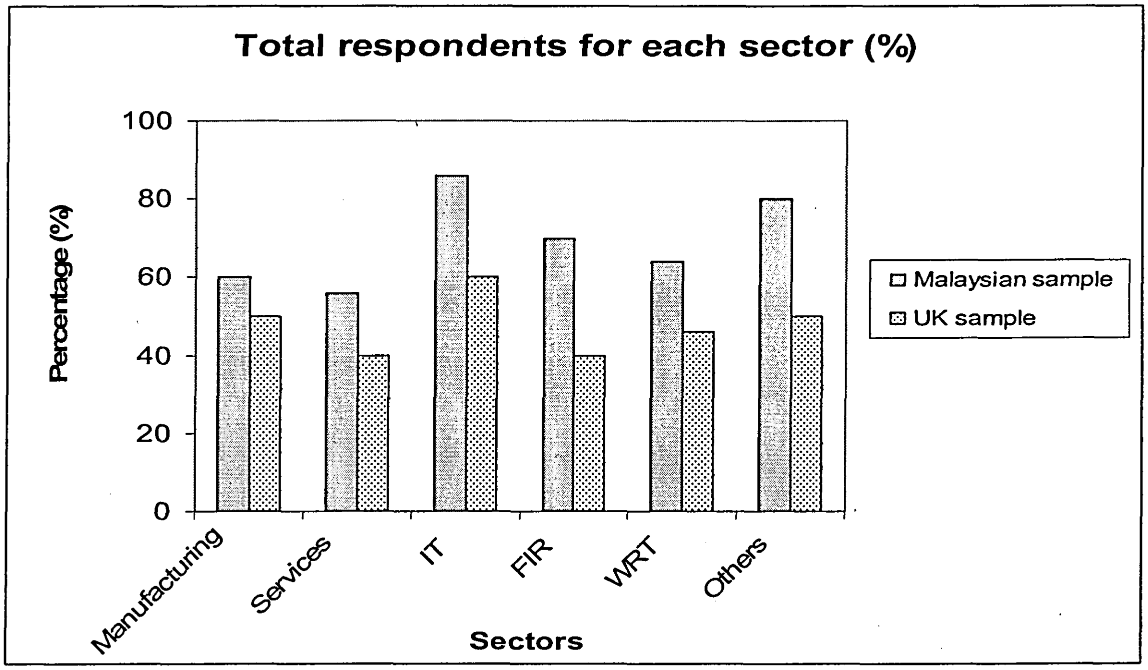


Figure 5.2 Percentage of each industry sector (out of 50) for the UK and Malaysian sample

E-Business development in UK as a developed country, has reached a certain stage of maturity. Although during the process of data distribution and collection, the researcher was in the UK, the turnaround time from sending the questionnaire to receiving the final completed questionnaire was approximately six months. This reason for this longer response time was the difficulty in finding companies that would express their interests in participating in this research. Initial respondents targeted in UK were large organisations such as Ebuyer (www.ebuyer.co.uk), The Thomas Food Partnership Sheffield and Cadbury Trebor Bassett. However, due to the low response rate from these large corporations, this empirical research was targeted at SMEs or micro businesses around UK. With the help from Mr Kevin Brown, a contact from Yorkshire Forward (www.yorkshire-forward.com) and the web site directories listed in Section 4.6.3, a higher response rate could be achieved. Surprisingly, businesses from SMEs and recommendation from Yorkshire Forwards expressed their interest to participate.

In addition, the questionnaire also asked the respondent to state their posts in their companies. Their post can be either an "IS" or "non-IS" managers. From Table 5.2, respondents have almost equal proportion of the two posts for both samples. It was noted that, response rate from "IS" positions were higher in Malaysia, but "non-IS" position were higher in UK. However, almost equal proportions of sample size for both positions could prevent result bias when responding to the questionnaire.

Posts / Positions			Malaysian sample	UK sample
Job Title	IS	CIO, CTO, VP of IS IS manager, director, planner Other manger in IS department	108 (51.9 %)	70 (49 %)
	Non IS	CEO, president, managing director COO, business operations manager CFO, administration / finance manager Others (IS analyst, marketing VP, other manager)	100 (48.1 %)	73 (51 %)

Keyword			
CIO	Chief Information Officer	CTO	Chief Technology Officer
VP	Vice President	IS	Information System
COO	Chief Operating Officer		

Table 5.2 Demographic characteristics of the survey participants (n= 351)

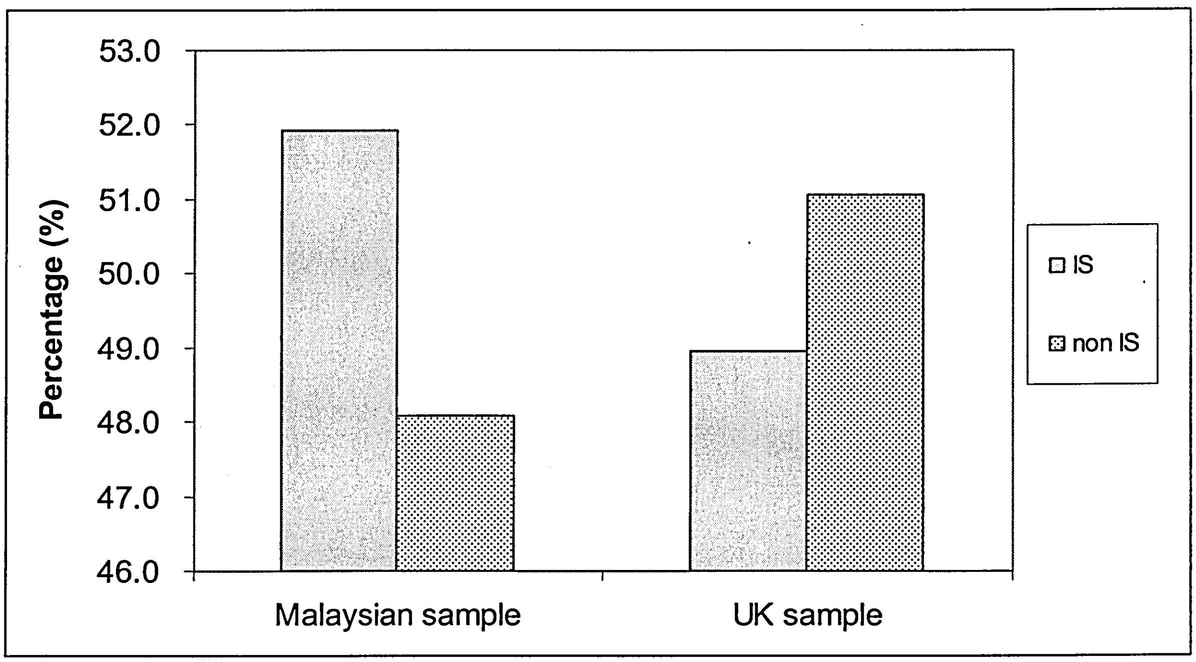


Figure 5.3 Percentage of IS and non IS positions

As described in Section 4.6.3, each of the samples is split into adopter and non adopter of e-business sub-groups, on the extent of Internet technologies used in their companies (see Table 5.3 and Figure 5.4). Full analysis will be discussed in Chapter 7.

Industry Sectors	Malaysia Observations			UK Observations		
	Total	Adopt	N_Apot	Total	Adopt	N_Apot
Manufacturing	30	16	14	25	15	10
Services	28	13	15	20	12	8
IT	43	34	9	30	15	15
Finance, Insurance and Real Estate	35	21	14	20	11	9
Wholesale and Retail Trade	32	19	13	23	13	10
Others (agriculture, communication, utility services, non classifiable establishments)	40	21	19	25	14	11
Total Sample / Split sample	**208**	**124 (59.6%)**	**84 (40.4%)**	**143**	**80 (55.9%)**	**63 (44.1%)**
Keyword:	Adopt	Adopter of e-business sub-group		N_Apot	non adopter of e-business sub-group	

Table 5.3 Demographic of respondents by sub-groups

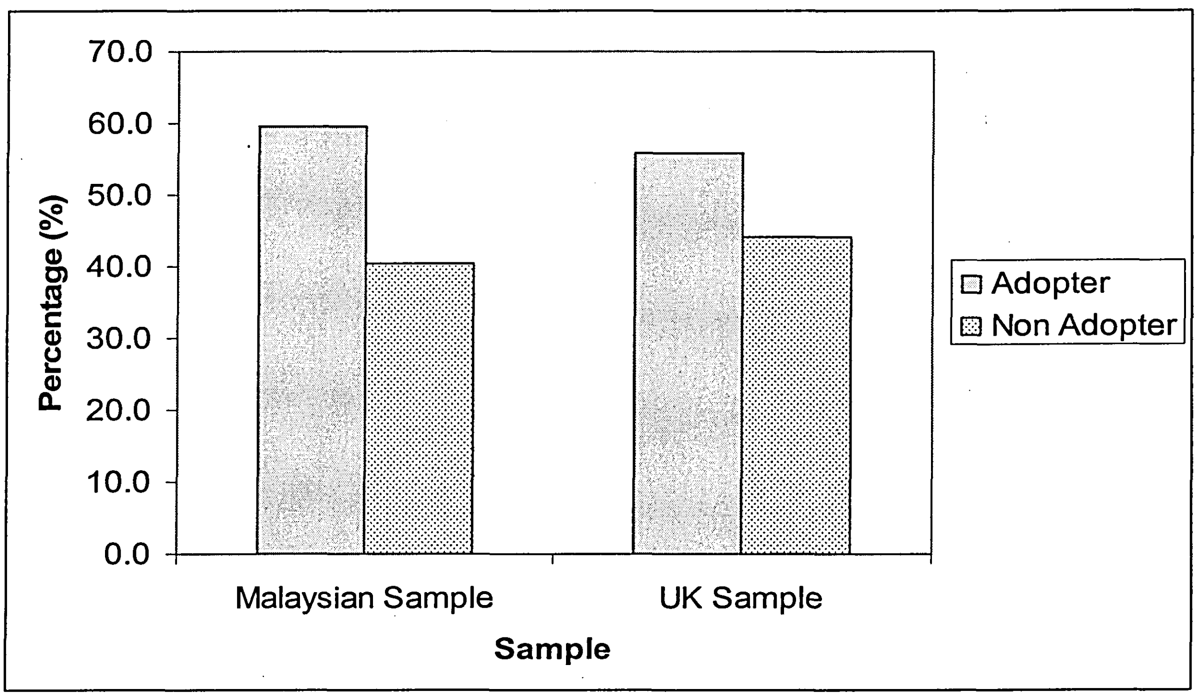


Figure 5.4 Percentage of adopter and non adopter sub-groups

5.3 EQUIVALENCE MODEL

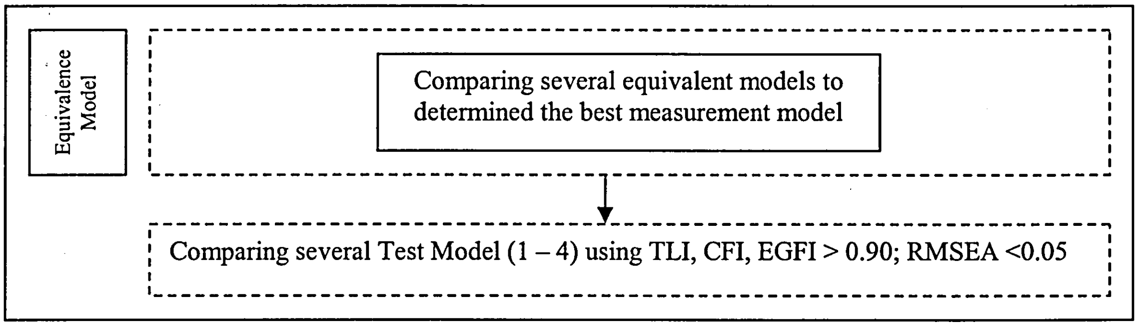


Figure 5.5 Equivalence model

In order to confirm the validity and applicability of both the Malaysian and UK measurement models, several competing nested measurement models were tested using data collected from both samples. Two separate analyses were conducted to evaluate if the proposed EBC model fits exclusively to each of the samples (see Figure 5.5). The correlation matrix comprises of 41 items / variables as input to the test model (EBC measurement model). Four confirmatory factory analysis (CFA) test models were identified to be estimated and eventually compared.

Several equivalent models were compared to determine the best measurement model (see Table 5.4). The proposed Model 1 consists of four second order constructs, with each of the construct consisting of a further three first order constructs, broken down into the items that asked respondents regarding the "technological", "organisational" and "people" (TOP) dimensions. In order to validate Model 1, an alternate Model 2 was proposed whereby, the covariance among the items is represented by four first order constructs (e-business adoption, supply chain strategy, business strategy and business performance). Whereas Model 3 is a two-factor model where 31 items/variables belonging to EBA, SCS, BS load on to one construct while 10 items belonging to BP load on to second construct. Model 4 is a unidimensional model, where all 41 items/variables load on to a single construct representing E-Business Capability model.

The test seeks to agree with the proposition that the EBC measurement model could be best explained by having three distinct first-order constructs loaded on each of the e-business capability factors (Test model 1), instead of loading the items in a single construct (see Test model 4).

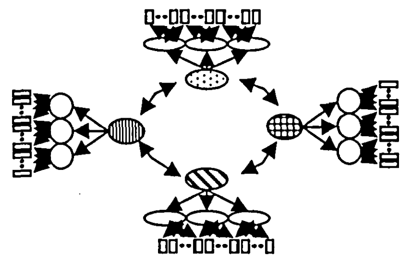
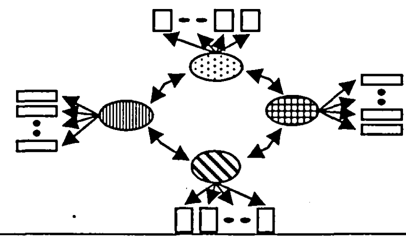
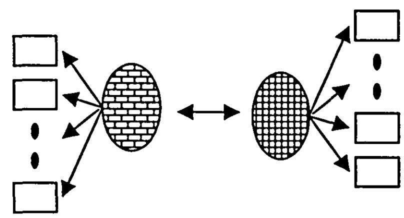
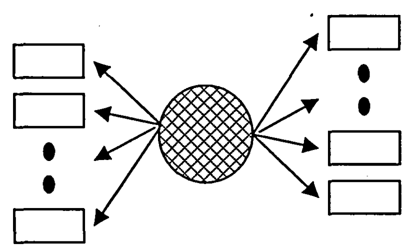
Test Models and Description	Schematic representation
Test Model 1 (sixteen factors model) : Covariance among the items is best represented by the four second order constructs (EBA, SCS, BS, BP), where each of the second order constructs consists of respective three first order constructs of technology, organisation and people (see opposite figure)	
Test Model 2 (four factors model): Covariance among the items is best represented by four first order constructs (EBA, SCS, BS, BP), where each construct represent as a distinct component of the E-Business Capability (EBC) model (see opposite figure)	
Test Model 3 (two factor model): Covariance among the items is best represented by a two first order constructs in where the 31 items/variables (belonging to EBA, SCS, BS) load onto one construct and the remaining 10 items / variables (belong to BP) load on a second construct.	
Test Model 4 (one factor model): EBC model is conceptualized as unidimensional model encompassing four second order constructs components (EBA, SCS, BS, BP); co-variation among the 41 items load onto one construct representing as E -Business Capability (EBC) model.	
Legend: (BP) Business Performance; (SCS) Supply Chain Strategy; (BS) Business Strategy; Items / Scales; First order constructs; (EBA) E-Business Adoption; BS +EBA +SCS; BS +EBA +SCS + BP; Pattern Second order constructs	

Table 5.4 Schematic representation and descriptions of equivalence measurement models.

A summary statistic for the above tests for the both samples is given in Table 5.5 supporting the findings of the χ^2 difference test. Both RGFI value were approximate to 0.90 which provide sufficient evidence to support that the model with four correlated second order factors for Malaysian (RGFI = 0.89) and UK (RGFI = 0.87) fit the data better than the other factor models. Test Model 1 for both Malaysia sample (χ^2 =

932.91, df = 761) and UK sample (χ^2 = 871.10, df = 761) revealed acceptable fit indices. (CFI = 0.97, TLI =0.97 , RMSEA = 0.03) compared to Test Model 2 to Test Model 4 which range from the value of 0.88 to 0.45 for CFI, 0.88 to 0.42 for TLI and 0.07 to 0.13 for RMSEA.

Test Model		Test Model 1		Test Model 2		Test Model 3		Test Model 4	
No of Constructs		16		4		2		1	
χ^2	M	932.91		1477.08		3800.79		4409.17	
	UK	871.10		1100.70		2357.98		2720.03	
		M	UK	M	UK	M	UK	M	UK
Degrees of Freedom		761	761	773	773	778	778	779	779
Comparative Fit Index (CFI)		0.97	0.97	0.88	0.91	0.49	0.55	0.39	0.45
Turkey Lewis Index (TLI)		0.97	0.97	0.88	0.90	0.47	0.53	0.36	0.42
Goodness of Fit Index (GFI)		0.83	0.79	0.73	0.73	0.38	0.42	0.35	0.38
Adjusted Goodness of Fit Index (AGFI)		0.81	0.76	0.70	0.70	0.31	0.35	0.32	0.31
RMSEA		0.03	0.03	0.07	0.05	0.14	0.12	0.15	0.13
Standardized RMR		0.06	0.06	0.07	0.07	0.17	0.15	0.17	0.15
$EGFI = \frac{1}{1+{2df}/{pn}}$ df=degrees of freedom p=number of indicator n=sample size		0.93	0.90	0.92	0.89	0.92	0.88	0.98	0.88
Relative goodness of fit measure : $RGFI = \frac{GFI}{EGFI}$		0.89	0.87	0.79	0.82	0.41	0.40	0.36	0.43
Legend: M : Malaysia Sample UK : United Kingdom Sample									

Table 5.5 Indices for the equivalence model test

In Table 5.5, the single factor model (Test model 4) demonstrated a χ^2 value of 2720.03 with 779 degrees of freedom as compared to a χ^2 value of 871.10 with 761 degrees of freedom (Test model 1) for the UK sample and a χ^2 value of 4409.17 with 779 degrees of freedom (Test model 4) as compared to a χ^2 value of 932.91 with 761 degrees of freedom (Test model 1) for the Malaysian sample. Both samples indicated that the Test Model 1 fit the data best for both samples compared to other test models (see Table 5.5). For example, comparison between Test model 1 and Test model 4 for the UK ($\Delta\chi^2$=1848.93 and Δdf = 18) and the Malaysian ($\Delta\chi^2$=3476.26 and Δdf = 18) samples indicated a significant deterioration in the model fit for the single factor model (Test model 4) compared to the four second order factors model (Test model 1).

In summary, it can be confirmed that Test Model 1 has the best goodness of fit in comparison with the other three test measurement models. This confirmed Test model 1 had met the conceptual equivalence requirement (Churchill, 1979). By using equivalence model test, it was found that each of the second higher factor models is significantly different (via chi-square difference tests), from the previous lower factor model. For example, the one-factor model had a significant improvement in fit over null model for the sample, the four factor model (Test Model 2) represented better fit of the data than the one-factor model and the sixteen factor model (Test Model 1) was significantly different for the four factor model, with relatively much higher TLI and CFI and low value of χ^2.

The best results would not be able to be obtained if the EBC model consist of four first order constructs with items (technology, organisation and people dimensions) were loaded onto a single constructs as with Test Model 2. As for Test Model 3 and Test Model 4, it served as a comparison to Test Model 1. With Test Model 1 selected as the best measurement model for this study, the next section will explain how well the model fits in this study with the data collected from both countries.

5.4 CONSTRUCT VALIDITY

Construct validity demonstrates how well the scale of a construct actually measures the construct. A scale is "construct valid" if: (i) To the degree it assesses the magnitude and direction of the representative sample of the characteristics of the construct (Dunn *et al.*, 1994); (ii) to the degree that the measurement instrument is not contaminated with elements from the domain of other constructs or error (Peter, 1981). However, a scale cannot have construct validity unless it achieves unidimensionality (Anderson and Gerbing, 1988).

The EBC measurement model in this study also measure multi level constructs where several unidiemsional scales are used (known as second order factor model) (Joreskog and Sorbam, 1989). The assessment of the unidimensionality of a scale involves further scale refinement if needed. Anderson and Gerbing (1988) suggest that the unidimensionality should be assessed before reliability is assessed (see Section 4.9.1 for complete descriptions of construct validity).

5.5 UNIDIMENSIONALITY

Once the measurement model is specified (see Section 5.3), the next step is to examine unidimensionality of the measurement model. This process systematically guides the refining and modifications and ensures that the constructs will posses both internal and external consistency (Anderson and Gerbing, 1988; Kumar and Dillon, 1990). The measurement model for confirmatory factor analysis (CFA) is a multivariate regression model that describes the relationships between a set of observed dependent variables and a set of continuous constructs. To assess the construct unidimensionality in CFA, Steenkamp and Trijp (1991) criteria was used where the overall measurement model fit was assessed first. Once the overall measurement model fit produces satisfying results, the next step is to proceed to analyse the component of the measurement fit of the model. That is, to first ensure that the overall model provides a satisfactory fit to the entire data set, and then examine the unidimensionality and internal consistency of each construct within this EBC measurement model.

5.5.1 Overall Measurement Model Fit

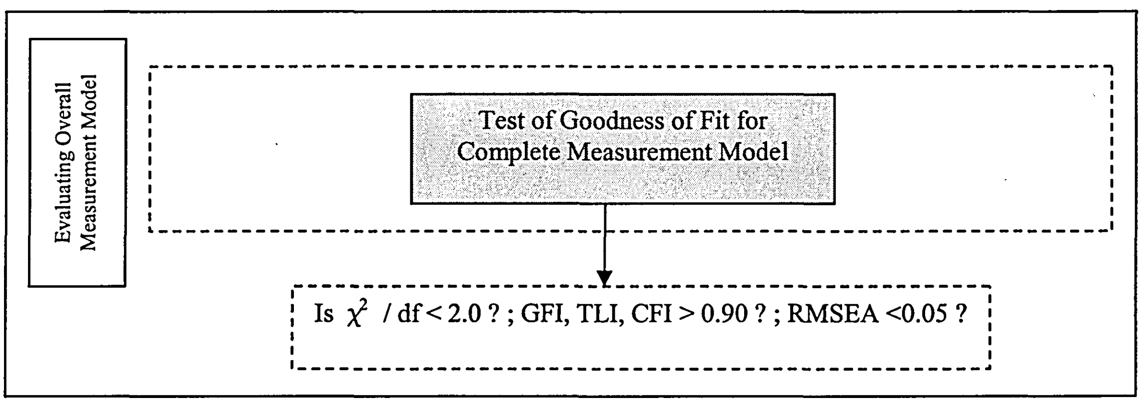


Figure 5.6 Evaluating overall measurement model

The analysis of the proposed EBC measurement model follows a two-step procedure recommended by Anderson and Gerbing (1988). In the first step, confirmatory factor analysis (CFA) was used to develop a measurement model with an acceptable fit to the data (Figure 5.6). Once an acceptable measurement model was developed, the structural model was tested in the second step (next chapter). A measurement model is equivalent to a CFA in which each latent construct is allowed to co-vary with every other latent constructs. The CFA consisted of four second order constructs with twelve first order factors. All of the constructs are permitted to correlate with one another (see Chapter 4.0 for explanations).

Table 5.6 displayed the CFA fit indices for the two samples. The respective Malaysia and UK measurement model fit respectively has a χ^2 value 932.91 and 871.10 with 71 degrees of freedom. The ratio of χ^2 to the degrees of freedom for Malaysia (1.23) and UK (1.14) are well below the recommended maximum ratio of 3:1 (Chin and Todd, 1995). The RSMEA of 0.03, CFI = 0.97, IFI = 0.97 and TLI of 0.97 met the good fit requirements. However, goodness of fit (GFI) and NFI for two samples were marginally acceptable for a good fit suggested by Chin and Todd (1995) and Hair *et al.* (1995). Once reason for this is that the model had a high degree of freedom (761) relative to a sample size of n = 208 (Malaysia), n = 143 (UK), for a relatively small number of parameters (100). Therefore, there was a tendency for GFI to have a downward bias (Chin and Todd, 1995). However, the overall model justified a good fit (Table 5.6).

Goodness of Fit Measures	Malaysia Measurement Model (χ^2 = 932.91, *df* = 761)	UK Measurement Model (χ^2 = 871.10, *df* = 761)
Absolute Fit Measures		
GFI	0.83	0.79
RMSEA	0.03	0.03
Incremental Fit Measures		
NFI	0.86	0.80
IFI	0.97	0.97
TLI	0.97	0.97
CFI	0.97	0.97
Parsimonious Measures		
χ^2/df	1.25	1.14
Note: *df* = degrees of freedom, χ^2 ratio to *df* are 1.25 and 1.14, reflecting good fit since the ratio is < 2.0; Typical Value : GFI, TLI, CFI > 0.90, RMSEA <0.05		

Table 5.6 Fit statistics for the CFA overall measurement model

5.5.2 Components of the Measurement Model

Further tests are conducted to determine the unidimensionality for the components of the measurement model in two stages:

1. Determine if the number of factors and the loadings of measured (indicator) variables on them conform to pre-established theory. The objective is to determine if the items represent the constructs.

2. Inspect the diagnostic indicators (standardised residual) and relationships between indication and latent variable. An acceptable measure of unidimensionality should reveal a relatively small standardised residual (Anderson and Gerbing, 1998).

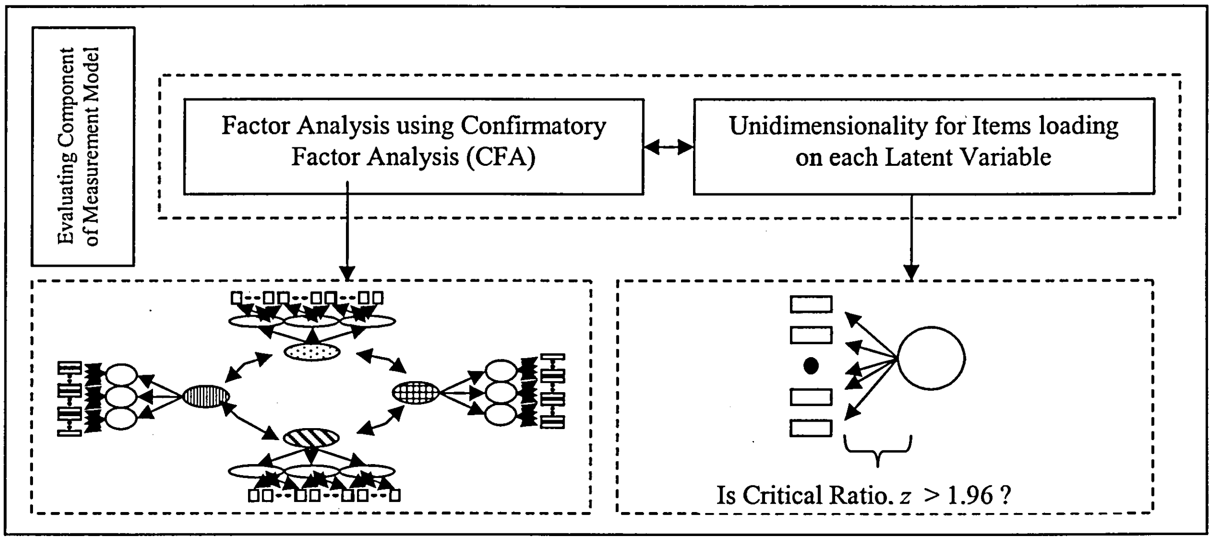


Figure 5.7 Schematic diagrams for evaluating component of measurement model

5.5.2.1 Factor Analysis using CFA

One step of factor analysis is to determine the minimum factor loading necessary to consider a variable as a defining part of that factor. A typical social science practice uses a minimum cut-off of range from 0.30 to 0.35. Norman and Streiner (1994) give a formula for minimum loadings when the sample size, n, is greater than 99 or more:

$$Min\_FL = 5.125 \big/ \sqrt{N-2}$$

Using Norman and Streiner (1994) formula for the Malaysian sample, the minimum factor loading an item should have is:

$$Min\_FL = 5.125 \big/ \sqrt{208-2} = 0.36 .$$

The CFA results (see Appendix 5.1) related to Malaysian respondents. The results demonstrated target loading greater than 0.36 for each item pairing. The target factor loading for items loading on all the first order factors for SCS (0.72 to 0.91), EBA (0.73 to 0.94), BS (0.62 to 0.89) and BP (0.59 to 0.92) were significant at $p < 0.00$).
Similarly, for the UK sample (size = 143), the minimum factor loading an item should have is:

$$Min\_FL = 5.125 / \sqrt{143 - 2} = 0.43$$

The CFA results in Appendix 5.1 were related to UK respondents. The results demonstrated substantial target loadings greater than 0.43 for each item pairing. Also, the target factor loadings subscale for all the first order factors (SCS (0.58 to 0.83), EBA (0.72 to 0.91), BS (0.62 to 0.89) and BP (0.57 to 0.93) were significant at $p < 0.00$.

In summary, all the items factor loadings for both Malaysia and UK data met the minimum target factor loadings. Therefore, these results gave confidence that all the items can be satisfactory loaded onto the first order constructs in the EBC measurement model.

5.5.2.2 Unidimensionality for Scale

In this section, the unidimensionality of scales for each of the measurement models for EBC model constructs had been assessed and confirmed. By using confirmatory factor analysis, it is possible to evaluate the dimensionality of a scale by examining the pattern of its component indication correlations. Critical ratios (*c.r.*) of the measured variables and the constructs are examined to see if the regression weights were significant (i.e., $z > 1.96$ at $p < 0.05$ significance level) (Anderson and Gerbing 1988; Min and Mentzer, 2004).

The test of unidimensionality of the BS scale for both samples with the final estimates of the regression weight, standard error, and the critical ratios are shown in Appendix 5.2. Critical ratios were found to be significant (i.e. > 0.20) for the first (TOP dimensions) and second order factors (EBC factors). Unidimensionality for each of the factor was, therefore, concluded to exist.

All of the items for both samples demonstrated high ($\lambda > 0.60$) and significant ($t > 1.96$) factor loadings (Chin, 1998). As presented in Appendix 5.2, all of the e-business adoption items loaded heavily on first order factor, ranging in between 0.73 to 0.94 for the Malaysia sample, and in between 0.72 to 0.95 for the UK sample indicating a significant contribution towards business performance. This demonstrated unidimensionality of the measure. Appendix 5.2 indicated the items with their factor loadings using Ford *et al.* (1986) criteria only variables with factor loadings > 0.40 were reported.

The SCS scale was examined for unidimensionality through CFA (Appendix 5.2). Critical ratios for regression weights of the items were significant (i.e. >2.00) for the first order and the second order factors. Therefore, unidimensionality for each factor was established for both the UK and Malaysia samples. All factor loadings for the measurement instrument were significant (i.e. t-values are larger than 6.00) for both samples and exceeded the 0.40 standardised level commonly considered appropriate in factor-analytic investigation (Ford *et al.,* 1986).

Unidimensionality of the business performance scale was also established using the final estimates of the regression weights, standards errors and the critical ratios. Arbuckle and Wothke (1999) stated that at significance level of 0.05, any critical ratio that exceeds 1.96 in magnitude should be considered significant. The structural parameter estimates of the overall structural equation modelling (Appendix 5.2) for all parameters (paths) were statistically significant (i.e. critical ratio exceeding 1.96) with *c.r.* ranging from 11.27 to 21.44 for the Malaysian sample and from 8.31 to 15.03 for the UK sample.

5.6 TEST SCALE RELIABILITY

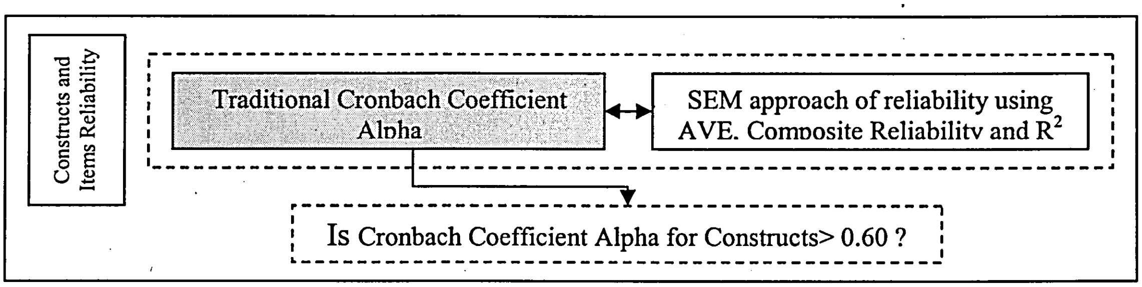


Figure 5.8 Schematic diagram for constructs and item reliability

Once the unidimensionality was established in the previous section, reliability could then be assessed. For a construct to possess construct validity, it must first be unidimensional reliable (Mentzer and Khan, 1995; Peter, 1979).

5.6.1 Overall Reliability for each Factor

In this section, two reliability approaches are conducted to test the scales. The traditional Cronbach coefficient alpha is employed as it is the most commonly used index of scales reliability. In general, scales that receive alpha scores over 0.70 are considered to be reliable (Dunn *et al.*, 1994; Menzter and Flint, 1997; Peter, 1979), however figures as low as 0.50 have been considered acceptable (Sharma, 1996).

Analysis was performed in two separate parts to evaluate the reliability of each construct, based on the Malaysian and UK data. For the Malaysian sample, Cronbach's alpha values of the 12 constructs greatly exceed the minimum requirement (> 0.70) and therefore, the internal consistencies of each group of indicators were deemed high (Table 5.7). For the UK sample, Cronbach's coefficient alpha reliability estimates for the 12 first order constructs of the EBC model were acceptable (all were above 0.75).

1st order Constructs	No of questions	Cronbach Alpha Reliability Coefficient		Standardized item alpha	
		Malaysian Sample	UK Sample	Malaysian Sample	UK Sample
EBA					
1. OC	3	0.93	0.90	0.93	0.90
2. TC	3	0.87	0.85	0.87	0.85
3. AC	3	0.85	0.82	0.85	0.82
BP					
4. FM	4	0.87	0.87	0.88	0.87
5. EM	3	0.75	0.79	0.75	0.79
6. CM	3	0.86	0.87	0.86	0.87
BS					
7. OI	4	0.82	0.81	0.82	0.81
8. PS	3	0.71	0.70	0.71	0.70
9. TI	4	0.88	0.86	0.89	0.87
SCS					
10. OIn	4	0.92	0.82	0.92	0.82
11. TIn	4	0.88	0.82	0.89	0.82
12. SCR	3	0.83	0.76	0.83	0.76

Table 5.7 Reliability analysis results

Standardised item alpha (of the Cronbach's alpha coefficient) of internal consistency are used when all scale items have been standardised. This coefficient is used only when the individual scale items are not scaled the same. Overall, the standardized alphas for the first order constructs had met the Nunnally (1978) as well as the Hair *et al.* (1995) and Loehlin (1998) criterion (Malaysian (0.71 to 0.93) and UK (0.70 to 0.90)) indicating a high internal consistency exceeding the recommended standards (see Table 5.7).These were actually very strong alphas, given the limited small numbers of items in the scales (only three to four items were loaded on each of the first order constructs for e-business capability factors and business performance).

However, several limitations are identified when using coefficient alpha analysis. There is an issue of accuracy of reliability as it tends to underestimate reliability scale (Steenkamp and Trijp, 1991; Bollen, 1989; Hulland *et al.*, 1996; Baumgartner and Homburg, 1996). Coefficient alpha also tends to become artificially inflated if the scale has a large number of items that artificially increase the indicator of reliability (Bollen, 1989).

Although coefficient alpha is widely used as an indicator of scale reliability, it also possesses limitations. For example, traditional reliability theory defined reliability as consistency (Cronbach and Meehl, 1995; Bollen, 1989). Garver and Mentzer (1999) comment that consistency is extremely difficulty to test and operationalise, especially when the specific variance associated with measurement error is considered (Bollen, 1989). Therefore, the next section will utilise the SEM approaches to support reliability results for both samples.

5.6.2 SEM Reliability Measures

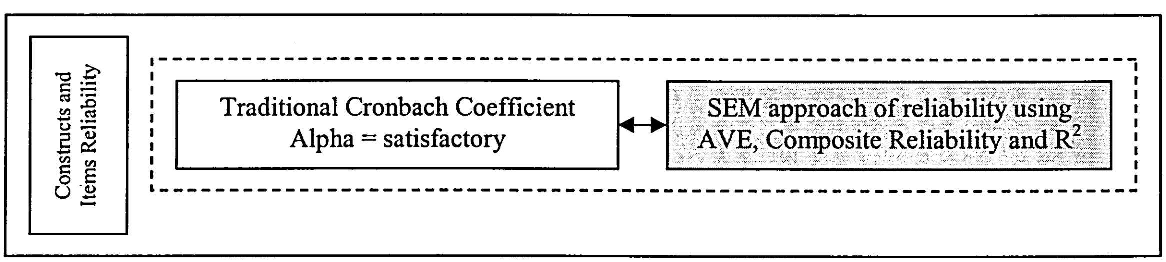


Figure 5.9 Schematic diagram for construct and item reliability

In addition to support reliability and internal consistency of the scales in the EBC measurement model, an alternative approach using SEM reliability was conducted to estimate scale and item reliability, which was designed to overcome limitation associated with coefficient alpha (Steenkamp and Trijp, 1991; Medsker *et al.,* 1994; Bollen, 1989; Joreskog and Sorbom, 1993). These reliability measures are considered in two stages: (a) the first stage determines the SEM item reliability using squared multiple correlation (SMC) and (b) the second stage extracts the SEM scale reliability measures using construct reliability and variance extracted (Figure 5.9).

5.6.2.1 SEM Item Reliability Measure

The squared multiple correlation R^2 value associated with each latent variable-to-item equation measures the reliability of that individual item (Joreskog and Sorbom, 1993). Bollen (1989) states that "a viable alternative is a structural equations approach that has R^2 as a reliable estimate". The most reliable indicator will have the highest R^2.

First order Constructs	**Estimate R^2**		**Factor Type**
	Malaysian Sample (n = 208)	UK Sample (n= 143)	
Supply Chain Strategy (SCS)			**InDeFac**
SCR	0.57	0.58	DeFac
TIn	0.82	0.80	DeFac
OIn	0.87	0.74	DeFac
Business Strategy (SCS)			**InDeFac**
TI	0.81	0.83	DeFac
PS	0.93	0.87	DeFac
OI	0.69	0.83	DeFac
E-Business Adoption (EBA)			**InDeFac**
AC	0.85	0.81	DeFac
TC	0.89	0.90	DeFac
OC	0.88	0.90	DeFac
Business Performance (BP)			**DeFac**
CM	0.82	0.84	DeFac
EM	0.92	0.95	DeFac
FM	0.88	0.89	DeFac
Legend Independent Factor = InDeFac	Dependent Factor = DeFac		

Table 5.8 Squared multiple correlations, R^2 for SEM

Each questionnaire item has a response R^2 that measures the item's variance explained by the factor. High R^2 (close to 1.0 and not less than 0.50) indicate that the items share substantial variance and therefore provide evidence of acceptable reliability. This measure of indicator reliability should be greater than 0.50 for each of the indicators

(Fornell and Larker, 1981). The R^2 for the Malaysian sample range from 0.81 upwards with only one construct, SCR, below with a value of 0.57. As for the UK sample, 10 constructs had R^2 values more than 0.80. Only two constructs had a value less than 0.80 SCR for the UK sample (0.58) and OIn for UK sample (0.74). In summary, the overall R^2 for both samples exhibited a good indication of reliability (Table 5.8).

5.6.2.2 SEM Scale Reliability Measures

SEM technique was used to estimate the construct reliability (CR) (Anderson and Gerbing, 1988; Kerlinger, 1986). Fornell and Bookstein (1982) stated that if CR value is higher than 0.6, it means that construct reliability is good with high internal consistency. A complementary measure of construct reliability is the average variance extracted measure (AVE). The AVE estimates provide a complementary measure to the composite reliability (Fornell and Larcker 1981). This measures the total amount of variance in the indicator accounted for by the latent variable (construct). Composite reliability as well as AVE of the constructs in this study is shown in Appendix 5.3. All of the estimates of AVEs for the Malaysian and UK samples were above 0.50 except for only one value of 0.49. The high values of both estimators provide further evidence of of scales. Fornell and Larcker (1981) stated that if AVE value is higher than 0.50, then the scale has highe distinct validity.

The analysis indicated that the scales were internally consistent and reliable (construct reliability >0.70; average variance extracted >0.50). Only one construct had AVE value of 0.49 (Malaysia: Partnership Strategy). UK sample also demonstrated internal consistency (construct reliability >0.70; average variance extracted >0.50). Therefore, all the construct reliabilities in this study were deemed to be acceptable.

5.7 CONVERGENT AND DISCRIMINANT VALIDITY

Once unidimensionality and scale reliability are realised, the next step is to assess and test the convergent, discriminant and predictive validity using the measurement model in SEM. Convergent validity is tested by determining whether the items in a scale converge or load together on a single construct in the measurement model. Firstly, Widaman's (1985) three comparison tests is used in this study to assess the convergent validity and discriminant validity for both samples (see Appendix 5.4 for complete results).

5.7.1 Method 1: Widaman's Three Model

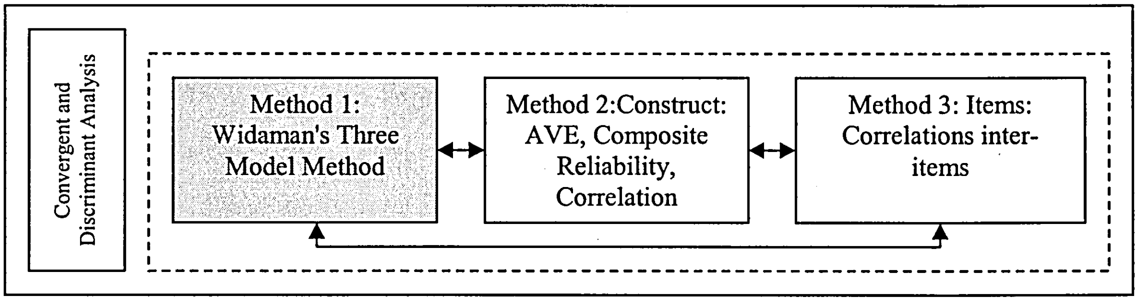


Figure 5.10 Method 1: Widaman's Model method

Widaman's (1985) three model comparison test follows a procedure outlined by Bienstock et *al.* (1997). The three comparison models consist of three models; Model 0, Model 1, and Model 2 (see Appendix 5.4 for details procedures). According to several authors (Bienstock *et al.,* 1997; Mentzer *et al.,* 1999; Widaman, 1985), significant χ^2 statistics in the comparison of Model 0 with Model 1 suggest convergent validity and in the comparison of Model 1 with Model 2 provides evidence of discriminant validity. The comparison result of Model 1 and Model 2 also indicate whether the construct should fit a first order factor or a second order factor.

Table 5.9 gives the convergent and discriminant validity results for the SCS, BS, EBA and BP constructs for the Malaysian sample. Similarly, Table 5.10 gives the convergent and discriminant validity score sore for the SCS, BS, EBA and BP constructs for the UK sample. As shown in Table 5.9, Table 5.10, the comparison of Test Model (comparison model 0-1) provided the convergent validity with χ^2 =1361.73.62 at df = 11 and χ^2 = 504.25 at df =11 for the Malaysian and UK sample. For the SCS construct, the comparison of Test Model 1 with Test Model 2 (comparison model 1-2) provided evidence of discriminant validity (χ^2 =261.03 at df = 3 for the Malaysian and χ^2 = 130.74 at df = 3 for UK the sample). Significant χ^2 results provided by the Widaman (1983)'s method had verified the convergent and discriminant validity: χ^2 = 1089.16 (Malaysia) and 618.86 (UK) at df = 3 (comparison model 0-1) and χ^2 = 430.13 and 269.23 respectively at df = 3 (comparison model 1-2).

Widaman's Model	SCS Construct	BS Construct	EBA Construct	BP Construct
Test Model 0				
χ^2_0	1682.01	1263.43	1537.83	1426.86
DF_0	55	55	36	45
Test Model 1				
χ^2_1	320.28	338.53	448.67	433.76
DF_1	44	44	27	35
Test Model 2				
χ^2_2	59.25	67.26	18.54	23.78
DF_2	41	41	24	32
Comparison Model 0 - 1				
$\chi^2_0 - \chi^2_1$	1361.73	924.91	1089.16	993.1
$DF_0 - DF_1$	11	11	9	10
Comparison Model 1 - 2				
$\chi^2_1 - \chi^2_2$	261.03	271.27	430.13	409.98
$DF_1 - DF_2$	3	3	3	3
Key :				
Test Model 0	Individual measurement items as unique factors in a construct;			
Test Model 1	Individual items loaded on one unique first order factor			
Test Model 2	Individual items loading on one of the appropriate first order factors that, in turn, are loaded on the second order factor (see Appendix 5.4 for illustration)			

Table 5.9 Malaysian sample: convergent and discriminant validity using Widaman's Model (1985)

Widaman's Model	SCS Construct	BS Construct	EBA Construct	BP Construct
Test Model 0				
χ^2_0	708.70	884.34	916.28	1081.73
DF_0	55	55	36	45
Test Model 1				
χ^2_1	204.45	283.32	297.42	360.20
DF_1	44	44	27	35
Test Model 2				
χ^2_2	73.71	72.63	28.19	32.46
DF_2	41	41	24	32
Comparison Model 0 - 1				
$\chi^2_0 - \chi^2_1$	504.25	601.02	618.86	721.53
$DF_0 - DF_1$	11	11	9	10
Comparison Model 1 - 2				
$\chi^2_1 - \chi^2_2$	130.74	210.69	269.23	327.74
$DF_1 - DF_2$	3	3	3	3
Key :				
Test Model 0	Individual measurement items as unique factors in a construct;			
Test Model 1	Individual items loaded on one unique first order factor			
Test Model 2	Individual items loading on one of the appropriate first order factors that, in turn, are loaded on the second order factor (see Appendix 5.4 for illustration)			

Table 5.10 UK sample: convergent and discriminant validity using Widaman's Model (1985)

Similarly for the BP constructs, these score had verified the convergent validity for both samples (Malaysia: χ^2=993.1, df=10 and UK 721.53 at df= 10). Comparison of Test Model 1 with Test Model 2 (comparison model 1-2) provided evidence of discriminant validity: Malaysia: $\chi^2 = 409.98$ and UK: $\chi^2 =$ 327.74 at df= 3 for BP construct.

By using Widaman's (1985) model, each of the second higher factor models is significantly different (via chi-square difference tests), from the previous lower factor model. These results clearly indicate that each of the second order construct solution should broken down into a further three first order factors to best fit the data for the samples.

5.7.2 Method 2: Validity for Constructs using AVE

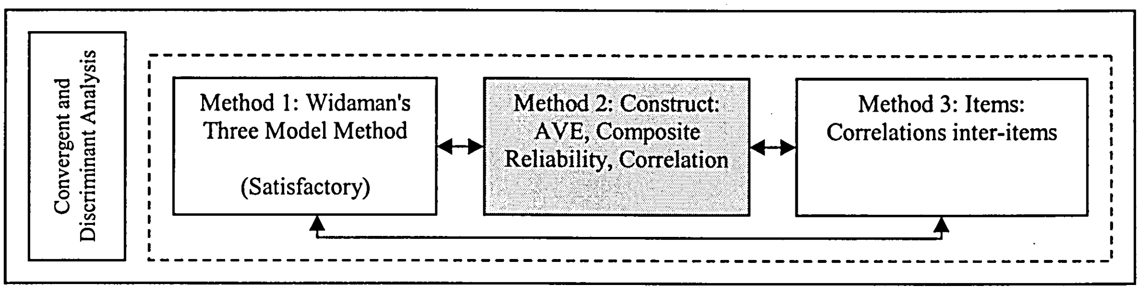


Figure 5.11 Method 2 for AVE, composite reliability, correlations

5.7.2.1 Discriminant Validity for Constructs

Occasionally AVE is used to gauge discriminant validity. A more rigorous test suggested by Fornell and Larcker (1981) can be employed if the squared correlation between constructs (r^2) is less than either of their individual AVEs. In this analysis, the task was to determine if a construct's AVE should be higher than the squared correlation between that construct and any other construct. This conclusion was corroborated by the technique employed to test the discriminant validity, i.e. the findings that the squared correlations between all constructs were significantly less than the corresponding AVE estimations. For example, in the Malaysian sample, the first order construct for business strategy (BS), had a correlation value of 0.46 between PS (BS subscale factor) and EM (BP subscale factor), with corresponding squared AVEs of 0.72 and 0.70, respectively (see arrows in Table 5.11). This showed a strong evidence of discriminant validity with the average combined variance of all of the constructs being greater than the construct's shared variance with every other construct.

The UK sample also displayed good reliability and discriminant validity. For example the first order construct for supply chain strategy (SCS) had a value of 0.43 between OIn (SCS subscale factor) and FM (BP) subscale factor, with corresponding squared AVEs at 0.82 and 0.73, respectively (see arrows in Table 5.12). Therefore, the findings show that the correlations between all latent constructs were significantly less than the corresponding squared AVE estimations for both samples.

5.7.2.2 Convergent Validity for Constructs

Evidence of convergent validity can be obtained by examining the correlation of different instruments designed to measure the same construct. All of the variances extracted for the first order factors of supply chain strategy (SCS), business strategy (BS), e-business adoption (EBA) and business performance (BP) exceed 0.50 cut-off, providing evidence of convergent validity. From previous analysis in Section 5.5.2 (Appendix 5.3), only one variance for Partnership Strategy (PS) had a value of 0.49 for the Malaysian sample, which indicated moderate support for convergent validity. Since the value of 0.49 was no different from 0.50, given the number of comparisons, a single exception was highly likely. As seen in Appendix 5.3, most AVE's were in the range of 0.60 to 0.88.

Discriminant validity is the principle that measures theoretical different constructs that do not correlate highly with each other. Items within each of the constructs at preliminary provide convergent and discriminant validity as they are highly correlated with the same construct while correlated with not the same construct are low (Table 5.11 and Table 5.12). For example for the Malaysian analysis, first order constructs for e-business adoption (EBA) consists of AC, TC and OC were highly correlated with each other with value ranging from 0.86 to 0.88 while having a low correlation with other constructs (e.g. TC : TI = 0.16 and AC : OI = 0.14). At the subscale or factor level for supply chain strategy construct, the "organisation integration (OIn)" and "technological integration (TIn)" subscales revealed the highest correlation value of 0.85 (Malaysian) and 0.77 (UK) (see Table 5.11 and Table 5.12) while other correlations valued at 0.55 and 0.57 for Malaysian and 0.65 and 0.68 for UK samples respectively.

Latent Variable	1	2	3	4	5	6	7	8	9	10	11	12
EBA												
1. AC	*0.93* **0.81**											
2. TC	0.87	*0.87* **0.82**										
3. OC	0.86	0.88	*0.86* **0.90**									
BP												
4. CM	0.26	0.27	0.26	*0.87* **0.83**								
5. EM	0.28	0.28	0.28	0.87	*0.76* **0.72**							
6 FM	0.27	0.28	0.28	0.85	0.90	*0.88* **0.82**						
BS												
7. TI	0.16	0.16	0.16	0.41	0.43	0.42	*0.89* **0.82**					
8. PS	0.17	0.17	0.17	0.44	[0.46]	0.45	0.87	*0.71* **0.70**				
9. OI	0.14	0.15	0.15	0.37	0.40	0.39	0.75	0.80	*0.82* **0.73**			
SCS												
10. SCR	0.13	0.13	0.13	0.32	0.34	0.33	0.18	0.20	0.17	*0.83* **0.78**		
11. TIn	0.19	0.19	0.19	0.48	0.50	0.49	0.28	0.30	0.25	0.55	*0.89* **0.81**	
12. OIn	0.19	0.20	0.20	0.49	0.52	0.51	0.29	0.31	0.26	0.57	0.85	*0.93* **0.87**

Table 5.11 Latent variable statistics (inter correlation between items (off-diagonal terms), composite reliabilities (Italic) and squared average variances extracted (AVE) (bold) (diagonal terms) for the Malaysian sample (n = 208)).

Latent Variable	1	2	3	4	5	6	7	8	9	10	11	12
EBA												
1. AC	*0.90* **0.78**											
2. TC	0.85	*0.85* **0.80**										
3. OC	0.86	0.90	*0.82* **0.87**									
BP												
4. CM	0.31	0.33	0.33	*0.88* **0.84**								
5. EM	0.33	0.35	0.35	0.89	*0.80* **0.76**							
6 FM	0.32	0.34	0.34	0.86	0.92	*0.88* **0.82**						
BS												
7. TI	0.18	0.19	0.19	0.45	0.48	0.47	*0.88* **0.81**					
8. PS	0.19	0.19	0.20	0.47	0.50	0.48	0.85	*0.71* **0.71**				
9. OI	0.18	0.19	0.19	0.46	0.49	0.47	0.83	0.85	*0.81* **0.72**			
SCS												
10. SCR	0.14	0.15	0.15	0.37	0.39	0.38	0.26	0.27	0.26	*0.75* **0.71**		
11. TIn	0.17	0.17	0.17	0.44	0.47	0.45	0.31	0.32	0.31	0.68	*0.83* **0.73**	
12. OIn	0.16	0.17	0.17	0.42	0.45	[0.43]	0.29	0.30	0.30	0.65	0.77	*0.82* **0.73**

Table 5.12 Latent variable statistics (inter correlation between items (off-diagonal terms), composite reliabilities (Italic) and squared average variances extracted (AVE) (bold) (diagonal terms) for the UK sample (n = 143)).

Overall, most items correlated more with their own scales than any other scale with significance of p<0.05. All the above tests confirmed that, the first order constructs provided convergent and discriminant validity, based on the correlation value demonstrated for both samples

5.7.3 Method 3: Convergent Discriminant Validity for Items (Scales)

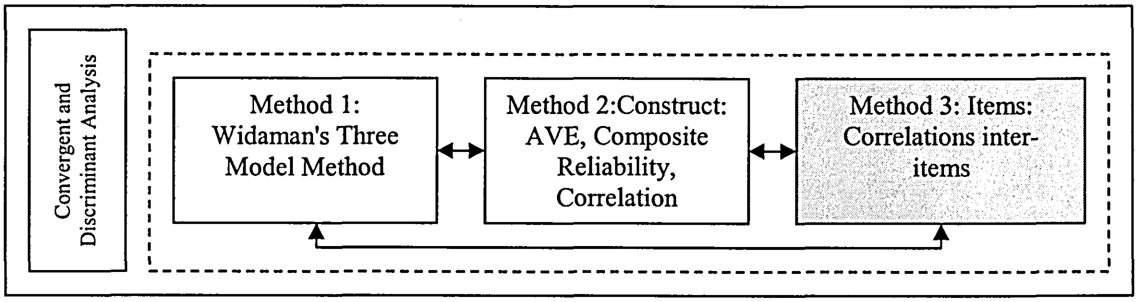


Figure 5.12 Schematic diagram of using Method 3 for accessing correlations inter-items

Method 3 described the need to assess the construct validity for items that loaded onto each of the specific constructs. The procedure for analysing constructs is the same as discussed in the previous Section 5.7.2. In this case items that loaded on the same construct will provide convergent validity if the items were highly inter-correlated, while providing discriminant validity if items do not correlate highly. Results also confirmed that the items that loaded on the first order constructs for supply chain strategy, business strategy, e-business adoption and business performance were highly correlated with each other at $p<0.05$ for both samples (see Appendix 5.5).

EBA Subscale	**AC**			**TC**			**OC**		
Items	1	2	3	4	5	6	7	8	9
1. EBAP_12	**1.00**								
2. EBAP_11	**0.73***	**1.00**							
3. EBAP_9	**0.65***	**0.61***	**1.00**						
4. EBAT_7	0.60	0.56	0.50	**1.00**					
5. EBAT_6	0.66	0.62	0.55	**0.67***	**1.00**				
6. EBAT_5	0.65	0.61	0.54	**0.66***	**0.73***	**1.00**			
7. EBAO_3	0.66	0.62	0.55	0.60	0.66	0.65	**1.00**		
8. EBAO_2	0.68	0.64	0.57	0.62	0.68	0.67	**0.78***	**1.00**	
9. EBAO_1	0.71	0.67	0.59	0.65	0.71	0.70	**0.81***	**0.84***	**1.00**
Note *p < 0.01									

Table 5.13 Inter-correlation scores among items for each subscale of EBA for the Malaysia sample (n=208)

Table 5.13 shows correlation between items for "Organisation Capability" ranging between 0.78 to 0.84 while among other subscales ranging from 0.55 to 0.71 for the Malaysian sample. This indicated that at the item level, correlations among the items designed to measure each subscale of first order constructs revealed a high correlation significant values between the same construct and low values between these item that do not belong to the same construct.

5.8 VALIDATING SECOND ORDER CONSTRUCTS

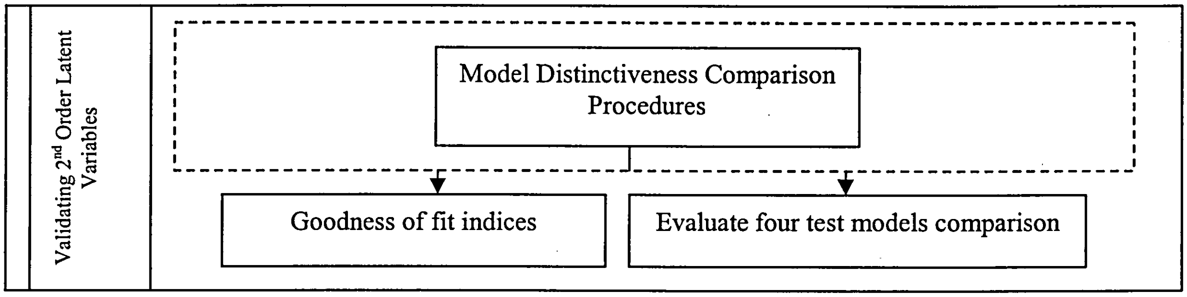


Figure 5.13 Validating 2nd Order Constructs.

In order to test the validity of the four second order constructs (e-business adoption, supply chain strategy, business strategy and business performance), a second order factor analysis was conducted (Hair *et. al,* 1995). Each of the second order factor models consists of three first-order factors. This procedure assessed the measurement model fit along with their standardised coefficients, observable indicators and measurement errors.

The overall fit measure for the respective EBC factors (e-business adoption factor, supply chain strategy factor, business strategy factor) and business performance factor indicated a very good model fit (Table 5.14). The confirmatory factor analysis for these this second order factor constructs for the Malaysian and UK samples revealed an acceptable fit indices. All of the four second order constructs revealed $\chi^2/df < 2.0$, TLI, CFI, GFI, IFI > 0.90, standardised RMR < 0.08, and RMSEA < 0.08.

Overall results suggested that the higher order model accounted for both samples very well. Further evidence was demonstrated by inspecting the correlations between the three constructs for each second order factor, where all the correlations were significant at $p<0.01$ with large positive values, indicating that the four scales converge onto common underlying constructs (Cadogan *et al.,* 1999).

Construct	SCS		BS		EBA		BP	
	M	UK	M	UK	M	UK	M	UK
χ^2/df	1.80	0.14	**0.64**	1.77	**0.77**	1.17	**0.74**	1.01
RMSEA	0.07	0.05	**0.06**	0.07	**0.00**	0.04	**0.00**	0.01
SRMR	0.06	0.03	**0.04**	0.04	**0.02**	0.03	**0.02**	0.03
RFI	0.86	0.95	**0.93**	0.89	**0.98**	1.00	**0.98**	0.96
IFI	0.95	0.95	**0.98**	0.96	**1.00**	0.99	**1.01**	1.00
TLI	0.93	0.99	**0.97**	0.95	**1.01**	1.00	**1.01**	1.00
CFI	0.95	0.98	**0.98**	0.96	**1.00**	1.00	**1.00**	1.00
GFI	0.91	0.99	**0.94**	0.92	**0.98**	0.96	**0.98**	0.96

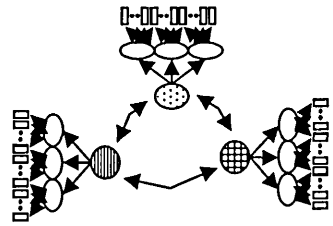
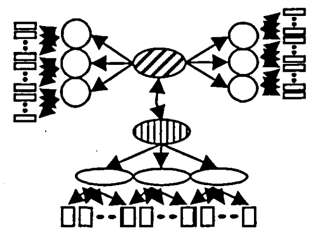
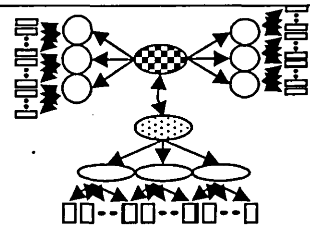
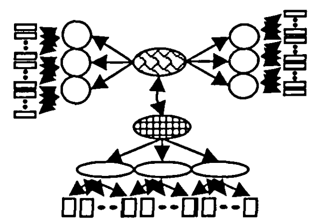
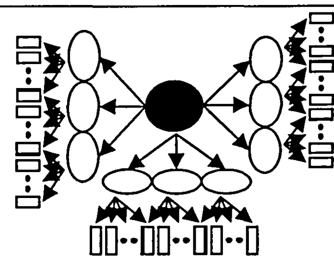
Legend:
M : Malaysian Sample
UK : United Kingdom Sample

Table 5.14 Model fit indices for the 2nd order factors

5.8.1 Distinctiveness of 2nd Order Constructs

As discussed earlier, clearly the correlations between the factors are important. In this section, the main interest is to assess the correlation among the second order constructs namely, supply chain strategy, business strategy, e-business adoption and the correlations of each of these factors with each other in the model. The main assumption here is that these factors are conceptually distinct, however, the question remains whether they are empirically distinct? In this section the relationships among SCS, BS and EBA factors are assessed and examined.

Before hypothesis testing was conducted with the structural equation modelling, a comparison model test was conducted to ensure the independent constructs – SCS, BS and EBA – are in fact closely related but three different concepts. Following a simplified version of the Marsh (1996) method, the relations and uniqueness of these factors were examined. The difference test models and their descriptions are given in Table 5.15 to test the distinctiveness of second order constructs.

Test Models and Description	Schematic representation
Model 0 : Covariance among the items is represented by three second order constructs of e-business adoption, business strategy and supply chain strategy where each construct represent as a distinct component of the EBC model	
Model 1: Covariance among the items is represented by two second order constructs; (1) combination of first order constructs of business strategy and supply chain strategy, (2) e-business adoption where each construct represent as a distinct component of the EBC model	
Model 2: Covariance among the items is represented by two second order constructs; (1) combination of first order constructs of e-business adoption and business strategy, (2) supply chain strategy where each construct represent as a distinct component of the EBC model	
Model 3: Covariance among the items is represented by two second order constructs; (1) combination of first order constructs of supply chain strategy and e-business adoption (2) business strategy where each construct represent as a distinct component of the EBC model	
Model 4: Covariance among the items is represented by one second order constructs combining the first order constructs for supply chain strategy, e-business adoption and business strategy	

Legend:

Supply Chain Strategy (SCS)

Business Strategy (BS)

E-business Adoption (EBA)

Items / Scales

First order factor constructs

EBA + BS

BS + SCS

SCS + EBA

BS + SCS + EBA

Pattern — Second order constructs

Table 5.15 Distinctiveness of 2nd order constructs descriptions

As shown in Table 5.15, five test models were analysed to examine the suitability of second order factors in the model. Model 0 represent correlation among three distinct second order constructs for supply chain strategy, e-business adoption and business strategy. Model 1 to Model 4 with alternative combinative constructs serve as comparison models to Model 0. This is to validate that the proposed model should consists of three distinct second order constructs, that are empirically distinct from each other.

5.8.1.1 Distinctiveness for the Malaysian Measurement Model

1. Using alternative models (Model 1 to Model 4); tests were conducted to determine if the alternative models have a better fit than the original model (Model 0). This procedure revealed that the fit indices for Model 1 to Model 4 did not improve significantly (or worsen) compared to Model 0.

2. In addition, the correlations among the constructs were very high and highly significant in Model 0. It also produced very good fit indices (TLI = 0.97, CFI = 0.97 and χ^2/df = 1.31 (see Table 5.16 and Table 5.17).

Model 0 - Three Distinct Model	χ^2	551.72			
	df	422.00			
	χ^2/df	1.31			
	CFI	0.97			
	TLI	0.97			
Model		Model 1	Model 2	Model 3	Model 4
Fit Indices	χ^2	791.79	967.53	962.79	1198.24
	df	424.00	424.00	424.00	425.00
	χ^2/df	1.87	2.28	2.27	2.82
	CFI	0.92	0.88	0.88	0.83
	TLI	0.91	0.87	0.87	0.81

Table 5.16 Model distinctiveness comparison results for the Malaysian sample (n = 208)

	EBA	BS	SCS
SCS	0.21**		
EBA		0.15*	
BS			0.15**
* $p < 0.05$			
** $p < 0.01$			

Table 5.17 Factor correlations for Model 0 for the Malaysian sample (n = 208)

5.8.1.2 Distinctiveness for the UK Measurement Model

The procedures used to test the distinctiveness for the UK EBC model were similar to Malaysian sample. The objective was to examine the relations and uniqueness of these factors.

1. Using alternative models (Model 1 to Model 4); tests were conducted to determine if the combination alternative models had better fit than the original model (Model 0). These procedures revealed that the fit indices from Model 1 to Model 4 did not improve significant (or worsen) compare to Model 0.

2. In addition, the correlations among the constructs were very high and highly significant in Model 0. The CFA conducted also produced a very good fit indices (TLI = 0.96, CFI = 0.96 and χ^2/df = 1.24 (see Table 5.18 and Table 5.19).

Model A - Three Distinct Model	χ^2	523.21			
	df	422.00			
	χ^2/df	1.24			
	CFI	0.96			
	TLI	0.96			
Model		Model 1	Model 2	Model 3	Model 4
Fit Indices	χ^2	633.13	776.53	780.53	884.18
	df	424.00	424.00	424.00	425.00
	χ^2/df	1.49	1.83	1.84	2.08
	CFI	0.91	0.84	0.85	0.81
	TLI	0.91	0.85	0.84	0.79

Table 5.18 Model distinctiveness comparison results for the UK sample (n = 143)

	EBA	BS	SCS
SCS	0.19*		
EBA		0.19*	
BS			0.2**

* $p < 0.05$

** $p < 0.01$

Table 5.19 Factor correlations for Model 0 for the UK sample (n = 143)

The comparison results showed that Model 0 for both samples exhibited better fit than alternative models. Therefore, it can be concluded that the SCS, BS and EBA concepts are related; however there are three different concepts, based upon the theory and the empirical test.

5.9 SUMMARY

This chapter explained the development of valid and reliable measures of the e-business capability concept. These results had ultimately demonstrated a valid and reliable set of forty-one items/variables to measure the e-business capability factors. This chapter successfully demonstrated the validity of psychometric properties of the instrumentation utilised in this study. The presentations and discussions of statistical analysis for the EBC model instrumentation had demonstrated their overall validity and reliability. The use of sophisticated statistical techniques had contributed to the overall confidence in a newly created measure (e-business adoption) and established instruments (business strategy, supply chain strategy and business performance).The next chapter will perform structural equation modelling (SEM) to investigate the impact of these EBC factors on business performances for both samples by looking into the proposed six main hypotheses and nine sub-hypotheses.

CHAPTER 6

RESULT STUDY 2: THE IMPACT OF EBC FACTORS ON BUSINESS PERFORMANCE

6.1 INTRODUCTION

Following satisfactory results of reliability and validity tests for the E-Business Capability (EBC) measurement model (Chapter 5), this chapter seeks to test the relationships among business strategy, supply chain strategy and e-business adoption and their relative impact on the business performance using structural equation modelling (Research Objective 3).

Firstly, correlations among EBC factors incorporating TOP dimensions are examined based on the confirmatory factor analysis (CFA) of 208 (Malaysia) and 143 (UK) responses. Then, an analysis is conducted to examine the results for the main hypotheses (H1 to H6). Thirdly, structural equation analysis examines the relationships at a higher level measuring the impact of "technological", "organisational" and "people" (TOP) dimensions on the EBC factors. Lastly, corresponding research findings are discussed. Figure 6.1 depicts the flow of Chapter 6.

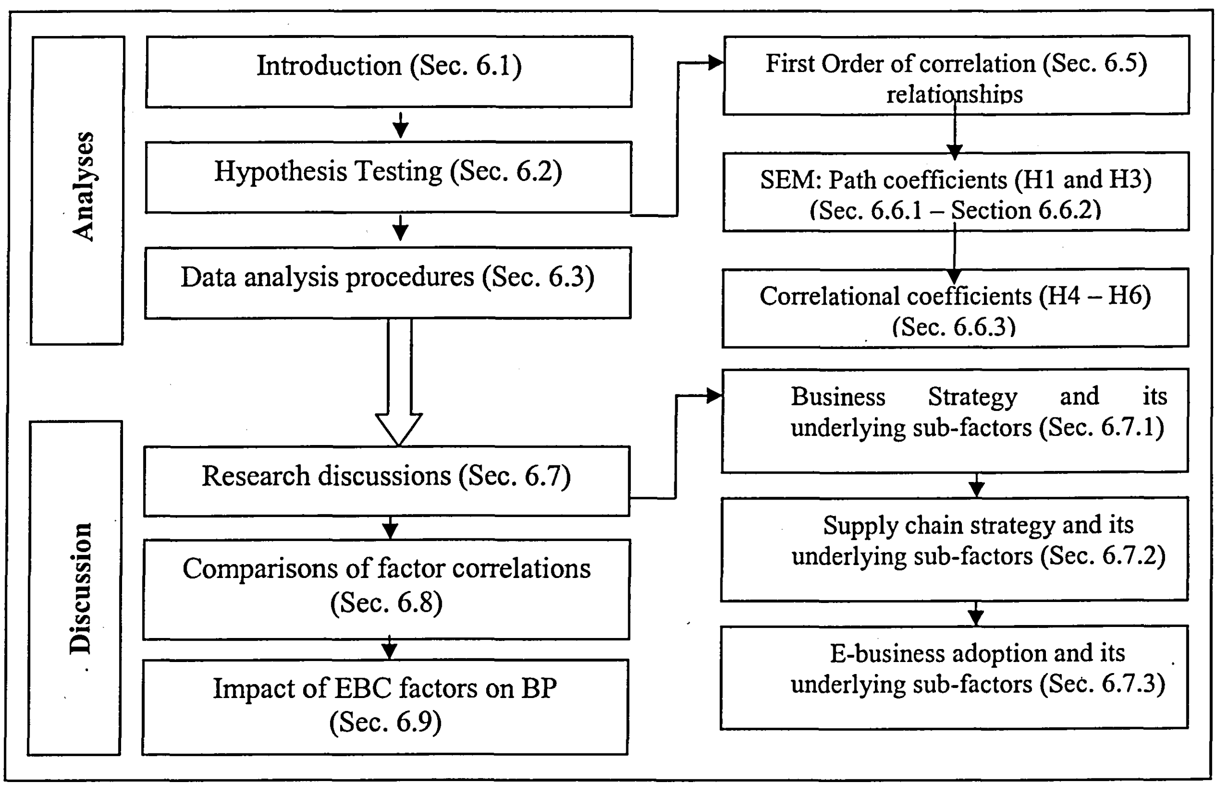


Figure 6.1 Flow chart of Chapter Six

6.2 HYPOTHESIS TESTING

It is posited that EBC factors have a positive impact on business performance and that this relationship between factors is mutually dependent (see Chapter 3 for the discussions of rationality for these predictions). These *'a-priori'* predictions are tested by developing a series of structural equation model that increase in complexity from the first order level to the second order level measurement and structural EBC models. The results endeavour to address the hypothesized reciprocal relationships posed for the e-business capabilities and of factors that impact on business performance:

Hypothesis Testing Assumption

*The **mutual dependent** **relationships** among measures of **Business Strategy** (Technological Infrastructure, Organisation Infrastructure, Partnership Strategy), **Supply Chain Strategy** (Technology Integration, Organisational Integration, Supply Chain Relationship) and **E-Business Adoption** (Technological Capability, Organisational Capability, Attitudinal Capability) will demonstrate a **positive impact** on company's **Business Performance***

6.3 DATA ANALYSIS PROCEDURES

The structural equation modelling (SEM) analysis presented in this chapter is based on two procedures:

(a) Analysis is performed based on the first order factor models (i.e. to the significance of the measured variables (multiple indicators) for a specific scale of first order factors and multiple indicators are a well defined construct).

(b) Upon validation of first order factor models (among TOP dimensions), second order models analysis (among EBC factors) will be performed for structural equation model testing (to determine the extent to which the EBC factors relationships could be explained in terms of the global scores of each construct).

Calculations are performed using SPSS AMOS 4.0 software (Arbuckle, 1999) to ascertain parameters, model fit, and the graphic displays of results. Analyses are performed based on running the proposed theoretical EBC model consisting of three second order factors of e-business capability (namely, supply chain strategy, e-business adoption and business strategy) incorporating "technology", "people" and "organisational" (TOP) dimensions as measured by the EBCQ (E-Business Capability Questionnaire). The model also contains of three first order factors of business performance that measure financial, efficiency and coordination performance.

The rational for running first order confirmatory factor analysis as the initial step is to assess the scores (significance) of each factor (latent variable / construct) where the scores consist of multiple indicators (item pairs / variables) that measure each factor. In this section, the model components consist of e-business capability factors and the business performance factor. A first order factor is defined as the measure that occurs when the scores of a combined set of multiple indicators are accounted for. The outcome of analysing first order factors is to determine statistically the contribution and validity of measured variables (multiple indicators) for each specific first order factor. The first order confirmatory factor analysis is based upon all multiple indicators designed to measure each factors, representing the twelve first-order factors (three first orders for each of the three EBC factors and three first-orders for business performance factors, see Figure 6.2).

A second order factor (latent variable / construct) is not directly measured but is a composite of the first order factors that serve as multiple indicators of second order factors. Firstly, the measurement EBC model is theoretically derived and statistically tested. The analysis of second order models will determine the extent of multi-factor relationships that can be explained in terms of the global scores of each construct.

6.4 PROCEDURES FOR CONDUCTING HYPOTHESES TESTING

SEM facilitates the prediction through measurement, path model, and constructs, where a path model or diagram depicts the structural relations between variables that form the model (Kelloway, 1998, p. 34). By using this capability, the section evaluates evidence for the relationships between surveyed company's e-business capability and business performance. The EBC and business performance factors are multi-constructs (factors) so there are multiple indicators of EBC and business performance. The path diagram needs to include all indicators; hence, the resulting path diagram is complex. Detailed explanations of SEM use can be referred to in Chapter 4 (see Figure 6.2).

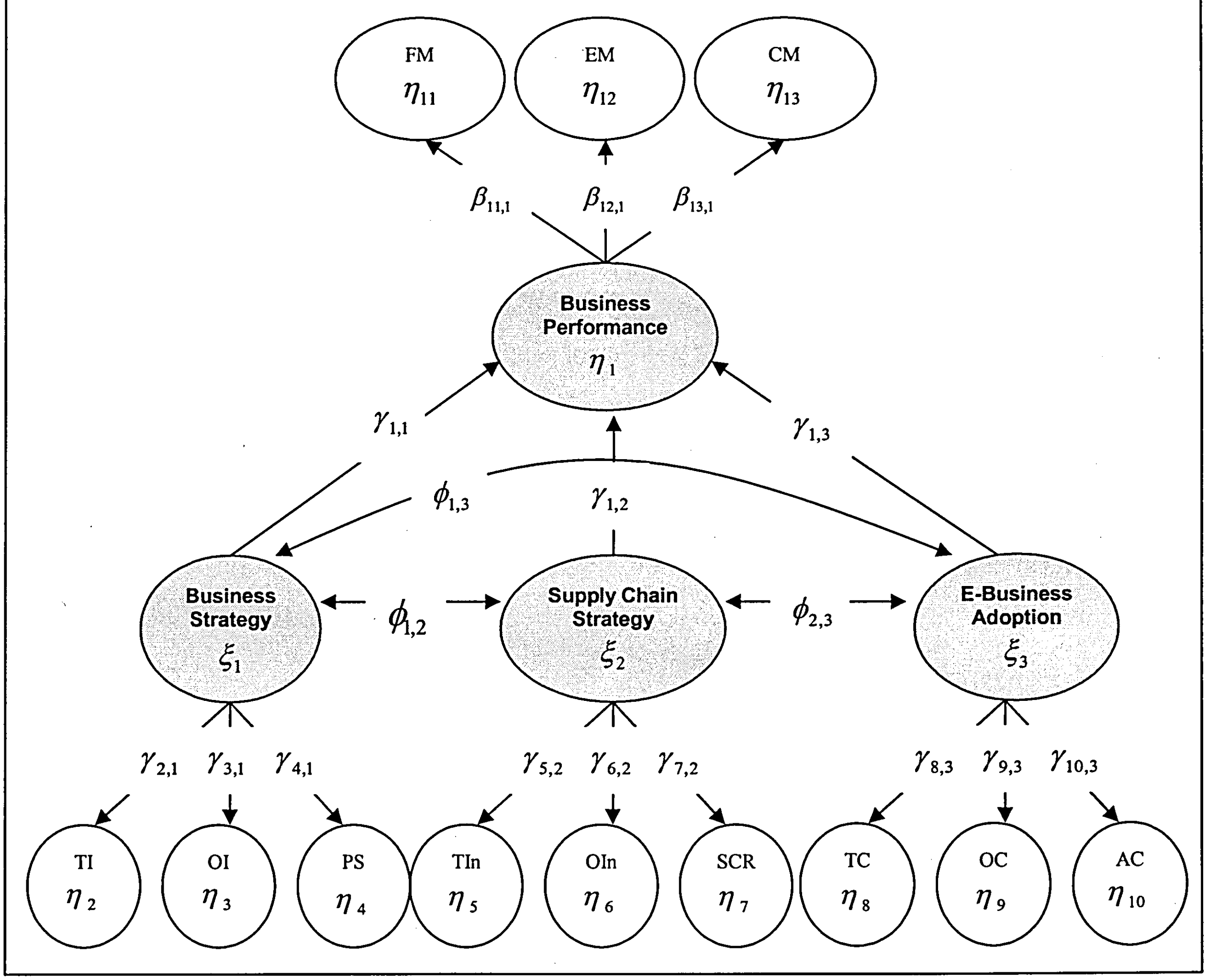


Figure 6.2 SEM symbol representation for the first and second order factors

6.5 FIRST ORDER MODEL CORRELATIONS

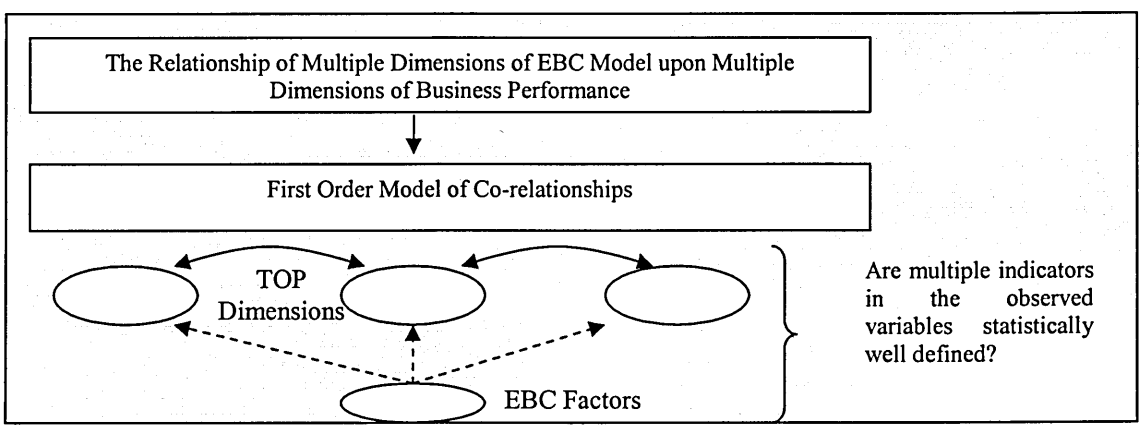


Figure 6.3 First order co-relationships for EBC factors

A first order confirmatory factor analysis for the Malaysian sample (n= 208) of all scales in first and second order factors revealed χ^2 = 838.35; df = 713 with 148 parameters and goodness fit indices of TLI = 0.98, CFI = 0.98, RMSEA = 0.03 indicating a acceptable fit (recommended: TLI; CFI > 0.90 and RMSEA < 0.05). Table 6.1 shows the correlation of coefficients for the first order confirmatory factor analysis of the Malaysian sample. The results of the full factor analysis model can be referred in Appendix 6.1.

Similar to the Malaysian sample procedure, first order confirmatory factor analysis for the UK sample (n = 143) reveal a χ^2 = 803.31, *df* = 713 with 148 parameters and fit indices of TLI = 0.97, CFI = 0.97, and RMSEA = 0.03. This also is a reasonable model fit although sample size for the model fit is smaller. The results of the full factor analysis model (factor loadings) can be referred in Appendix 6.2.

Goodness of Fit Measures	**UK sample (n = 143)**	**Malaysian sample (n = 208)**
	(χ^2 = 803.31, df = 713)	(χ^2 = 838.35; *df* = 713)
CFI	0.97	0.98
RMSEA	0.03	0.03
TLI	0,97	0.98
χ^2/df	1.17	1.17

Table 6.1 The primary goodness of fit statistics

6.5.1 Relations Wwithin-Constructs

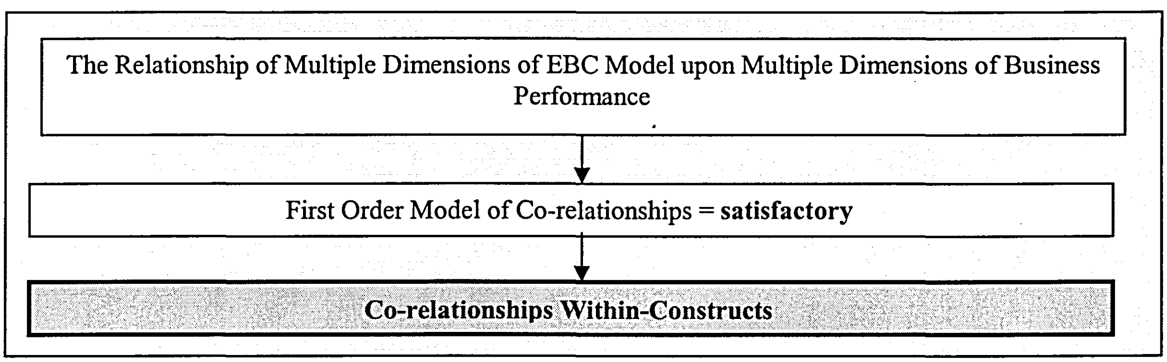


Figure 6.4 First order model co-relationships within constructs

Table 6.2 has demonstrated substantial co-relationships between all of the EBC factors for the Malaysian sample. The first order of EBA construct, "organisation capability" (OC) and "technology capability" (TC) dimension demonstrated a significant relationships at ϕ = 0.88 whereas other within-construct correlations were relatively high (ϕ = 0.86 and 0.87). The correlations within the scales for business performance (BP) and business strategy (BS) also demonstrated high significant correlations greater than 0.70. The within-construct correlations for the construct of supply chain strategy (SCS) were significant (t > 0.20) at the 0.05 level ranging from ϕ = 0.54 to ϕ = 0.85).

Latent Variable	1	2	3	4	5	6	7	8	9	10	11	12
EBA												
1. AC	1.00											
2. TC	0.87	1.00										
3. OC	0.86	0.88	1.00									
BP												
4. EM	0.30	0.31	0.29	1.00								
5. CM	0.27	0.29	0.29	0.84	1.00							
6. FM	0.26	0.25	0.24	0.86	0.91	1.00						
BS												
7. TI	0.22	0.10	0.14	0.50	0.52	0.45	1.00					
8. PS	0.31	0.15	0.16	0.50	0.49	0.39	0.85	1.00				
9. OI	0.20	**0.10**	0.10	0.23	0.35	0.25	0.74	0.84	1.00			
SCS												
10. SCR	0.11	0.12	0.19	0.48	0.50	0.42	0.36	0.27	0.24	1.00		
11. TIn	0.20	0.17	**0.28**	0.45	0.46	0.45	0.29	0.25	0.20	0.55	1.00	
12. OIn	0.13	0.12	0.23	0.53	0.55	0.48	0.28	0.32	0.23	0.54	0.85	1.00

Note: All factor correlations are statistically significant (p <0 .05).

SCS	Supply Chain Strategy				
EBA	E-Business Adoption	BP	Business Performance	BS	Business Strategy
TI	Technological Infrastructure (IT)	TIn	Technological Integration (ERP, EDI)	TC	Technological Capability
OI	Organisation Infrastructure	OIn	Organisation Integration	OC	Organisational Capability
PS	Partnership Strategy	SCR	Supply Chain Relationship	AC	Attitudinal Capability
FM	Financial Measures	EM	Efficiency Measures	CM	Coordination Measures

Table 6.2 First order correlation coefficient matrix for the Malaysian sample (n = 208)

Table 6.3 illustrates the significant factor correlations for the UK's e-business capability scales and business performance scales. The results revealed a substantial relation between all the EBC constructs with significant correlations at more than 0.60. The pattern of within-construct correlations was consistent across the e-business capability constructs and business performance constructs. For example, correlations within constructs for supply chain strategy construct demonstrated a significance correlation ranged from ϕ = 0.63 to ϕ = 0.78 (TIn and OIn) for the dimensions of SCR.

Latent Variable	1	2	3	4	5	6	7	8	9	10	11	12
EBA												
1. AC	1.00											
2. TC	0.85	1.00										
3. OC	0.86	0.90	1.00									
BP												
4. EM	**0.33**	0.37	0.33	1.00								
5. CM	0.34	0.34	0.33	0.89	1.00							
6. FM	0.30	0.32	0.35	0.86	0.93	1.00						
BS												
7. TI	0.23	0.11	0.15	0.50	0.51	0.49	1.00					
8. PS	**0.39**	0.23	0.27	**0.59**	0.52	0.47	0.83	1.00				
9. OI	0.29	**0.09**	0.15	0.40	0.43	0.40	0.84	0.87	1.00			
SCS												
10. SCR	0.03	0.03	0.06	0.38	0.45	0.32	0.32	0.24	0.31	1.00		
11. TIn	0.09	0.18	0.16	0.38	0.46	0.41	0.34	0.30	0.35	0.69	1.00	
12. OIn	0.19	0.24	0.31	0.50	0.48	0.47	0.21	0.33	0.27	0.63	0.78	1.00

Note: All factor correlations are statistically significant ($p < 0.05$).

SCS	Supply Chain Strategy				
EBA	E-Business Adoption	BP	Business Performance	BS	Business Strategy
TI	Technological Infrastructure (IT)	TIn	Technological Integration (ERP, EDI)	TC	Technological Capability
OI	Organisation Infrastructure	OIn	Organisation Integration	OC	Organisational Capability
PS	Partnership Strategy	SCR	Supply Chain Relationship	AC	Attitudinal Capability
FM	Financial Measures	EM	Efficiency Measures	CM	Coordination Measures

Table 6.3 First order correlation coefficient matrix for the UK sample (n = 143)

6.5.2 Relations Between-Constructs

The Relationship of Multiple Dimensions of EBC Model upon Multiple Dimensions of Business Performance

↓

First Order Model of Correlational Relationships = **satisfactory**

↓

Co-relationships Within-Constructs = **satisfactory**

↓

Co-relationships between -Constructs

Figure 6.5 First order model of co-relationship between constructs

Table 6.2 has demonstrated a strong significant correlation existed among the dimensions of FM, CM and EM (business performance construct) to all e-business capability constructs. Results also demonstrated a weak positive relationships among three of the EBC factors (ranging from $\phi = 0.10$ for OI and TC to $\phi = 0.28$ for TIn and OC; See Table 6.2 bold and dotted box) indicated that these were three distinct factors but were closely related to each other because of the significant correlations.

The UK sample also demonstrated significant relationships between the EBC factors and the business performance (BP) factors. For example, correlations for first order constructs between EBA and BS ranging from ϕ = 0.09 to ϕ = 0.39 indicated that they were weak but significant correlations (see Table 6.3 dotted box line). This result also indicated that the three e-business capability factors were distinct but were closely related to each other because of the significant correlations.

6.5.3 The Relationship of Business Performance to EBC factors

The Malaysian's EBC factors had demonstrated a positive and significant relationships with the business performance (see Table 6.2). For example, "Efficiency Measure" (EM) of BP had demonstrated a positive and significant correlation with all factors of EBC (ranging from ϕ = 0.23 for OI to ϕ = 0.50 for PS and TI; shading box) demonstrating a relationship between E-Business Capability factors and multiple dimensions of their business performance (See Table 6.2 shading box).

The UK's e-business capability scales also revealed a high number of scales significantly correlated with the business performance scale (see Table 6.3). The first order construct for e-business adoption, business strategy and supply chain strategy revealed significant correlation scores with the three first order constructs for business performance (EM, CM and FM) ranging from ϕ = 0.33 (EM ←→ AC) to ϕ = 0.59 (PS ←→ EM) (see bold font at Table 6.3).

Given that the results revealed a strong correlation of e-business capability factors to business performance, these results provided a good support for the interpretation that company's EBC factors were significantly related to company's business performance for the both surveyed samples.

6.6 EVALUATION OF MAIN HYPOTHESES (H1 TO H6)

6.6.1 Path Coefficients (H1 to H3) Results for the Malaysian Sample

An analysis of the direct impact of EBC factors (known as second order factors) (including path coefficients) on business performance for the Malaysian company's (n = 208), revealed a χ^2 of 932.91, *df* = 761 with 100 parameters and fit indices of TLI = 0.97, CFI = 0.97 RMSEA = 0.03 (Table 6.4). This model fit indices fall in an acceptable range (> 0.90) and the RMSEA was less than 0.05. This structural model was nested within the first order model; in that it had been generated by imposing restrictions on, the parameters of the first order model (see Table 6.4).

A comparison of the second order model with the previous first-order model revealed that this model was as good fit as to the data (TLI of 0.97 and RMSEA of 0.03 versus TLI of 0.98 and RMSEA of 0.03 for first-order). The second-order model suggesting (via the lower model fit) that the relationships among the e-business capability factors and business performances could be fully explained in terms of these higher-order factors. This was in supportive of the multidimensionality for these EBC constructs. The second order model however, offers greater parsimony in that a greater number of relations amongst the first-order factors were explained in terms of fewer relations amongst the second-order factors.

GOODNESSOF-FIT MEASURES	Default Model (χ^2 = 932.91, *df* = 761)
Absolute Fit Measures	
CFI	0.97
GFI	0.83
RMSEA	0.03
Incremental Fit Measures	
AGFI	0.81
NFI	0.86
TLI	0.97
Parsimonious Measures	
χ^2/df	1.23

Table 6.4 The primary goodness of fit statistics for the Malaysian sample (n = 208)

The key factor weightings that had contributed to the second-order factors of global e-business capability factors and business performance in this model include "Partnership Strategy" ($\gamma_{4,1}$ = 0.97; $p < 0.05$), "Efficiency Measures" ($\beta_{12,1}$ =0.90; $p < 0.05$), "Technology Capability" ($\gamma_{8,3}$ = 0.94; $p < 0.05$) and "Organisation Integration" ($\gamma_{6,2}$ = 0.93; $p < 0.05$). The global EBC factors presented good standardised regression weights (ranging from $\gamma_{7,2}$ = 0.61 to $\gamma_{9,3}$ = 0.94) for second order factors for e-business adoption, supply chain strategy and business strategy, as do the business performance second order factor at the multiple indicator level (ranging from $\beta_{13,1}$=0.90 to $\beta_{12,1}$ =0.96)(see Table 6.5).

2nd Factor Loadings (Sub-hypotheses)					**Standardised Weight (Standard Error (SE))**	**Critical Ratio (*c.r.*)**
H1a	OI	←	BS	$\gamma_{3,1}$	0.83 (Fixed)	(Fixed)
H1b	TI	←	BS	$\gamma_{2,1}$	0.90 (9.87)	0.11
H1c	PS	←	BS	$\gamma_{4,1}$	0.97 (8.57)	0.12
H2a	TIn	←	SCS	$\gamma_{5,2}$	0.91 (10.93)	0.10
H2b	OIn	←	SCS	$\gamma_{6,2}$	0.93 (Fixed)	(Fixed)
H2c	SCR	←	SCS	$\gamma_{7,2}$	0.61 (7.26)	0.09
H3a	TC	←	EBA	$\gamma_{8,3}$	0.94 (13.89)	0.07
H3b	OC	←	EBA	$\gamma_{9,3}$	0.94 (Fixed)	(Fixed)
H3c	AC	←	EBA	$\gamma_{10,3}$	0.92 (1.27)	0.06
FM	←		BP	$\beta_{11,1}$	0.94 (Fixed)	(Fixed)
CM	←		BP	$\beta_{13,1}$	0.96 (10.26)	0.07
EM	←		BP	$\beta_{12,1}$	0.90 (8.82)	0.08

Table 6.5 Second factor loadings for sub-hypotheses for the Malaysian sample (n = 208)

The dimension of "Supply Chain Relationship" (SCR; $\gamma_{7,2}$ = 0.61) demonstrated a substantially lower factor loading (within supply chain strategy factor and indeed the structural component of this model. Based on the second order factor loadings, the results revealed overall that the e-business capability measures was strongly contributing to the prediction of business performance at the structural (higher-order) level and at the measurement level (see factor loadings in Table 6.5).

Hypotheses					Standardised Weight (*c.r.*)	Standard Error (SE)
Paths Coefficients						
H1	BP	←	BS	$\gamma_{1,1}$	0.32 (4.48)	0.09
H2	BP	←	SCS	$\gamma_{1,2}$	0.44 (5.89)	0.08
H3	BP	←	EBA	$\gamma_{1,3}$	0.15 (2.46)	0.04
Factor Correlations						
H4	BS	←→	SCS	$\phi_{1,2}$	0.34 (3.82)	0.04
H5	SCS	←→	EBA	$\phi_{2,3}$	0.22 (2.81)	0.07
H6	BS	←→	EBA	$\phi_{1,3}$	0.19 (2.35)	0.06

Table 6.6 Regression weights for hypotheses H1 to H6 for the Malaysian sample (n = 208)

Table 6.6 indicates the main hypotheses results for the Malaysian sample. The path coefficients of interest in this model were generated between the independent factors (ξ , exogenous) of e-business capabilities and the dependent factor of business performance (η , endogenous). Interestingly, the results suggested that the global construct of company's supply chain strategy (H2; $\gamma_{1,2}$ = 0.44; *c.r.* = 5.89) was the strongest stronger predictor of business performance followed by the global construct of business strategy (H1; $\gamma_{1,1}$ = 0.32; *c.r.* = 4.48) and e-business adoption construct (H3; $\gamma_{1,3}$ = 0.15; *c.r.* = 2.46) (see Table 6.6).

The positive and significant path coefficients value obtained from supply chain strategy construct (H2) and business strategy construct (H1) to company's business performance construct suggested that the relation between e-business capability factors and business performance may be considerably stronger than the relationship between e-business adoption construct (H3) and business performance although it was clear that the constructs were of relevance to success of e-business.

6.6.2 Path Coefficients (H1 to H3) Results for the UK sample

An analysis of the direct effects of e-business capabilities factors (higher order factors) (including path coefficients) on business performance for UK company's (n = 143), revealed a χ^2 of 871.10, *df* = 761 with 100 parameters and fit indices of TLI = 0.97, CFI = 0.97 RMSEA = 0.03. This model fit indices fall in the acceptable range (> 0.90) and the RMSEA < 0.05 (Table 6.7).

Similar to the Malaysian analysis, a comparison of the second order model with the previous first-order model for UK data revealed that this model was a good fit to the data (TLI of 0.97 and RMSEA of 0.03 versus TLI of 0.97 and RMSEA of 0.03 for first-order). The second-order model for this data also suggested (via the lower model fit) that the relations among the constructs of company's e-business capability factors and business performances could be fully explained in terms of these higher-order factors.

Goodness Fit Measures	Default Model (χ^2 = 871.10, *df* = 761)
Absolute Fit Measures	
CFI	0.97
GFI	0.79
RMSEA	0.03
Incremental Fit Measures	
AGFI	0.76
NFI	0.80
TLI	0.97
Parsimonious Measures	
χ^2/df	1.14

Table 6.7 The primary goodness of fit statistics for the UK sample (n = 143)

Table 6.8 summarises the key factor weightings that had contributed to the second-order factors of global e-business capability factors and global business performance in this model include "Coordination Measures" ($\beta_{13,1} = 0.91; p < 0.05$), "Partnership Strategy" ($\gamma_{4,1}$ =0.93; $p < 0.05$), "Technology Adoption" ($\gamma_{8,3} = 0.95$; $p < 0.05$) and "Organisation Capability" ($\gamma_{9,3} = 0.95; p < 0.05$). For the global e-business capability factors scales presented good standardised regression weights ranging from ($\gamma_{7,2}$ = 0.76 to $\gamma_{8,3}$ = 0.95, significant at *c.r.* > 1.96) for second order factors (sub-hypotheses) for e-business adoption, supply chain strategy and business strategy, as do the business performance second order factor at the multiple indicator level ranging from ($\beta_{12,1} = 0.91$ to $\beta_{13,1} = 0.98$, significant at *c.r.* > 1.96).

2nd Factor Loadings					**Standardised Weight, Standard Error (SE)**	**Critical Ratio (*c.r.*)**
H1a	OI	←	BS	$\gamma_{3,1}$	0.91 (Fixed)	(Fixed)
H1b	TI	←	BS	$\gamma_{2,1}$	0.91 (9.45)	0.10
H1c	PS	←	BS	$\gamma_{4,1}$	0.93 (8.38)	0.12
H2a	TIn	←	SCS	$\gamma_{5,2}$	0.90 (6.82)	0.15
H2b	OIn	←	SCS	$\gamma_{6,2}$	0.86 (Fixed)	(Fixed)
H2c	SCR	←	SCS	$\gamma_{7,2}$	0.76 (5.53)	0.11
H3a	TC	←	EBA	$\gamma_{8,3}$	0.95 (11.06)	0.09
H3b	OC	←	EBA	$\gamma_{9,3}$	0.95 (Fixed)	(Fixed)
H3c	AC	←	EBA	$\gamma_{10,3}$	0.90 (8.68)	0.08
FM	←		BP	$\beta_{11,1}$	0.94 (Fixed)	(Fixed)
CM	←		BP	$\beta_{13,1}$	0.91 (8.73)	0.09
EM	←		BP	$\beta_{12,1}$	0.98 (7.14)	0.10

Table 6.8 Second factor loadings for sub-hypotheses for the UK sample (n = 143)

It is also of interest to investigate the regression weight of path coefficients for the UK's EBC model that generated between the independent variables (ξ, exogenous) of EBC factors and the dependent factor of business performance (η , endogenous). Interestingly, in comparison with the Malaysian structural model result, UK structural model suggested that the global construct of company's business strategy (H1; $\gamma_{1,1}$ = 0.37; *c.r.* = 4.19) was the strongest stronger predictor of business performance followed by the global construct of supply chain strategy (H2; $\gamma_{1,2}$ = 0.35; *c.r.* = 3.79) and e-business adoption construct (H3; $\gamma_{1,3}$ = 0.22; *c.r.* = 2.95) (see Table 6.9).

Hypotheses					Standardised Weight, Critical Ratio (*c.r.*)	Standard Error (SE)
Paths Coefficients						
H1	BP	←	BS	$\gamma_{1,1}$	0.37 (4.19)	0.10
H2	BP	←	SCS	$\gamma_{1,2}$	0.35 (3.79)	0.09
H3	BP	←	EBA	$\gamma_{1,3}$	0.22 (2.95)	0.05
Factor Correlations						
H4	BS	←→	SCS	$\phi_{1,2}$	0.38 (3.37)	0.06
H5	SCS	←→	EBA	$\phi_{2,3}$	0.21 (2.03)	0.10
H6	BS	←→	EBA	$\phi_{1,3}$	0.22 (2.26)	0.08

Table 6.9 Regression weights for hypotheses H1 to H6 for the UK sample (n = 143)

The strong standardised value of path coefficients from company's supply chain strategy (H2) and business strategy (H1) to company's' business performance suggest that the relationships between EBC factors and business performance may be considerably stronger than the relationship between e-business adoption construct and business performance although it is clear that both constructs were of relevance to the success of e-business. Another interpretation is that both of the first order level the dimensions of business performance were well defined (at the measurement level) and at the higher level (the structural level) these same dimensions were also correctly defined for the UK sample and consequently led to a good model fit.

6.6.3 Correlational (H4 to H6) Results for Both Samples

Typically, in SEM, exogenous constructs (independent factors) are allowed to co-vary freely. Parameters labelled with the Greek character "phi" (ϕ) represent these covariances. The correlational paths are also of key interest when running this model. *Phi* weights of the parameter estimates are generated among the independent variables (latent variable) of e-business capability factors. For example, results suggested between correlation between supply chain strategy and business strategy had the highest *phi* value of $\phi_{1,2}$ = 0.34 at significant value of t >1.96 for the Malaysian sample (see Table 6.9).

The next strong correlations displayed was between supply chain strategy and e-business adoption and followed by business strategy and e-business adoption with $\phi_{2,3}$ = 0.22 (*c.r.* = 2.81) and $\phi_{1,3}$ = 0.19 (*c.r.* = 2.35). The strongest correlation was between supply chain strategy and business strategy which confirmed that companies in Malaysia regardless of which sectors they belongs to still treated both of these factors as a important driver for improvement of business performance by treating equally important and they complement each other when a strategy had been formulated.

Table 6.10 suggests that the strongest correlation was between supply chain strategy and business strategy (H4) of $\phi_{1,2}$ = 0.38 at *c.r.* = 3.37 for the UK sample. Correlation between business strategy and e-business adoption (H6; $\phi_{1,3}$ = 0.22; *c.r.* = 2.26) was the second relatively strongest followed by supply chain strategy and e-business adoption (H5; $\phi_{2,3}$ = 0.21; *c.r.* = 2.03). In comparison with Malaysian data, UK data also had relatively the strongest value of correlation between supply chain strategy and business strategy, which validated that regardless of geographical area, both factors were important drivers for improvement of business performance. Figure 6.6 displays the parameter estimates for both samples.

Correlational coefficients					Malaysian sample	UK sample
H4	BS	←→	SCS	$\phi_{1,2}$	0.34	0.38
H5	SCS	←→	EBA	$\phi_{2,3}$	0.22	0.21
H6	BS	←→	EBA	$\phi_{1,3}$	0.19	0.22

Table 6.10 A comparison of correlation constructs for both samples.

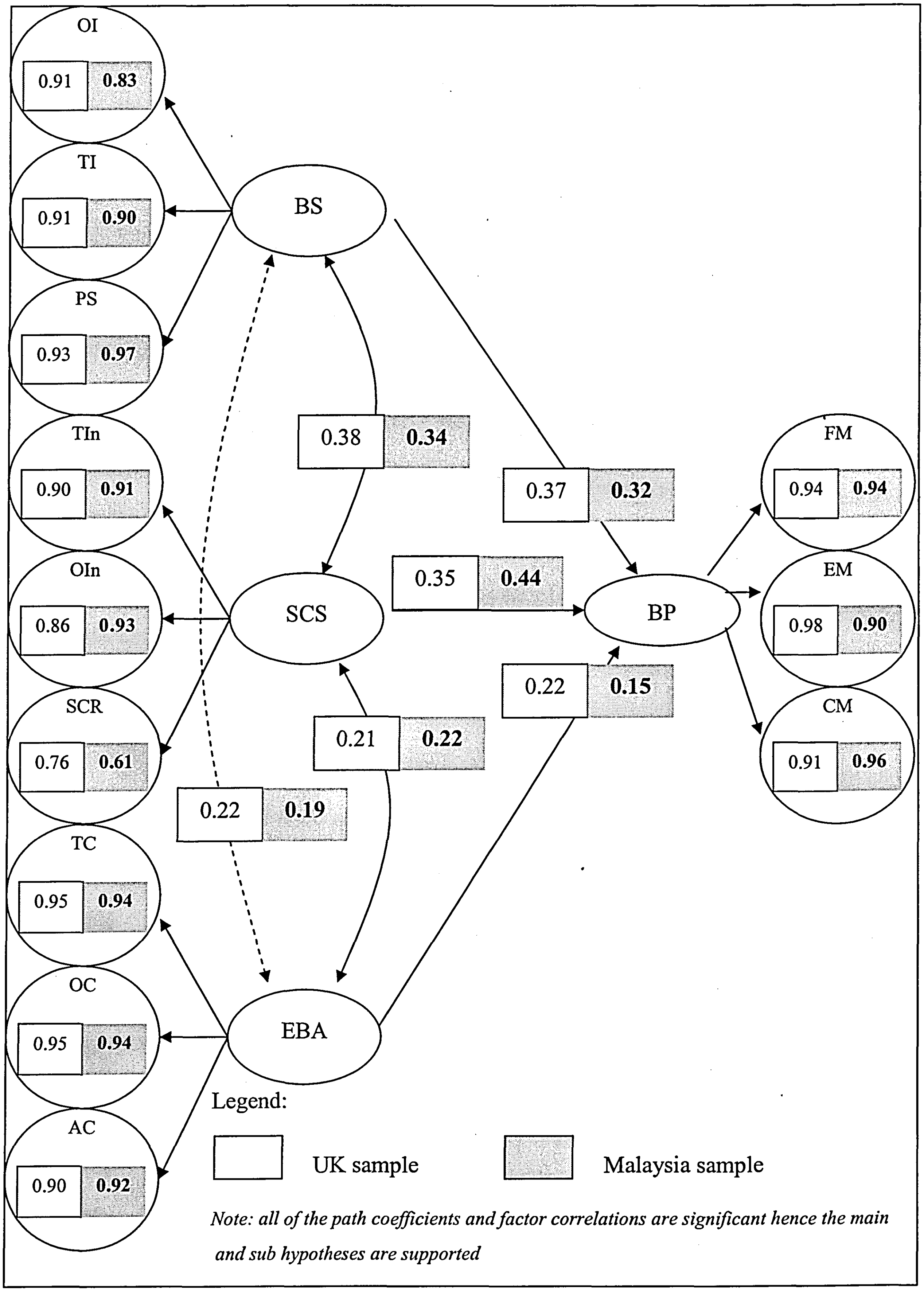


Figure 6.6 Standardised estimates for main and sub-hypotheses for UK (n =143) and Malaysian (n = 208) samples

6.7 RESEARCH FINDINGS AND DISCUSSIONS

Section 6.1 to Section 6.6 provided the SEM analysis for the proposed e-business capability factors embedded with "technological", "organisational" and "people". The section below extends these analyses in the context of hypotheses formulations.

6.7.1 Hypothesis 1: Business Strategy vs. Business Performance

Hypothesis H1 examined the effect of appropriate implementation of business strategy on successful of e-business adoption. Specifically, the hypothesis suggests that the effective implementation of business strategy with embedded "technology", "organisation", and "people" dimensions is positively associated with e-business success. Both quantitative results from the UK ($\gamma_{1,1} = 0.37$; *c.r.* = 4.19) and Malaysian samples ($\gamma_{1,1} = 0.32$; *c.r.* = 4.48) supported this result at a significance level of 0.01. Business strategy factor has the strongest impact on the respondents' business performance within the UK sample (see Table 6.9) and places second strongest impact on the Malaysian companies' (see Table 6.6) business performance. Nevertheless, this hypothesis supported the statement that it is imperative to formulate a comprehensive Internet strategy in today's highly competitive and global marketplace for companies from both countries. In order to maintain sustainability in e-business strategy success, it is important to have not only an Internet related business in the business operation but also those have the capability to improve their service level across upstream and downstream formulating a sustainable business strategy that utilises the Web for competitive advantage (Anton, 2002).

This result also confirms that sample from the developed and developing countries has implemented a systematic approached with emphasis on strategic business strategy when considering e-business initiatives. Organisations acknowledge the need to have an effective e-business strategy as a result from customer's expectation and competitive pressures (Czuchry, 2001). This is supported by Macaluso (2000)'s statement that companies that are in hurry to join the Internet's highly competitive environment without any proper planning and formulation of strategy and business model will have a higher probability of failure. In addition, companies especially in Malaysia where business uncertainty and business challenges are high during e-business adoption phase, companies need to ensure that the goal of management is to direct their resources with the intention of achieving the company's goals in an effective and efficient manner (Griffin, 1999, p. 34). This effectiveness will ensure that the Malaysian as well as UK companies will be able to avoid poor designed of prototype business strategy that will not meet the criteria of good management (Murray, 2001).

Based on the research findings, it is suggested that firms that are able to acknowledge the importance of "technological", "organisational" and "people" as an opportunity to create competitive advantage will concentrate on future strategies than current strategies. Based on these findings, it can be argued that firms that responded to this study are able to emphasise their future opportunities relative to current strategies. Both surveyed samples are able to critically review their current technology options and actively monitor new technologies to assess new technologies that may advance or hinder the achievement of their objectives for the success of e-business adoption, which will result in increasing business performance.

Underlying hypothesis of H1 consists of three sub-hypotheses that related and impact the overall performance of business strategy are "H1a: organisational infrastructure", "H1b: technological infrastructure" and H1c: partnership strategy". The following sub-sections discuss these factors separately and where appropriate, link them to previous literature in this study.

6.7.1.1 Sub-hypothesis H1a: Organisational Infrastructure vs. Business Strategy

Sub-hypothesis H1a examined the effect of organisational infrastructures on implementation of business strategy. Specifically, the hypothesis suggests that the organisational infrastructure embedded in the business strategy would have a positive impact on business performance when e-business is implemented successfully. The survey results showed that organisation infrastructure sub-factor has a positive and significant impact across industry sectors from in the context of developed (UK; $\gamma_{3,1} = 0.91$) and developing (Malaysia: $\gamma_{3,1} = 0.83$) countries on the success of e-business. Questions constructed in this sub-factor supported the findings that samples from both countries are able to deviate from existing practices in creating new products or processes, which are in line with previous research (Deshpandé *et al.,* 1993).

Organisational infrastructure examined the organisation's ability to develop innovations including new products and services, and is measured in this study using a six-point scale wherein one items pertain to capabilities for market entry in product-markets with the questions of "articulate the value proposition, that is, the value created for users by the offering based on the technology" (BSO_1: Malaysia: 0.83; UK: 0.86; see Appendix 4.2). In one of the research questions, respondents were asked to the extent their companies are able to "estimate the cost structure and profit potential of producing the offering, given the value proposition and value chain structure chosen" (BSO_2: Malaysia: 0.71; UK: 0.59; see Appendix 4.2). Results had indicated that organisations are more likely to invest resource to adopt new technologies such as Internet technology if they are more aware of technological developments and opportunities has with sensible cost structure and profit margin. In addition, significant and positive impact of strategic implementation of "organisational infrastructure" on business strategy indicate that management within the organisation in both samples would perceive a strategic issue as an opportunity (value proposition, cost structure, profit) as positive outcome as opposed as a thereat which will result of better control over the outcomes (Dutton and Jackson, 1987). As a result, firms would need to undertake proactive actions to ensure e-business success with consideration of organisation infrastructure dimension.

Within this dimension, respondents were also asked on the extent that their organisation "is able to restructure the organisational and behavioural drivers such as compensation and budgets to ensure departmental alignment and follow through" (BSO_3: Malaysia: 0.62 UK: 0.60; see Appendix 4.2). The result indicates that respondents are able to demonstrate "the pattern of shared values and beliefs that help individuals understand organisational functioning and provide norms for behaviour in the organisation" (Qui,n, 1988, p. 112). When implementing a new strategy or changes within an organisation for the purposes of e-business, this strategic implementation sub factor will serves as an important predictor of organisational capabilities and outcomes, such as customer orientation (Deshpandé *et al.,* 1993) and new-product development (Moorman, 1995). Consistent with these perspectives, these research findings indicated that organisation that intend to initiative an e-business operation (either in developed or developing country context) acknowledged the ability to "detect" and "response" to technologically opportunistic (Internet technology).

6.7.1.2 Sub-hypothesis H1b: Technological Infrastructure vs. Business Strategy

Sub-hypothesis H1b examined the effect of strategic implementation of technology infrastructure on business strategy. Specifically, the hypothesis suggests that improving the approach to execute technological infrastructure embedded in business strategy, will indirectly improve the business performance. Both samples from quantitative analysis supported this hypothesis at significant level of 0.01 (UK: $\gamma_{2,1} = 0.91$; Malaysia: $\gamma_{2,1} = 0.90$) which confirms that effective implementation of strategic technology sensing and responses within and around the business environment has positive impact on the success of business strategy implementation within the UK and Malaysia companies.

Result also revealed a strong standardised estimate that asked respondents to the extent the organisation is able to "sense and response to the Web based opportunities to create unique customers knowledge and customer relationships" (BST_12: Malaysia: 0.87 UK: 0.92; see Appendix 4.2). High-standardised factor loading indicates the ability of responded companies to be perceived as the ability to continually scan for information about potential technological opportunities and threats (Daft and Weick, 1984) and the ability to respond to technological changes in its environment (Wade and Hulland, 2004). For example, it can be argued that both surveyed samples indicate the organisation's ability to sense and respond to external technology developments (acquire knowledge about, and understand technological developments) in its business environment.

Hence, utilising the Internet technology may be sources of competitive advantage to a firm that is able to adopt it successfully because without proper consideration and adoption of Internet technology, the firm will be deemed to failure (Lee and Tsai, 2005; Sahay *et al.,* 2004). Berman and Hagan (2006) which state that companies that are conscious of changes in their environment are more likely to create enough momentum to change and adapt to new technology to create competitive advantages and compete globally support this. Quantitative results had indicated a relatively strong influence of this variable ("able to create a powerful set of new core operations capabilities in company's core business processes"; BST_13: Malaysia: 0.88; UK: 0.81; see Appendix 4.2) to technological infrastructure dimension.

Based on these findings, positive impact of business strategy may be due to the ability of the UK and Malaysian businesses to positioning themselves strategically in alternative technologies to guard against technological lockout (Subramanian and Nosek, 2001). As a result, the dimension of "technological dimension" incorporated in business strategy seek to investigate the ability of firms to sense and respond to external technology developments (Internet technology) which will have a positive impact on business performance. This research findings are consistent with the previous literature, that show the needs of organisations to have a high level of technological sensing capability to continually examine for information about potential technological opportunities (Internet technology) and threats (Taylor and Murphy, 2004).

6.7.1.3 Sub-hypothesis H1c: Partnership Strategy vs. Business Strategy

Hypothesis H1c examined the impact of business strategy with consideration of "external" factors on e-business success. Specifically, the hypothesis suggests that the better the well defined and identification of partnership strategy (people dimension) incorporated in business strategy; the more likely that e-business will be adopted successfully. Quantitative results for both samples (UK: $\gamma_{4,1}$ = 0.93 and Malaysia $\gamma_{4,1}$ = 0.97) supported these results with highly standardised estimates at significance level of 0.01. The survey results show that companies from the UK and Malaysia are able to successfully execute the "partnership strategy" within business strategy by able to gather market intelligence pertaining to customer needs, dissemination of intelligence among departments, and organisation-wide responsiveness to it (Kaefer and Bendoly, 2004; Porter, 2001). This statement would be in the survey question of "My firm established a program to integrate and facilitate individual customer requirements across our strategic business units".

Within partnership strategy, results also revealed a strong influence of the ability of organisation to "commit in sharing responsibility with suppliers and customers in new product/service development and commercialisation" (BSP_9: Malaysia: 0.69; UK: 0.75; see Appendix 4.2). Based on these findings, both surveyed samples acknowledged the important of an organisational innovativeness and technological orientation is appropriate primarily to the new product development activities of the firm. It is essential to make sure that the organisation is committed to sharing responsibility with customers and suppliers in new product/service development and commercialisation (Lumpkin *et al,*. 2002; Croteau *et al.,* 2001).

Based on the research findings, it can be argued that the participant and support from business partners and customers (external) is requiring undertaking the e-business organisational development (strong impact on the extent of the organisations ability to "actively pursues business relationships and programs designed to achieve customer involvement over and above individual sales transactions" (BSP_8: Malaysia: 0.65; UK: 0.66; see Appendix 4.2). For example, Chen *et al.* (2005) argue that the financial sectors would not be able to implement e-business successfully without the support and participant of their business partners. Empirical findings for this sub-factor is consistent with Fjermestad's (2003) argument that technology vendors, consultants and change agents play a significant role in convincing potential adopter about potential benefits of e-business adoption.

6.7.2 Hypothesis 2: Supply Chain Strategy vs. Business Performance

Hypothesis H2 examined the effect of strategic implementation of supply chain strategy on e-business adoption and business performance. Specifically, the hypothesis suggests that the effective implementation of supply chain strategy with embedded "technology", "organisation" and "people" dimensions has a positive and significant impact on business performance. Both quantitative results for UK ($\gamma_{1,2}$ = 0.35; *c.r.* = 3.79) and Malaysia ($\gamma_{1,2}$ = 0.44; *c.r.* = 5.89) supported this hypothesis. This shows that the UK and Malaysian companies recognise the importance of supply chain management in order to reap the benefits of partnership and resource integration among partners (Chin *et al.,* 2005). The effectiveness of supply chain strategy for companies participated in this study is closely related to the strategy that is implemented (Olsen and Boyer, 2003). They are able to acknowledge that strategies that competencies instead of price are more likely to result in sustained competitive advantage because of Internet technology (Porter, 2001).

Based on these findings, it can be argued that in today's fast-changing competitive environment, companies from the UK and Malaysian industry sector's competitive positions are continuously being confronted by the emergence of new technologies, products, markets and competitors (Phan, 2001). As a result, companies need to have flexibility and adaptability when adopting Internet technology in their supply chain implementation to develop a sustainable competitive advantage that would involved a decentralised and responsive work organisation, based on co-operative relations not only within the firm but also in its relations with customers, suppliers and competitors.

Both samples produced a positive and significant impact on business performance can be supported with the statement on the impact of globalisation on the supply chain strategic implementation due to the emergence of Internet technology. E-business adoption enables not only large cooperation to excel but also SMEs and small companies to become involved into opening the global market and increase in market share. In addition, companies would create interests from potential overseas customers and business partners that may be impossible to achieve if they have not have Internet presence. This situation is applicable for businesses in Malaysia (in context of developing country) because the ability to reach out more to businesses internationally with the improved information visibility allows supply chain partners to better coordinate production and distribution (Lee and Whang, 2001).

Literature review has suggested that leading companies have realised the potential of integration their supply chain with Internet technology (Simchi-Levi *et al.,* 2003). However, there is a lack of studies reporting empirical findings related to this important issue (Cagliano *et al.,* 2003: Wu *et al.,* 2003). Development of e-business has also facilitated the ease of products and suppliers searching (Kapplan and Sawhney, 2000). This study has proved the importance of strategic implementation of supply chain strategy coupled with e-business to enhance their business performance.

Underlying the hypothesis H2 consists of three sub-hypotheses that impact on the overall performance of supply chain strategy are "H2a: Technology integration", "H2b: organisational integration" and H2c: supply chain relationship". The following sub-sections discuss these factors separately and where appropriate, link them to previous literature in this study.

6.7.2.1 Sub-hypothesis H2a: Technology Integration vs. Supply Chain Strategy

Hypothesis H2a suggests that a well defined technological integration (technological dimension) embedded in supply chain strategy; the more likely that e-business will be implemented successfully. Quantitative results for both samples (UK: $\gamma_{5,2} = 0.90$ and Malaysia $\gamma_{5,2} = 0.91$) supported these results with highly standardised estimates at significance level of 0.01. By using the appropriate "technological factor", result findings have supported Porter (2001) argument whereby companies from UK and Malaysia have incorporated e-business technological solutions into their strategies and utilising them to be complementary into their operation rather than "cannibalising" them.

Question that was asked in the questionnaire survey relating to technological integration would to the extent the organisation is able to "determine the appropriate level of investments they should invest for Internet based supply chain system" (SCST_5: Malaysia: 0.79; UK: 0.67; see Appendix 4.2). Based on this finding, it can be argued that businesses can gain e-business experience and knowledge with Internet technological commitment as returns grow (Daniel *et al.,* 2002; Gankema *et al.,* 2000). For example, because of the relatively low costs of setting up Web pages, supply chain partners or vendors can offer these benefits to their customers.

Results findings also indicate the importance of integration and information sharing for successful of e-business system adoption. This dimension was asked in the research questionnaire, "logistics operating and planning database are integrate across applications within my firm" and "my firm has an adequate ability to share both standardized and customised information externally with suppliers and/or customers" These findings are inline from previous research that suggest a positive relationships between the integration and compatibility of information sharing within the organisation and e-business adoption success does exist (Teo and Tan, 2000; Lertwongsatien and Wongpinunwatana, 2003). For example, the Malaysian businesses such as the manufacturing sector had been implementing traditional EDI system in managing their communication and resources with supply chain partners. As results, it is imperative for them to acknowledge the need to implement new technologic (Internet technology) in order to compete and integrate with their supply chain partners to maintain and achieve competitive advantage and sustainability. The same may be applicable to businesses in UK with long business establishment before the emergence of Internet technology.

6.7.2.2 Sub-hypothesis H2b: Organisation Integration vs. Supply Chain Strategy

Hypothesis H2b examined the impact of organisational integration within supply chain strategy. Specifically, the hypothesis suggests that the better the integration within organisation encompass in of supply chain strategy, the more likely that adoption of e-business will be implemented successfully. Quantitative results for both samples (UK: $\gamma_{6,2}$ = 0.86 and Malaysia $\gamma_{6,2}$ = 0.93) supported these results with highly standardised estimates at significance level of 0.01. As observed from these research results, both surveyed samples of "organisation integration (OIn)" and "technology integration (TIn)" dimension demonstrated a strong and significant impact on supply chain strategy with value respectively (M: $\gamma_{6,2}$ = 0.93; UK : $\gamma_{6,2}$ = 0.86, both *c.r.* = fixed and M: $\gamma_{2,5}$ = 0.91: *c.r.* = 11.50; UK : $\gamma_{2,5}$ = 0.90: *c.r.* = 7.57. These results are inline with Steven's (1989) and Earl's (2000) view that companies should promote inter-functional and technology integration across the organisation.

By having a positive impact of "organisational integration" on supply chain strategy, it has become a catalyst by facilitating information sharing within and among firms. In order to accomplish this, it would be assumed that responded companies have achieved a process oriented organisation structure that will work better towards e-business adoption in comparison with hierarchical structure. Research articles that suggested that a flatter organisation would be able to integrate between than traditional hierarchical structure networks with many partners (Rao *et al.,* 2003) have supported this. In addition, Dennis and Kambil (2003) and Kotzab and Teller (2003) also supported the statement of having a better organisation integration and coordination where there are avenues for information exchange and coordinate at all level of hierarchy. This process of streamlining is vital because it will ensure that effect diffusion of shared culture value across the supply chain because the lack of this factor will be an obstacle to achieve supply chain integration (Christopher, 2005, p 35; Sanders and Premus, 2005).

This research seeks to reduce the previous research gaps survey that outlined that more research is needed to better understand the behavioural and managerial issues with regard to e-business and IT adoption (Lewis and Suchan, 2003) in order to understand how the e-business impact the supply chain. Some of the suggested areas to look into are sociology, anthropology and "subjective" or "soft" side (Ellram and Zsidisin, 2002;

Rungtusanatham *et al.,* 2003; Grover and Malhotra, 2003). Therefore, this study has investigated the "organisational" issues and how organisations can change their practices and structures to take advantage of emerging new e-business applications (Kling and Lamb, 2000). It is thus challenging to capture this path dependency and take it into consideration when evaluating benefits of e-business on supply chain management (Lewis and Suchan, 2003). Therefore, these results had successfully confirmed and validated the strategic impact of "organisational" dimension on the business performance.

Following from the above discussion, the UK and Malaysian companies should have a right balance between internal and external supply chain strategy. Barratt and Green (2001) argues that an over emphasis on internal integration could lead to organisation silos without proper monitoring. By having a strategic alignment between internal (organisation) and external (people) integration could results in closer relationships, integration process and sharing information with customer and suppliers (Barratt, 2002). The following section discusses the relative importance of "people" dimension within strategic implementation of the supply chain strategy to ensure e-business success.

6.7.2.3 Sub-hypothesis H2c: Supply Chain Relationship vs. Supply Chain Strategy

Hypothesis H2c suggests that supply chain relationship (people dimension) has a direct and positive impact on supply chain strategy. Quantitative results for both samples (UK: $\gamma_{7,2}$ = 0.76 and Malaysia $\gamma_{7,2}$ = 0.61) supported these results with highly standardised estimates at significance level of 0.01. However, a relatively weak value ($\gamma_{2,7}$ = 0.61: *c.r.* = 7.49) the analyses supports the findings that the Malaysian companies need to further strengthen the external "supply chain relationship" in order to influence positively on business performance. Sanders and Premus (2005) suggest that by engaging in external collaboration can resulted in accessing information in a timely manner that allow to process relevant information efficiently, and make informed decisions both internally and across enterprises. The reason for weak impact of "people" dimension on strategic implementation of supply chain strategy has been confirmed by previous empirical studies that many organisations have trouble in adopting their current practices and structures to take advantage of IT (Kling and Lamb, 2000) and this challenge has make it more difficult when there are two or more supply chain partners are included in an e-business process (Beveren and Thomson, 2002; William *et al.,* 2002; Whipple and Frankel, 2000).

In addition, organisations should be able to recognise the benefits of utilising Internet and Intranet technologies between organisations such as enhance co-operations within supply chain (Moini and Tesar, 2005), able to communicate easily and share knowledge experience, thus facilitate long-term relationship building (Wang *et al.,* 2000). A relatively low impact of supply chain relationship dimension on supply chain strategy may be due to the failure of responding companies to acknowledge that a smooth interaction and partnering within the supply chain pipeline will facilitate companies to optimize their business performance (Wong, 1999) hence the creation of more reliable and value added produces (Desbarats, 1999). In addition, Daly and Bruce (2002) further support this finding concluding that the UK manufacturing industry fail to recognise that the function of e-business as a facilitator of supply chain relationships.

Another finding is related to share rewards and risks among business partners. For example, it has been a challenge for companies to effectively coordinate the information systems to work between companies within the supply chain pipeline without having to agree on the share of risk and rewards involved (Lewis and Cockrill, 2002). This may be the reason why a weak value was obtained with the question related (SCSP_11; "has supply chain arrangement with supplier and customer that operate under principles of share rewards and risks") in the questionnaire survey.

The research findings are consistent with previous research that argues that "in order for suppliers to be an actively involve in electronic supply chain using Internet technology, a complete change of attitude amongst buyers and supplier must take place" (Loughlin, 1999, p. 23). Supply chain partners from a brick and mortar that were long established before the emergence of Internet technology need to change their mindset from less confrontational to a more collaborative if they want a successful e-business adoption. One of the methods suggested by Loughlin (1999) is to use technique as opposed to applying pressure to constantly lowering their prices that will prevent them from participating in e-business initiatives. They need to define a clear specific roles and responsibilities when collaborate with supply chain partners in e-business adoption (SCSP_9: Malaysia: 0.76; UK: 0.64; see Appendix 4.2).

Based on this the above findings, it is clear that companies from the developed and developing country context should understand the importance of partnership especially when developing business-to-business (B2B) e-business operations (Angeles and Nath, 2000). However, the low impact of "supply chain relationship" shows that this process has proved to be difficult and complex. There is an extensive literature on the benefits of establishing a partnership relationship to enable organisations to access to new market, introduction of benefit or new products and overcoming trade barriers. The issues of trust and commitment are still an important factor to partnership, which takes time to build (Taylor and Murphy, 2004). Other issues include inability to meet the expectation of collaborating parties and control. These issues secured a low value when the respondents were asked "my firm clearly defines specific roles and responsibilities jointly with our supply chain partners"; and "my firm has a guideline for developing, maintaining and monitor supply chain relationships by a clearly defined legal framework"

6.7.3 Hypothesis 3: E-Business Adoption vs. Business Performance

Hypothesis H3 examined the impact of e-business adoption in consideration with TOP dimensions on business performance. The objective is to measure the "e-readiness" factor that is able to explain differences in the success of e-business development. Specifically, this hypothesis suggested that the clarity of an e-business strategic goal would have a positive impact on e-business success. Both quantitative results for UK ($\gamma_{1,3}$ = 0.22; *c.r.* = 2.95) and Malaysia ($\gamma_{1,3}$ = 0.15; *c.r.* = 2.46) supported this hypothesis. The result acknowledges e-business adoption goals as a crucial factor in adoption e-business. This is supported by previous findings (Grandon and Pearson, 2003). Eid *et al.* (2002) clearly argue that the success of e-business development is based on the synthesis of human, business, and technology resources, with management commitment and governance.

In this study, the success of e-business adoption was influenced by three measures; that is, "Sub-hypothesis H3a: the strategic readiness of technological adoption implementation will have positive influence of company's e-business adoption strategy; sub-hypothesis H3b: the appropriate identification of organisational readiness (organisational capability) among employees within e-business adoption strategy will have a positive impact on company's business performance and sub-hypothesis H3c: the strategic recognition of readiness (attitudinal capability) among business patterns and customers in consideration of e-business adoption strategy will have a positive impact on company's business performance.

6.7.3.1 Sub-hypothesis H3a: Technological Capability vs. E-Business Adoption

Sub-hypothesis H3a examined that a well-defined and established consideration for technology readiness within and across the company with the success of supporting the firm's business. The survey results show that technology adoption sub-factor is having positive and significant influence on difference sectors across the UK ($\gamma_{8,3}$ = 0.95) and Malaysia ($\gamma_{8,3}$ = 0.94)'s adoption success. The statement that perceived usefulness (i.e., perceived benefits) of an innovation is a key factor in its adoption, especially with regard to information technology adoption (Venkatesh and Davis, 2000), supports this research finding. By obtaining positive and significant factor loadings from the question that ask respondents if the firm "has the necessary technology infrastructure (hardware, software, people) to execute our e-business initiatives" (EBAT_7; Appendix 4.2) implies that both samples (UK and Malaysia) are aware of potential benefits (i.e. usefulness) of a technology are more likely to adopt it. It gives support to the Zhu *et al.* (2004) hypothesis about the role of firms' technological competence in e-business diffusion. They state that firms with higher levels of technological competence are indeed more likely to adopt e-business.

Within TOP dimension, technological capability emerged as the strongest dimension for e-business adoption for both samples, while organisational capability and attitudinal capability also significantly contribute to e-business value. It is inline with article by Devaraj and Kohli (2003) state that given its technology driven nature, the success of any firms to derive value or business performance from Internet technology would depend heavily on their ability to leverage Internet technology based capabilities. This is based on the argument that firms with stronger technological capability and greater devotional financial resources to IT are more likely to realise e-business value hence increase business performance (Zhu *et al.*, 2004; Hsiu and Lee, 2005).

Result also revealed a positive and significant factor loading for the question that asked respondent if the firm "effectively integrate the system(s) as part of E-business applications with well defined technology standards" (EBAT_5). It implies that most of the respondents from the UK and Malaysian samples are able to offer personalise and integrate customer services to their customers. In additional, strong influence of the variable also implied the readiness of back end system would enable integration of information processing within the firm coordination and across business partners (Robey *et al.,* 2002). Internet related will be able to provide the necessary support for e-business initiatives on the front end and back end (Zhu *et al.,* 2004; Dewan and Kraemer, 2000).

6.7.3.2 Sub-hypothesis H3b: Organisation Capability vs. E-Business Adoption

The findings revealed that both the UK ($\gamma_{9,3}$ = 0.95) and Malaysian ($\gamma_{9,3}$ = 0.94) surveyed companies acknowledged the success of e-business development is supported by organisational e-readiness (sub-Hypothesis H3b). Specifically, the hypothesis suggests the strategic readiness of organisational capability adoption would have positive influence on company's e-business adoption strategy. This finding is supported by previous studies that the readiness of management and organisational factors have a strong influence on the successful IT implementation (Aubert *et al.,* 1999; Barua *et al.,* 2000). In other words, organisation that has a clear long term e-business vision statement which will effectively encourage employee's commitment to support this initiatives, the more likely the realisation of the organisation of a successful e-business adoption.

Molla (2004a) comments that e-business adoption are likely to succeed where there exists a good mixture of governance models, executive-level championship, and e-commerce-complimentary human, technical and business resources. The result in the study suggests that organisations are likely to attain success of e-business development if management have an in-depth understanding of the required organisational changes and prepare for dealing with these changes competently. In order to achieve this objective, organisation need to define roles, responsibilities and accountabilities related to e-business initiatives and delegating the authority without withdrawing top management support for those responsible for making decisions related to e-business (Caloghirou *et al.,* 2004; Molla, 2004b).

Sub-Hypothesis 3b also investigated the impact of employee's skill and competencies on the success of e-business adoption (EBAO_3). The findings from both countries confirm that the respondents perceived the "employee's skill and core competencies embedded in organisational capability" (questionnaire survey) in e-business adoption as a positive predicator of e-business success. These are in line with previous research, which suggests that successful adoption of e-business are positively related to the effectiveness of employee's skill and competencies (Hall and Andriani, 2003; Bong *et al.,* 2004). Improving staff's competence can motivate them to work harder and commit to changes. New practices or changes will shake the status quo of the current operations. Without the commitment of staff, new culture cannot be aligned with new common goals and objectives (Cheng and Love, 2001).

Based on these findings, it can be argued that management support and commitment significantly influences e-business to be implemented successfully regardless of geographical area. Management support within an organisation is important in mobilizing the necessary resources for initiating e-business projects (Beatty *et al.,* 2001) and new product development activities (Hsieh *et al.*, 2006). In essence, organisations should focus on e-business systems as a business solution as a whole rather than just an IT solution within departments.

Specific question in the questionnaire was asked "if the organisation is able to foster awareness and internalisation of the mission, vision and core values needed to execute the strategies for e-business adoption (EBAO_2)". A relatively high factor loadings for both the UK and Malaysian samples indicate that the strong support of top management to focus on market orientation that play an important role in the development and fostering of a market orientation throughout the organisation (Bradford and Florin, 2003). Consistent with literature, this survey results indicated that management support was an important contribution in directing their companies to "sense" and "response" to Internet technological opportunism. It is important for management team efforts to emphasise the importance of organisational responsiveness to new technologies. Top management's role assumes particular importance because new technologies often involve the changes of existing assets and routines for which top management's approvals will be required (Riemenschneider and McKinney, 2002).

6.7.3.3 Sub-hypothesis H3c: Attitudinal Capability vs. E-Business Adoption

Hypothesis H3c examined the strategic recognition of readiness (attitudinal capability) among business patterns and customers in consideration of e-business adoption strategy will have a positive impact on company's business performance. Quantitative results for both samples (UK: $\gamma_{10,3} = 0.90$ and Malaysia $\gamma_{10,3} = 0.92$) supported these results with highly standardised estimates at significance level of 0.01 are in line with the academic view that where attitudinal capability relates to all employees of an organisation a successful e-business adoption require a dedicated individual (usually the Chief Executive Office (CEO), to champion a multitude of good management practices to develop right attitudes for his/her employees to adopt organisational change (Tidd *et al.,* 2001). As a result, this empirical analysis implies that the readiness of supply chain partners influence the e-business adoption decisions in both samples from UK and Malaysia. Firms that perceived more influence from their supply chain partners will likely to implement e-business successfully.

However, a relatively weak factor loadings of the variable (EBAP_9: Malaysia: 0.73 and UK: 0.72) belonging to attitudinal capability dimension for both samples suggested the need to improve and encourage organisations to "effectively share operational information externally with selected suppliers and/or customers" in order to increase operation flexibility through external collaboration. This may indicate that organisations are still reluctant to allow their suppliers and customers access to their databases and inner workings (Jayachandran *et al.,* 2005). This is indicative of a lack of trust in the value chain and, perhaps, an unwillingness to expose a firm's weaknesses and mistakes. The finding also revealed a relatively weak factor loading (EBAP_11: Malaysia: 0.83 and UK: 0.73; see Appendix 4.2) which indicate that performance measurement across business need to be improved if organisations wish to execute a successful e-business adoption.

The survey results also showed that a supply chain partner's willingness to participate in e-business initiatives is a major reason for many organisations to implement e-business. This was included in the survey questionnaire as "if their organisations (supply chain partners) are ready to improve coordinate and collaborative online by having an Internet-based systems" (EBAP_12: Malaysia: 0.88 and UK: 0.88; see Appendix 4.2). The support for supplier/customer readiness is supported by previous e-business literature which have stated that participation and readiness along the supply chain pipeline influences the introduction of new processes and the adaptation and evolution of existing approaches to e-business development (Grandon and Pearson, 2003; Scupola, 2003).

Based on these findings, it can be argued that intra-organisation is not sufficient, and must be coupled with the readiness of their customers and suppliers to participate in their e-business initiatives. In order to achieve these issues, mutuality of benefits, rewards and risks sharing together with the exchange of information as the foundation of collaboration need to be address and clarify (Barratt and Oliveira, 2001). For example, most of the businesses from Malaysia especially from manufacturing and supplier industry sectors are from traditional and conservative business background. They may have failed to understand the need for collaboration with their supply chain and failed to understand what collaboration utilising Internet technology actually implies (Ireland and Bruce, 2000).

6.8 COMPARISON OF MAIN HYPOTHESES ACROSS TWO SAMPLES

Factor correlations (Hypotheses H4 to H6) were investigated for the two samples. In comparison with the Malaysian sample, correlation between supply chain strategy and business strategy (H4) for the UK companies provide relatively a stronger correlation with standardise value of $\phi_{1,2} = 0.38$ vs. 0.34 (see Table 6.11). Meanwhile, low (but significant) correlation was recorded between supply chain strategy and e-business adoption (H5: M: $\phi_{2,3} = 0.22$ and UK: $\phi_{2,3} = 0.21$) and business strategy and e-business adoption (H6: M: $\phi_{1,3} = 0.22$ and UK: $\phi_{1,3} = 0.19$). A few reasons to explain for low value of e-business adoption construct for both samples are mentioned in the literature as unwillingness of managers to be responsible for technological change (Kalakota and Robinson, 2001), complexity of available e-business services (Bodorick *et al.,* 2002) and lack of required skills and knowledge (Lawson *et al.,* 2003).

It is not surprising that the business strategy and supply chain capabilities are the main contributor for business performance for the UK and Malaysian companies. These results confirms the general view that for organisation to be successful, supply chain management need to be given a higher level of strategic importance (Barlow *et al.*, 2004; Quayle, 2002). The results also supported the view that organisations those articulate their strategic objectives and plans relating to supply chain management are likely to perceive better business benefits.

Findings also suggested that successful supply chain collaboration is the result of human interactions facilitated by IT, but not to be replaced by IT. This is supported by the fact that the "supply chain relationship (SCR)" recorded the least contribution towards supply chain strategy with $\gamma_{2,7} = 0.75$, $c.r. = 6.58$ for the UK sample (see Table 6.11). Table 6.12 displays a summary of sub-hypotheses results from performing SEM hypothesis testing for the UK and Malaysian samples.

Hypotheses		**UK sample**	**Malaysian sample**
Hypothesis 1: Business strategy is a significant determinant of business performance	$\gamma_{1,1}$	Supported 0.37	Supported 0.32
Hypothesis 2: Supply chain strategy is a significant determinant of business performance	$\gamma_{1,2}$	Supported 0.35	Supported 0.44
Hypothesis 3: E-business adoption is a significant determinant of business performance	$\gamma_{1,3}$	Supported 0.22	Supported 0.15
Hypothesis 4: Successful e-business adoption is directly related to the level of mutual dependency between business strategy and supply chain strategy	$\phi_{1,2}$	Supported 0.38	Supported 0.34
Hypothesis 5: Successful e-business adoption is directly related to the level of mutual dependency between supply chain strategy and e-business adoption	$\phi_{2,3}$	Supported 0.21	Supported 0.22
Hypothesis 6: Successful e-business adoption is directly related to level of mutual dependency between business strategy and e-business adoption	$\phi_{1,3}$	Supported 0.22	Supported 0.19

Table 6.11 Results of main hypothesis for UK (n =143) and Malaysian (n = 208) samples

Sub - hypotheses		UK Sample	Malaysia Sample
Sub-hypothesis H1a: *Organisational infrastructure is a significant determinant of business strategy*	$\gamma_{3,1}$	Supported 0.91	Supported 0.83
Sub-hypothesis H1b: *Technological infrastructure is a significant determinant of business strategy*	$\gamma_{2,1}$	Supported 0.91	Supported 0.90
Sub-hypothesis H1c: *Partnership strategy is a significant determinant of business strategy.*	$\gamma_{4,1}$	Supported 0.93	Supported 0.97
Sub-hypothesis H2a: *Technological integration is a significant determinant of supply chain strategy*	$\gamma_{5,2}$	Supported 0.90	Supported 0.91
Sub-hypothesis H2b: *Organisational integration is a significant determinant of supply chain strategy*	$\gamma_{6,2}$	Supported 0.86	Supported 0.93
Sub-hypothesis H2c: *Supply Chain Relationship is a significant determinant of supply chain strategy*	$\gamma_{7,2}$	Supported 0.76	Supported 0.61
Sub-hypothesis H3a: *Technological capability technological dimension is a significant determinant of e-business adoption*	$\gamma_{8,3}$	Supported 0.95	Supported 0.94
Sub-hypothesis H3b: *Organisational capability a significant determinant of e-business adoption*	$\gamma_{9,3}$	Supported 0.95	Supported 0.94
Sub-hypothesis H3c: *Attitudinal capability a significant determinant of e-business adoption*	$\gamma_{10,3}$	Supported 0.90	Supported 0.92

Table 6.12 Results of sub-hypothesis for UK (n =143) and Malaysian (n = 208) samples

6.9 EVALUATION OF BUSINESS PERFORMANCE FACTOR

6.9.1 Impact on Financial Measures

It is essential for companies to build a good reputation based on financial measures with their stakeholders and employees, as well as their target groups such as customers, business partners and suppliers. Table 6.13 shows the business performance analyses results. For instance, analyses of the survey results show that the respondent can see the direct impact of financial measure to business performance (0.94) for both samples. The literature support that e-business have an impact on profitability (local and international sales increase: Chaston, 2001; Kent and Mentzer, 2003), e-business strategic achievement (market share and customer service improved: Grembergen and Saull, 2001; Gembergen and Amelincks, 2002).

Business Performance Dimensions		UK sample	Malaysia sample
Impact on Commerce			
Respondent's perceptions of the benefits of Internet technology to increases the company financial outcome in terms of traditional and e-business measures	$\beta_{11,1}$	0.94	0.94
Impact on Internal Efficiency			
Respondent's perceptions of the potential of e-business to improve staff productivity and operational efficiency when complementary resources exist.	$\beta_{12,1}$	0.98	0.90
Impact on Coordination (Upstream and Downstream)			
Respondent's perceptions of the benefits of broad interactivity and connectivity of the Internet can facilitate firms' coordination with business partners and reduce transaction costs which can be enhanced and made more efficient by the Internet.	$\beta_{13,1}$	0.91	0.96

Table 6.13 Business performance "dependent variables in the research"

6.9.2 Impact on Internal Efficiency

Current empirical studies had been able to demonstrate that strategic adoption of e-business when relating to e-business capability factors will have an effect on the multiple industry sectors' internal efficiency performance through their direct and indirect effect. The indirect effect on companies' internal efficiency originates from implementing supplies chain strategy, business strategy and e-business adoption related success factors. For example, implementing e-business initiatives in consideration of e-business capability factors has a strong direct impact from business performance to internal efficiency factor for UK is 0.98 and Malaysia is 0.90. This indicates that when business performance of UK sample goes up by 1, internal efficiency measure factor goes up by 0.98 and 0.90 for the Malaysian sample. By having analyses of the survey results show that e-business adoption have impact on employee's efficiency (Hasan and Tibbits, 2000), internal efficiency complement by Internet technologies which led to cost control (Filis *et al.,* 2004a, 2004b; Sanders and Premus, 2005) and reduce of costs management (Wagner *et al.,* 2003; Tracey *et al.,* 2005).

In addition, strong impact of internal efficient measure to business performance as shown in Table 6.13 also in line with previous research which stated the potential of e-business to improve staff productivity and operational efficiency when complementary resources exist (Grembergen and Saull, 2001; Grembergen and Amelincks; 2002, the ability to enhance the diversity and flexibility of the organisational workforce (Hinson and Sorensen, 2006) and the impact of business performance also involve developing skills and effective knowledge management relevant to future needs among employees (Lee, 2001; Mahmood and Soon, 1991; Zhu *et al.,* 2004).

Based on the above findings and discussions, it can be argued that e-business adoption enhance internal processes. However, applying e-business without proper planning will results in poor information technology alignment. Businesses should have priority of which processes to implement first such as installation of new information systems or redesign of process for higher efficiency.

6.9.3 Impact on Coordination (Upstream and Downstream)

Respondents clearly perceive the benefits of broad interactivity and connectivity that Internet can facilitate firms' to coordinate with business partners and reduce transaction costs. The upstream and downstream coordination on business performance is vital for multiple industry sectors in scoring 0.91 for the UK and 0.96 for the Malaysian samples. The high standardised value for both the samples are inline with previous research that support the function of the Internet to facilitate firms' coordination with business partners and reduce transaction costs with the advantage features of interactivity and connectivity (Zhu *et al.,* 2004; Mahmood and Soon, 1991). In particular, major value chain activities in the financial services industry feature information transactions (with customers and business partners) or information processing (within firms), both of which can be enhanced and made more efficient by the Internet (Clemons and Hitts, 2001; Fan *et al.,* 1999).

6.10 SUMMARY

The first order, higher order, and path models provided evidence on the relations of e-business capabilities drives and business performance for both samples from Malaysia and the UK. Incorporating recent e-business theory and measurement in the research design by utilising Steven's (1989) supply chain integration model, the proposed e-business capability instrument for the UK and Malaysian samples were validated. Through several analyses, this study identified factors that will shape and affect business performance. In addition, this study also highlighted empirical evidence of the impact of e-business success in terms of financial measures, internal efficiency measures, and coordination of upstream and downstream measures.

This chapter empirically tested the theoretical model (Chapter 3) to assess the impact of the proposed e-business capability on business performance. The factors of e-business capability and business performance were tested to confirm or refute their significance to the theoretically derived model. The results of this chapter confirmed these patterns of relations in the first-order analyses and provided statistical support for the theory of multidimensionality in both e-business capabilities and business performance. It was confirmed that all of the EBC factors were treated as equally significant and importance on business performance for both samples although different parameters weights were observed. In addition, it was also observed that TOP dimensions had relatively significant impacts on each of the EBC factors. Having tested the hypotheses in the context of overall samples (UK= 143 and Malaysia = 208), the next chapter seeks to evaluate the impact of EBC factors and TOP dimensions on business performance among adopter and non-adopter e-business sub-groups for both samples.

CHAPTER 7

RESULT STUDY 3: MULTIPLE GROUP ANALYSIS

7.1 INTRODUCTION

Chapter 6 had presented the hypotheses results for the Malaysian and UK data. First and second order confirmatory factor analysis were conducted to examine the impact of technological, organisational and people (TOP) dimensions on the e-business capability factors. However, a critical question when performing SEM is that whether the EBC structural model parameter estimates can be compared across the four sub-groups (adopter of e-business and non-adopter of e-business sub-groups for both samples). In order to pursue this question, nested multi-group confirmatory factor analysis (CFAs) and SEMs are conducted to asses and compare the path coefficients and correlations (hypotheses) across sub-groups.

This chapter aims to test the parameter estimates (main hypotheses and sub-hypotheses) of the EBC structural model when the samples have been categorised into sub-groups of adopter of e-business and non-adopter of e-business respectively. It seeks to investigate whether the impact of e-business capability factors to business performance can be comparable between adopter and non-adopter of e-business across four sub-groups for the UK and Malaysian samples (see Figure 7.1).

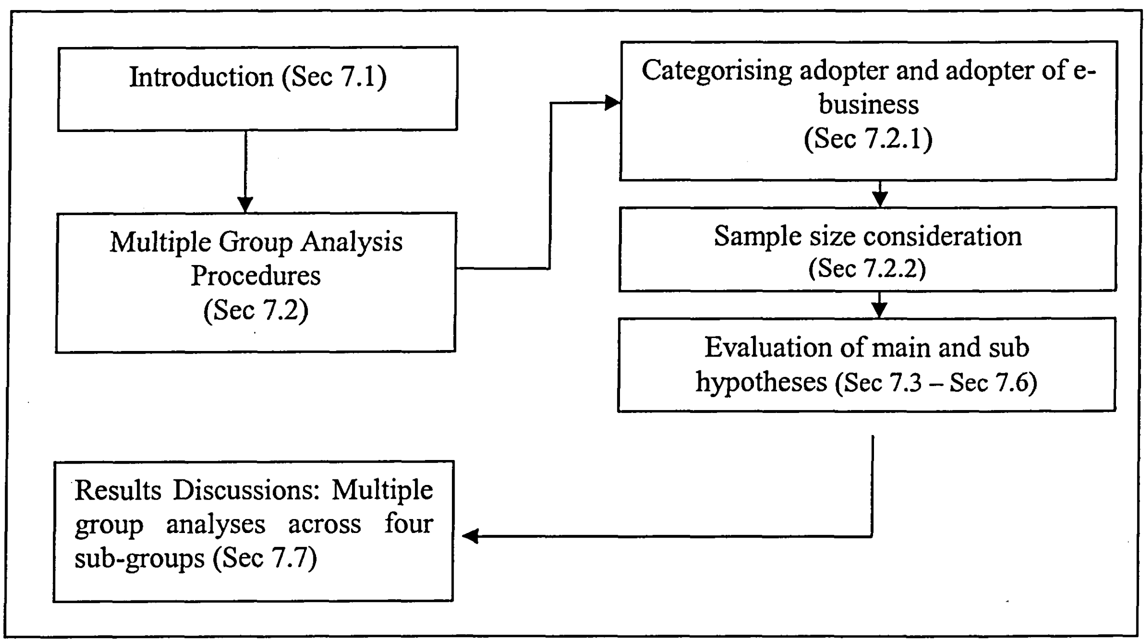


Figure 7.1 Flowchart of Chapter Seven

7.2 MULTIPLE GROUP COMPARISON (MGC) PROCEDURES

Multiple group comparison analysis (MGC) was employed in this study to compare the hypotheses results (sub and main) across multiple sub-groups. For this study, based on procedures performed in Section 4.6.3, four sub-groups had been identified. The use of multiple group comparison technique is to confidently demonstrate that the overall effects (previous chapter) are not due simply to sample composition. In addition, by assessing the impact of EBC factors on business performance with underlying TOP dimension between the four sub-groups, the findings will be able to offer advice and guidelines to companies those who have, and have not yet adopted e-business.

7.2.1 Categorising Adopter and Non Adopters Sub-Groups

In the questionnaire, respondents were asked to answer a set of seven questions to identify if their company was either fairly advanced in their e-business adoption, or had only just begun to adopt, or had not yet adopted e-business practices. Table 7.1 displays the questions that served as guidelines to categorise between adopter and non-adopter of e-business sub-groups (see Section 4.6.3 for detail procedures).

<table>
<tr><th colspan="2">Sub-groups</th><th>Secondary e-business activities</th><th>Coding</th></tr>
<tr><td rowspan="8">Adopter of e-business</td><td rowspan="3">Non adopter of e-business</td><td>• Marketing/Advertising goods and services over Internet</td><td rowspan="8">• Implemented already (coded as “1”)
• Plan to implement within the next 6 - 12 months (coded as “0”)</td></tr>
<tr><td>• Basic communication i.e. emails, fax, telephone</td></tr>
<tr><td>• Searching for/evaluating suppliers over Internet</td></tr>
<tr><td rowspan="5"></td><td>Primary e-business activities</td></tr>
<tr><td>• Selling goods and/or services over a Internet (inc. EDI)</td></tr>
<tr><td>• Buying from suppliers over Internet (inc. EDI)</td></tr>
<tr><td>• Sharing information with partner organisations over Internet (e.g., jointly working on a technical documents, or CAD files)</td></tr>
<tr><td>• Providing customer support/aftercare over Internet</td></tr>
<tr><td colspan="4">Based on elementary analysis, respondents were divided into
• Non-adopter of e-business sub-groups; ≤ 3 items (“code value =1”) in secondary e-business activities and 0 item (“code value = 0”) in primary e-business activities).
• Adopters of e-business sub-groups; all of the 3 items (“value =1”) in secondary e-business activities and ≥ 1 item (“value =1”) in primary e-business activities)</td></tr>
</table>

Table 7.1 Lists of E-business practice questionnaire.

7.2.2 Sample Size and Fit Indices

Before any MGC analysis is carried out, the equality proportion of sample sizes across sub-groups must be carefully considered to avoid sample size bias that could resulted in producing unreliable and bias results. Since MGC estimate relatively more parameters than single group analysis, this study need approximately equal sample size for each sub-group to ensure the stability of the parameter estimates. Some literatures suggest that large groups will exert more influence on the SEM results than smaller groups (Anderson, and Gerbing, 1998; Barrett and Kline, 1981; Bentler, 1990; Bentler and Chou, 1987; Bollen, 1989).

Table 7.2 illustrates the sample sizes under this study, which had been stratified into four sub-groups. Malaysian se-business sub-groups relatively slightly skewed with 124 respondents. However, due to the overall adequate sample sizes, chi square, and Lagrange multiplier tests are proposed to be appropriate when comparing nested models, with several fit indices (Joreskog and Sorbom, 1993; Bollen, 1989; Kline, 1998). Table 7.3 lists the suitable recommended goodness of SEM fit indices.

Sub- Groups	Country	Symbol	Sample Size (n)
Adopter of e-business	Malaysia	M_{Adopt}	124
	UK	UK_{Adopt}	80
Non adopter of e-business	Malaysia	M_{N_Adopt}	84
	UK	UK_{N_Adopt}	63

Table 7.2 Symbol representation for the four sub-groups

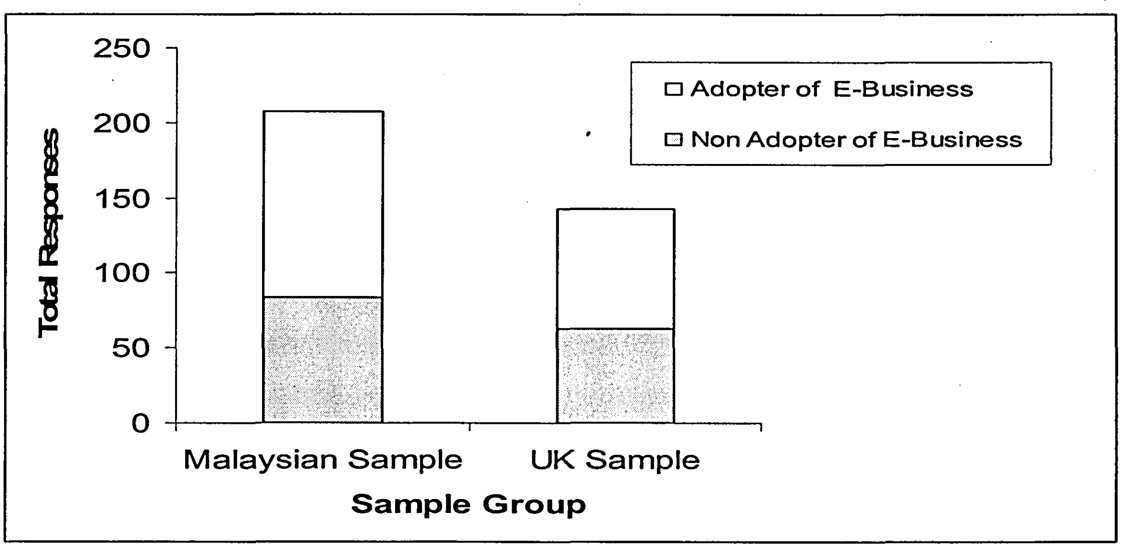


Figure 7.2 Graph representation of sample size for four sub-groups

Comparison fit measures	Recommended fit value	Indication of fit
1. Absolute fit measure		Very Good Fit > 0.90 0.70 < Good Fit < 0.89 0.50 < Reasonable Fit < 0.69 Poor Fit < 0.49
Chi-square ; *df* (p-value)	$P > 0.05$	
Root mean square (RMESA)	< 0.08	
2. Incremental Fit Measures		
Tucker-Lewis index (TLI)	> 0.90	
Comparative fit index (CFI)	> 0.90	

Table 7.3 Recommended goodness-of-fit values

7.2.3 Statistical Procedures for MGC

SPSS AMOS 4.0 maximum likelihood program (Arbuckle and Wothke, 1999) is used to test the comparison among sub-groups for the EBC model, together with the hypotheses. Non - recursive model (see Figure 6.2) is used which consists of business strategy (ξ_1), supply chain strategy (ξ_2) and e-business adoption (ξ_3) as the exogenous (independent) factors (latent variables), while business performance (η_1) as (independent) endogenous constructs. SEM MGC is suited for testing interactions through flexible interplay between theory (EBC theoretical framework) and data (samples from UK and Malaysia). This approach bridges theoretical and empirical knowledge for a better understanding of the real world (Fornell and Bookstein, 1982; Raykov and Marcoulides, 2000; Anderson and Vastag, 2004).

Different parameters are constrained (i.e. first and second factor loadings, path coefficients, and factor correlations) to be invariant across the four sub-groups using nested MGC CFAs and SEMs. Twenty proposed models consists of ten CFA models (MG2 to MG11), and eight structural models (MG12 to MG19) are use to evaluate and determine which model would be best-suited model for the evaluation of impact on business performance. Two types of analyses are conducted as shown in Figure 7.3.

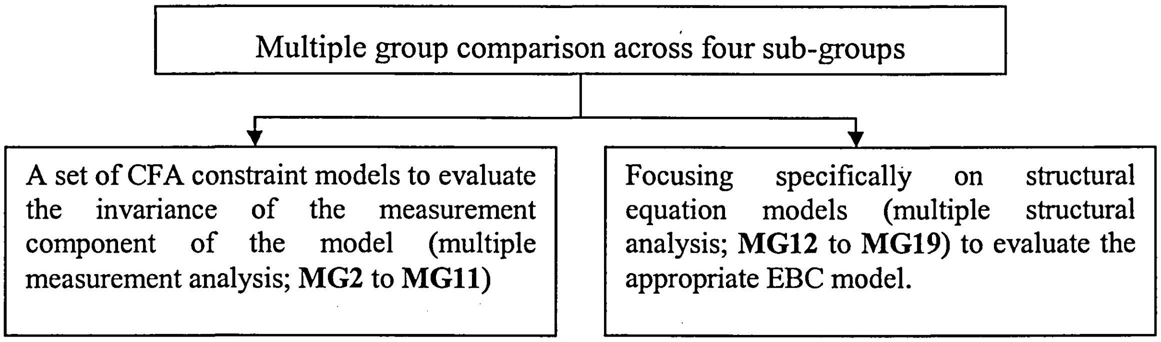


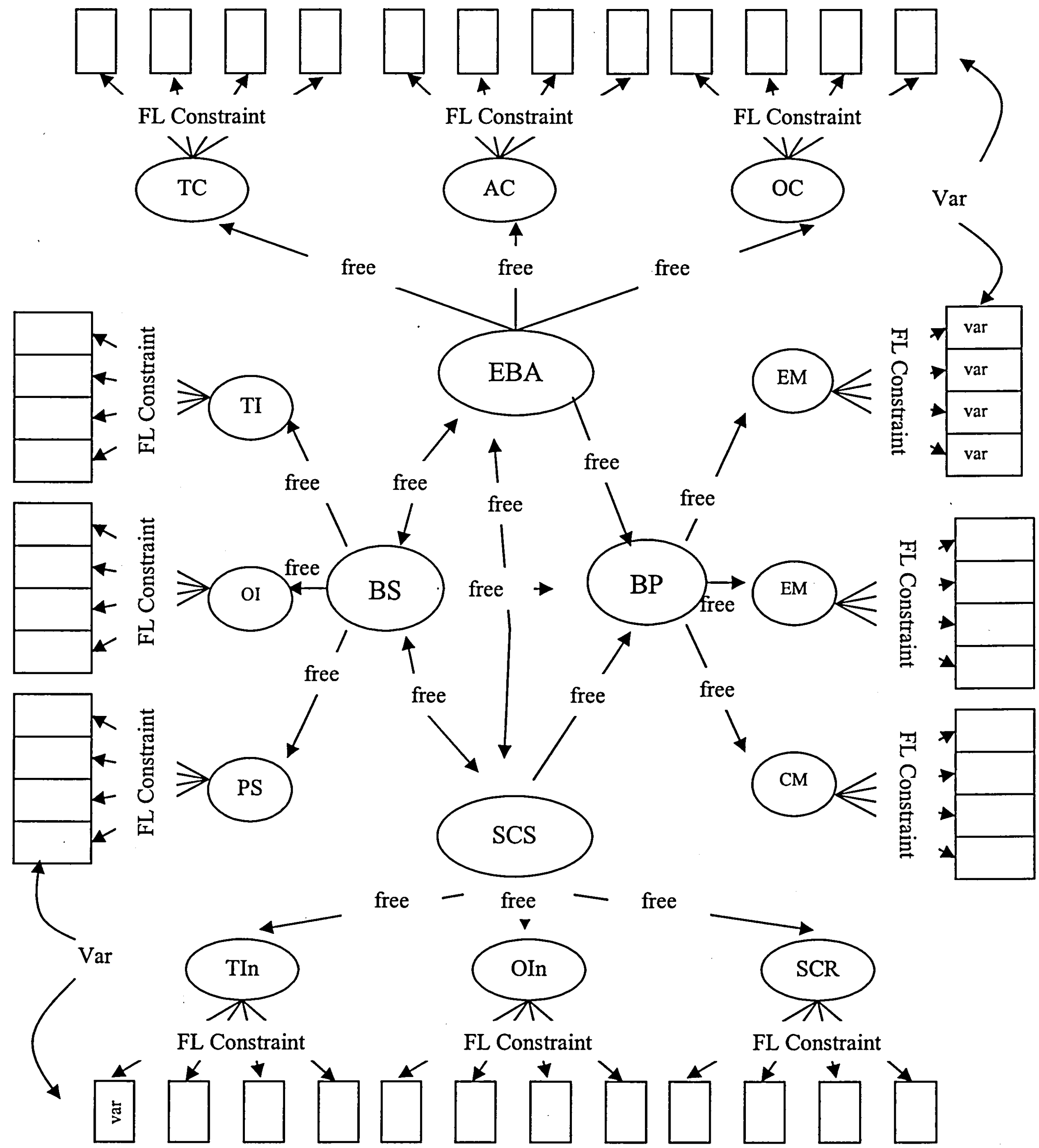
Figure 7.3 Two ways for conducing MGC across four sub-groups

Model **MG1** to model **MG11** take into consideration factor loadings (1st order and 2nd order) and factor correlations of the EBC measurement models. With the baseline multiple-group model (**MG1**), no constraints are imposed and parameters for the a-priori model are fitted separately to data from each sub-group. In the first test of model **MG2**, only first order factor loadings are constrained to be equal across the four sub-groups. Model **MG2** is meant to investigate the parameter estimates for the sub hypotheses for second order factor loadings (H1a to H3c consists of "technological", "organisation" and "people" dimensions), correlations among second order constructs (H4, H5 and H6) and path coefficients (H1, H2 and H3). This will assume that all of the variables across four sub-groups (first order factor loadings) have similar impact to their respective TOP dimensions for each of the EBC factors (see Figure 7.4).

Results obtained from this model are compared with those based on the totally non-invariant (no constraint) solution (MG1) to determine if the fit indices were good and differed within a limited range. If good fit indices were obtained for MG2, this would imply that the model supported the appropriateness of the measures across the four sub-groups and satisfied the requirement for multiple group comparison.

Model **MG3** is meant to investigate the parameter estimates for the correlations among second order constructs (H4, H5 and H6) and path coefficients (H1, H2 and H3) when assuming that (i) the sub hypotheses of second order factor loadings (H1a to H3c) have similar impact on their respect EBC factors and; (ii) all of the variables across four sub-groups (first order factor loadings) have the same positive and significant impact to their respective TOP dimensions for each of the EBC factors (see Figure 7.5).

In each of the subsequent CFA models (**MG4** to **MG11**), a combination of constraints are imposed on factor correlations and second factor loadings. It is to assess if the imposition of these constraints would affect the goodness of fit indices in comparison with models **MG1** and **MG2,** respectively. The results therefore obtained will determined if the models have supported the cross-generalisability among EBC factors and TOP dimensions across four sub-groups.

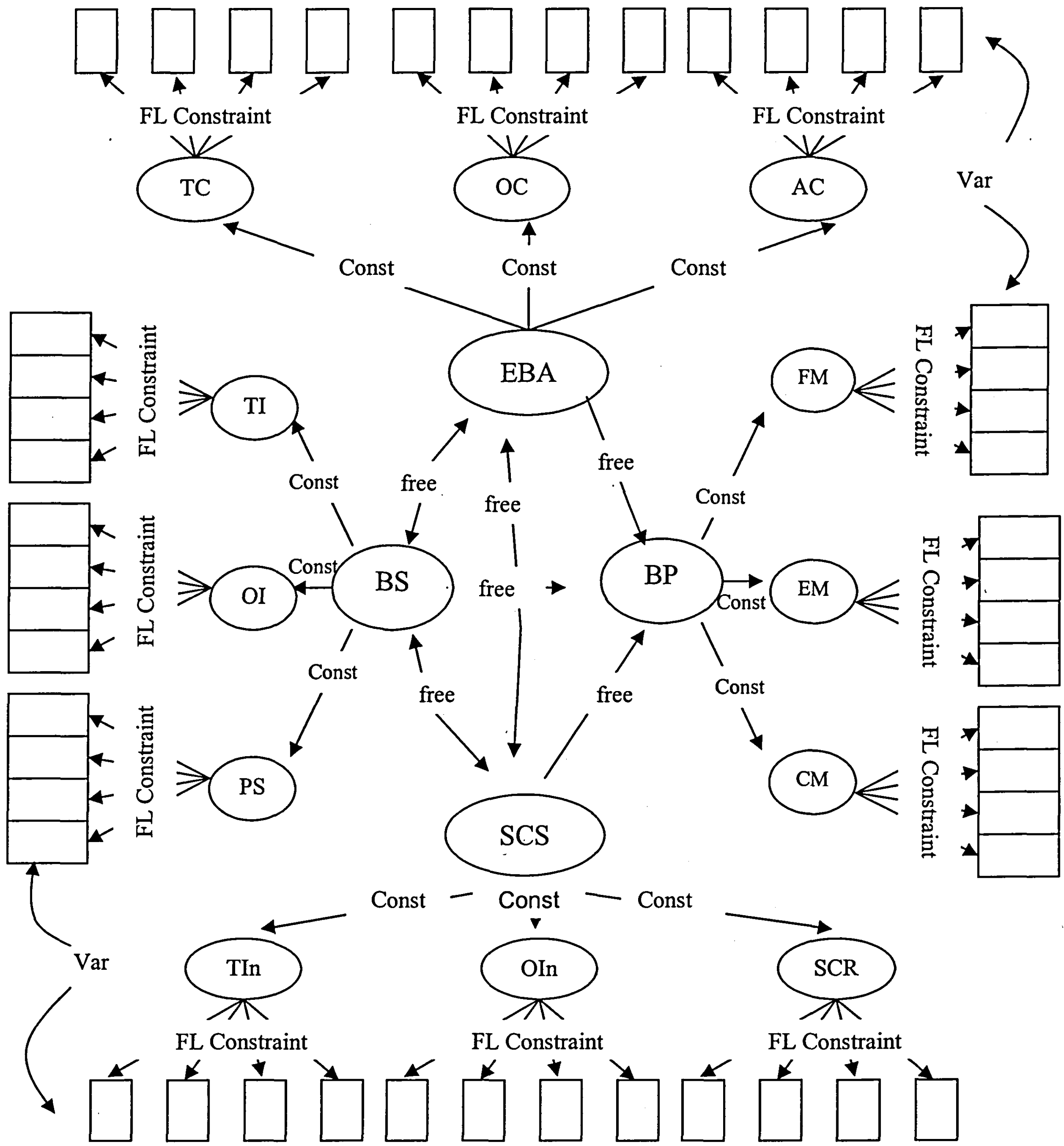


Legend

FL Factor Loading var Variables

Note : In the first test model MG2, only first order factor loadings were constrained to be equal across the 2 categories. This model is used to evaluate the multiple group comparison between adopter of e-business and non adopter of e-business on second order factor loadings (technological, organisation and people dimensions), correlations among second order constructs (H1, H2 and H3) and path coefficient (H4, H5 and H6).

Figure 7.4 Model MG2 schematic representation



Legend

FL Factor Loading var Variable Const Constraint

With model MG3, constraints / invariants are imposed on the first order and second order loadings to measure the difference between the two categories. The path coefficients and correlations with first and second order factor loadings are equal across four sub-groups.

Figure 7.5 Model MG3 diagram representation

Models MG12 to MG19 focus specifically on the structural component (path coefficients and factor correlations) that are critical to test predictions based on the EBC structural model. With model MG12, the path coefficients and the first and second order factor loadings are required to be equalled for each of the two groups, whereas the factor correlations are to be estimated freely across sub-groups. Model MG13 is similar to MG12 except the factor correlations and second order factor loadings are to be freely estimated across the four sub-groups.

The assumption of this test of invariance for the three path coefficients (H1, H2 and H3) was to provide a global test that the predicted path coefficients are positive. In order to evaluate of models MG14 to MG19, specific path coefficient (H1, H2 and H3) and factor correlations (H4, H5 and H6) are to be freely estimated while the rest of the factor loadings (first order or second order factor loadings, depending on model evaluation) are invariant across sub-groups. This is to demonstrate the sensitivity of "goodness of fit" of these models in comparison with model MG2 where certain path coefficients are to be constrained to test for invariance. Lastly, model MG20 is known as "total invariant model" with all of the factor loadings (first order and second order); path coefficients and factor correlations are held constraint (invariant) across four sub-groups.

7.3 RESULTS ANALYSES

In evaluating the parameter estimates across four sub-groups, no invariance constraints were imposed for the baseline multiple-group model (MG1). The fit indices (e.g., TLI = 0.91; CFI = 0.92; RMSEA = 0.03 and $\chi^2/df = 1.23$) showed a reasonably good fit. Subsequently, first test of invariance (model MG2) was evaluated, in which the first factor loadings were constrained (to be equalled) across the four sub-groups. Fit indices also produced a reasonably good fit (TLI = 0.92; CFI = 0.92; RMSEA = 0.03 and $\chi^2/df = 1.23$) and similar with totally non-invariant solution (MG1) (see Table 7.4).

In model MG3, it was assumed that that the second order factor loadings were equal across the four sub-groups. Fit indices were acceptable (TLI = 0.91; CFI = 0.92; RMSEA = 0.03 and $\chi^2/df = 1.22$) and met the minimum requirement to conduct MGC analysis. In each of the subsequent CFA models (MG4 to MG11 in Table 7.4), constraints were imposed in combination with a set of parameters estimates consists of first order factor loadings, second order factor loadings and factor correlations across four sub-groups.

Model	χ^2	*df*	χ^2/df	CFI	TLI	RMSEA	Full E-Business Capabilities (EBC) Model	
Total Sample	**Group**						CFA Invariant (constraint)	Freely Estimate
TG1	1303.89	761	1.71	0.94	0.94	0.05		
Multiple Group CFA								
MG1	3756.29	3044	1.23	0.92	0.91	0.03	-	1st FL, 2nd FL, FC,
MG2	**3842.46**	**3132**	**1.23**	**0.92**	**0.91**	**0.03**	-	**FC(H4-H6), PC (H1-H3), 2nd FL**
MG3	**3865.04**	**3157**	**1.22**	**0.92**	**0.91**	**0.03**	**2nd FL**	**FC(H4-H6), PC (H1-H3)**
MG4	3884.78	3140	1.24	0.91	0.91	0.03	FC (H4-H6)	2nd FL
MG5	3920.47	3164	1.24	0.91	0.91	0.03	2nd FL, FC (H4-H6)	-
MG6	3850.02	3134	1.23	0.92	0.91	0.03	FCH4	FC(H4, H5)
MG7	3844.52	3134	1.23	0.92	0.91	0.03	FCH5	FC(H4, H6)
MG8	3854.32	3134	1.23	0.91	0.91	0.03	FCH6	FC(H4, H5)
MG9	3871.58	3158	1.23	0.92	0.91	0.03	2nd FL, FCH4	FC(H5, H6)
MG10	3866.15	3158	1.22	0.92	0.91	0.03	2nd FL, FCH5	FC(H4, H6)
MG11	3906.20	3158	1.24	0.91	0.91	0.03	2nd FL· FCH6	FC(H4, H5)

Note. The entire tested model has SEM invariant = 1st FL and freely estimated = PC (H1-H3). 1st FL = Factor loading for first order factors, 2nd FL = Factor loadings for second order factor, FC(H4-H6) = Factor Correlations, FV = Factor Variances, FC(H4) = Factor Correlation between EBR and BS, FC(H5) = Factor Correlation between SCS and EBA, FC(H6) = Factor Correlation between EBA and BS, PC(H1-H3) = Path Coefficients , PCH1 = Path Coefficient from BS to BP, PCH2 = Path Coefficient from SCS to BP, PCH3 = Path Coefficient from EBA to BP. In Model TG1, the EBC model was fit to the total group, whereas for Models MG1-MG20 the EBC model is fit separately for each of the 4 sub-groups representing different groups. For Models MG2-MG19, some combinations of parameters are required to be invariant across the four sub-groups.

Table 7.4 Measurement goodness-of-fit analysis for the EBC model fit with respect to the total group and multiple sub-groups

The imposition of constraints only resulted in small decrements in fit indices among models MG1 to MG11. Even the highly restricted models (MG4 and MG5) (i.e., requiring every parameter to be the same in all four sub-samples) provided a good fit to the data that differed slightly from Model MG1 that had no invariance (constraints) (see Figure 7.5 for RMSEA and CFI fit indices comparisons). Therefore, these results produced from MG2 to MG11 were able to support comparable EBC measurement models of the relationships across four sub-groups. As seen in Table 7.4, all of the goodness of fit indices for model MG1 to MG11 indicated very good fit i.e. CFI ≥0.91

(recommended CFI > 0.90); TLI $\geq$0.91 (recommended TLI > 0.90); RMESA $\leq$0.03 (recommended RMSEA < 0.05); and 1.22 $\leq \chi^2/_{df} \leq$1.24 (recommended $\chi^2/_{df}$< 5) (see Figure 7.5 for RMSEA, TLI and CFI fit indices comparisons).

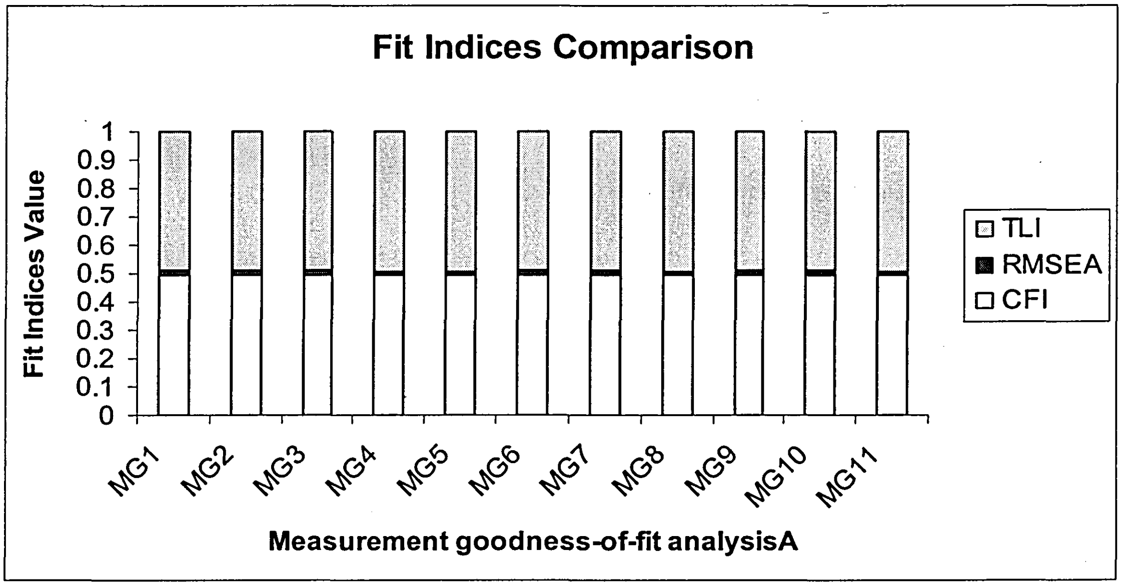


Figure 7.5 Fit Indices comparisons from model MG1 to MG11

In Table 7.5, all goodness of fit indices for model **MG12** to **MG20** also indicated an acceptable value i.e. 0.91 $\leq$ CFI $\leq$ 0.92 (recommended CFI > 0.90); TLI = 0.91(recommended TLI > 0.90); RMESA = 0.03 (recommended RMSEA < 0.05) and 1.22 $\leq \chi^2/_{df} \leq$1.24 (recommended $\chi^2/_{df}$< 5).

Models MG12 to MG19 specifically focused on the structural component of the EBC model – the path coefficients and factor correlations that were critical to test predictions based on the EBC model (see Table 7.5). With MG12, the path coefficients (H1 to H3), first and second order factor loadings were constrained across four sub-groups. There were not decrement in fit indices (TLI = 0.92; CFI = 0.92) in comparison with MG1; model indicating that the model had met the acceptable fit indices requirement.

The goodness of fit for model MG13 was similar to model MG12 with the exception that the second factor loadings were freely estimated. Results indicated that Model MG20 still produced an acceptable goodness of fit when all of the loadings, paths coefficients, and factor correlations were held invariant across four sub-groups (see Figure 7.6 for RMSEA, TLI and CFI fit indices comparisons).

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	Full E-Business Capabilities (EBC) Model	
Multiple Group SEM							SEM Invariant (constraint)	Freely Estimate
MG12	3868.43	3164	1.22	0.92	0.91	0.03	2nd FL, PC (H1-H3)	FC (H4-H6)
MG13	3847.99	3140	1.23	0.92	0.91	0.03	PC (H1-H3)	FC (H4-H6), 2nd FL
MG14	3845.11	3134	1.23	0.92	0.91	0.03	PC H1	FC(H4-H6), 2nd FL
MG15	3842.84	3134	1.23	0.92	0.91	0.03	PC H2	FC(H1-H3), 2nd FL
MG16	3844.86	3134	1.23	0.92	0.91	0.03	PC H3	FC(H4-H6), 2nd FL
MG17	3865.34	3158	1.22	0.92	0.91	0.03	2nd FL, PC H1	FC(H4-H6)
MG18	3864.01	3158	1.22	0.92	0.91	0.03	2nd FL, PC H2	FC(H4-H6)
MG19	3866.23	3158	1.22	0.92	0.91	0.03	2nd FL, PC H3	FC(H4-H6)
MG20	3924.92	3173	1.24	0.92	0.91	0.03	2nd FL, FC(H4-H6), PC (H1-H3)	-

Note. All of the tested model has SEM invariant = 1st FL and freely estimated = FV. 1st FL = Factor loading for first order factors, 2nd FL = Factor loadings for second order factor, FC(H4-H6) = Factor Correlations, FV = Factor Variances, FC(H4) = Factor Correlation between EBR and BS, FC(H5) = Factor Correlation between SCS and EBA, FC(H6) = Factor Correlation between EBA and BS, PC(H1-H3) = Path Coefficients , PC H1 = Path Coefficient from BS to BP, PC H2 = Path Coefficient from SCS to BP, PC H3 = Path Coefficient from EBA to BP. In Model TG1, the EBC model was fit to the total group, whereas for Models MG1-MG20 the ECC model was fit separately for each of the four sub-groups representing different groups. For Models MG2-MG19, some combination of parameters is required to be invariant across the four sub-groups.

Table 7.5 Structural goodness-of-fit for the EBC model fit with respect to multiple sub-groups

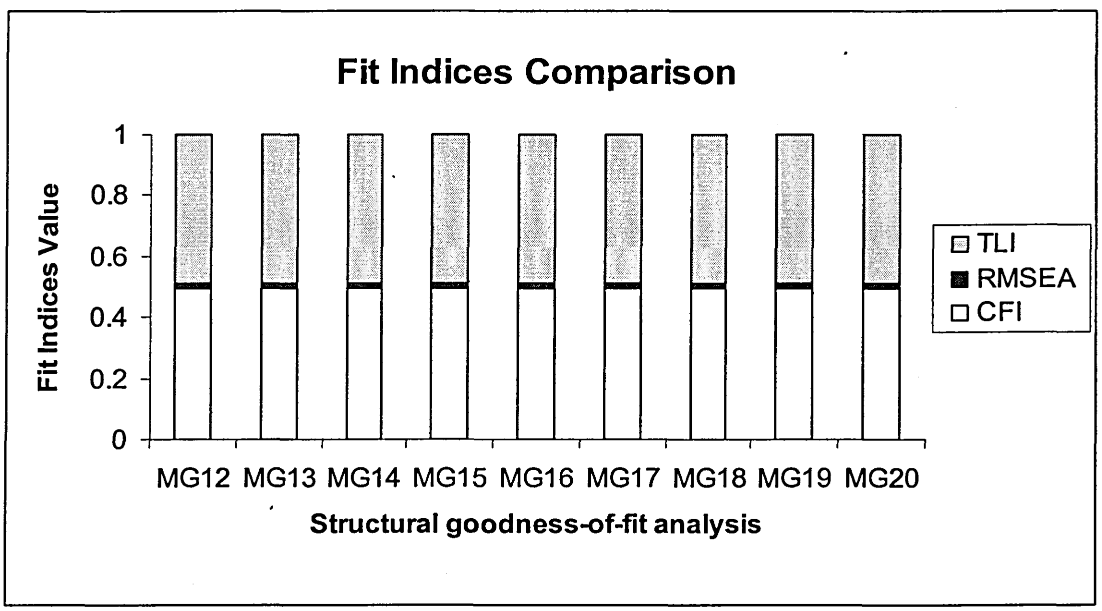


Figure 7.6 Fit Indices comparisons for models MG12 to MG20

In summary, these analyses successfully illustrated that even the extremely demanding models (with total constraint for all parameters such as MG20) was able to provide a reasonable goodness of fit. However, as a result, none of these multiple group models had stood out clearly as the "best" fit. Therefore, further analyses will be conducted to asses the parameter estimates based on two models out of the twenty identified models. The comparisons of parameters across four sub-groups will be evaluated as:

i) Evaluate the parameters for main hypotheses (H1 to H6) and sub-hypotheses (H1a to H3c) by constraining first order factor loadings to be equalled (it is assumed that all of the first order factor loadings loaded on first order factors (TOP dimensions) have the same weighting and impact effects between four sub-groups) (model MG2) (See Figure 7.4).

ii) Evaluate parameters for main hypotheses (H1 to H6) by constraining first and second order factor loadings (TOP dimensions: H1a to H3c) to be equalled (it is to assumed that all of the 1^{st} order factor loadings loaded on first order factors (TOP dimensions) and second order factor loadings (EBC factors) had the same weighting and impact effects and between four sub-groups) (model MG3) (See Figure 7.5).

Results display in Table 7.4 and Table 7.5 indicated that different models had the ability to access certain path coefficients or factor correlations by constraining certain paths or correlations to be equalled / invariant. Further investigations were conducted to determine if the nested comparison model (model MG2 and MG3) produced a significant chi-square difference in the nested model in Figure 7.7.

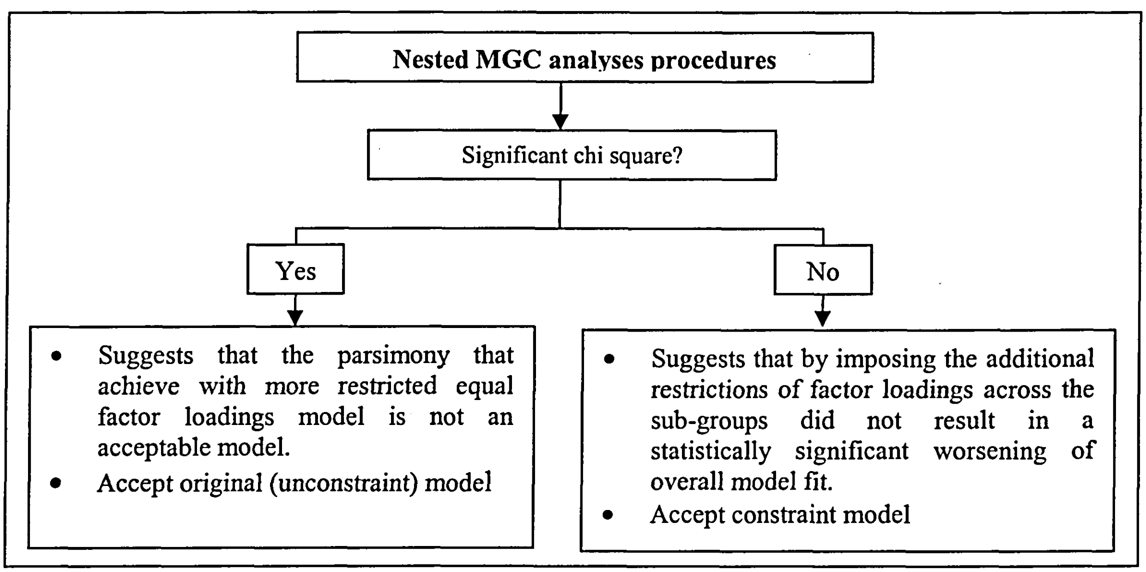


Figure 7.7 Chi-square comparisons for nested multiple groups

7.4 EVALUATION OF MG3 MODEL

The critical issue in the present investigation is to determine the parameter weights of the path coefficients (H1 to H3) and factor correlations (H4 to H6) on business performance across the four sub-groups. Model MG3 assumed that the entire set of first and second factor loading factors (dimensions of TOP) that loaded on EBC factors (business strategy, supply chain strategy and e-business adoption) are invariant (i.e. same significant parameter weights) across four sub-groups. Parameter estimates and goodness of fit for this highly restrictive multi-group model MG3 were nearly the same as those based on the total group model TG1 (see Table 7.4). In order for model MG3 to qualify as the "best" fit model to compare hypotheses H1 to H6 among sub-groups, the following hypotheses (propositions) are proposed:

H_0 : The baseline model **MG1** that allow first and second order factor loadings to be varied across four sub-groups fits the data better;

H_1 : The nested model **MG3** that constrained first and second order factor loadings across four sub-groups fits the data better.

	Baseline MG1 Model	**Nested MG3 Model**	**Nested Comparison**
χ^2	3756.29	3865.04	$\Delta\chi^2 = 108.75$
df	3044	3157	$\Delta df = 113$
No. Parameters	400	287	
χ^2/df	1.23	1.22	
TLI	0.91	0.91	$p = 0.60$ (Reject H_0; accept H_1)
CFI	0.92	0.92	
IFI	0.92	0.92	
RMSEA	0.03	0.03	

Table 7.6 Measurement invariance of EBC MG3 model

The results of nested multiple model comparison ($\Delta\chi^2 = 108.76$ with $\Delta df = 113$. $p = 0.60$; $p > 0.05$) suggested that by imposing additional restrictions of (first and second order) factor loadings across four sub-groups did not resulted in significant worsening of overall model fit (see Table 7.6). This confirmed that that model **MG3** had met the criteria to articulate and compare the parameter estimates (i.e. hypotheses H1 to H6) across four sub-groups.

7.4.1 Sub-Group Comparison for Hypotheses H1 to H3

Table 7.7 presents different of parameter estimates among adopter and non-adopters of e-business sub-groups in the EBC structural model. Business strategy (BS) provided a positive impact on business performance (BP) across all the four sub-groups. As observed in Table 7.7, all of the critical ratios were statistically significant (greater than 1.96) at 0.05 level and the standardised path coefficients value had almost similar parameter estimates across four sub groups ranging in between $\gamma = 0.28$ to $\gamma = 0.31$.

With regard to hypothesis H2, the non-adopter of e-business UK sub-group demonstrated the strongest standardised path coefficient ($\gamma_{1,2\ (UK_{N\_Adopt})} = 0.46$; *c.r.* = 3.32) in comparison with other three sub-groups. Whereas, adopter ($\gamma_{1,2\ (M_{Adopt})} = 0.27$; *c.r.* = 2.05) and non-adopter ($\gamma_{1,2\ (M_{N\_Adopt})} = 0.32$; *c.r.* = 2.60) for Malaysia displayed a significant and positive impact on business performance. However, no significant casual path was found linking "supply chain strategy (SCS) to business performance (BP)" for adopter of e-business sub-group in UK ($\gamma_{1,2\ (UK_{Adopt})} = 0.12$; *c.r.* = 1.10.

E-business adoption (EBA) was observed to be a significant and strong influence on "business performance" in comparison with other factors across adopter of e-business sub-groups for the two samples. This had confirmed the contribution of this factor to ensure the success of e-business implementation for both samples. This was supported by discussions in previous chapter (Section 6.7.3). In comparison with other factors, both sub-groups of e-business had demonstrated the strongest ($\gamma_{1,3\ (UK_{Adopt})} = 0.57$; *c.r.* = 4.09) and second strongest ($\gamma_{1,3\ (M_{Adopt})} = 0.42$; *c.r.* = 2.94) within the sample. However, e-business adoption (EBA) (H3: ($\gamma_{1,3\ (UK_{N\_Adopt})} = 0.17$; *c.r.* = 1.03: $\gamma_{1,3\ (M_{N\_Adopt})} = 0.14$; *c.r.* = 0.80) for both non-adopter of e-business sub-groups had revealed a positive but insignificant path coefficient with business performance (BP). This implies that for the non- adopters e-business strategy was either non-existent or do not contributed towards the business performance. Figure 7.8 portrays the comparison of path coefficients (H1 to H3) across four sub-groups.

Hypotheses					Standardised Weight, (Critical Ratio, t-value)				Standard Error (S.E)			
					Adopt (M)	Adopt (UK)	non- Adopt (M)	non- Adopt (UK)	Adopt (M)	Adopt (UK)	non- Adopt (M)	non- Adopt (UK)
Paths Coefficients												
H1	BP	←	BS	$\gamma_{1,1}$	0.31 (3.92)	0.30 (2.85)	0.31 (2.53)	0.28 (2.14)	0.10	0.13	0.14	0.15
H2	BP	←	SCS	$\gamma_{1,2}$	0.27 (2.05)	**0.12 (1.10)**	0.32 (2.60)	0.46 (3.32)	0.13	0.13	0.13	0.13
H3	BP	←	EBA	$\gamma_{1,3}$	0.42 (2.94)	0.57 (4.09)	**0.14 (0.80)**	**0.17 (1.03)**	0.15	0.17	0.53	0.40
Factor Correlations												
H4	BS	←→	SCS	$\phi_{1,2}$	0.36 (3.25)	0.28 (1.98)	0.38 (2.79)	0.44 (2.80)	0.16	0.06	0.07	0.10
H5	SCS	←→	EBA	$\phi_{2,3}$	0.77 (5.55)	0.49 (3.10)	**0.02 (0.15)**	**0.02 (0.15)**	0.42	0.07	0.03	0.03
H6	BS	←→	EBA	$\phi_{1,3}$	0.31 (2.66)	0.45 (2.94)	**0.12 (0.52)**	**0.02 (0.15)**	0..13	0.07	0.04	0.03

Table 7.7 Group comparison between (UK_{Adopt}, n = 80; UK_{N_Adopt}, n = 63; M_{Adopt}, n = 124; M_{N_Adopt}, n = 84) based on path coefficient and factor correlations for model MG3 with correspond t-value and (*c.r.*) [The bold indices show statistically insignificant results]

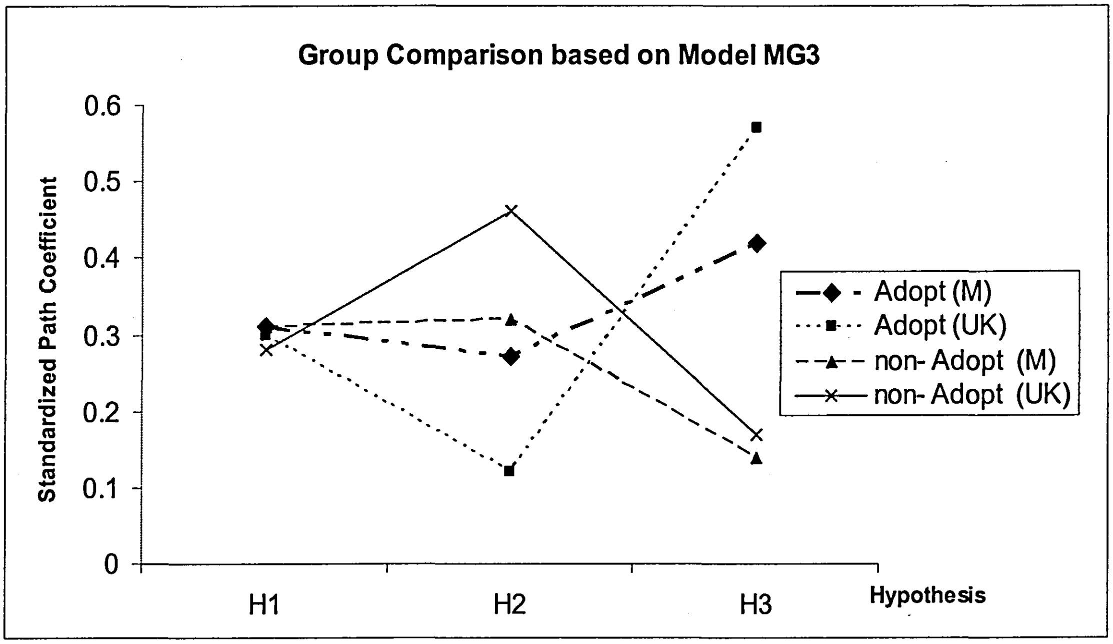


Figure 7.8 Group comparison of hypotheses H1 to H3 based on model MG3

7.4.2 Sub-Group Comparison for Hypotheses H4 to H6

Results display in Table 7.7 suggested a positive and significant reciprocal effect between business strategy (BS) and supply chain strategy (SCS) (H4). Non-adopter of e-business UK sub-group had the strongest correlation with standardised factor correlations of $\phi_{1,2}$ (UK_{N_Adopt}) = 0.44 and critical ratio = 2.80 followed by non adopter for e-business Malaysian sub-group $\phi_{1,2}$ (M_{N_Adopt}) = 0.38; *c.r.* = 2.79. Sub-groups for both adopter of e-business sub-groups also demonstrated a positive correlation with standardised value ($\phi_{1,\,2}$ (M_{Adopt}) = 0.36; *c.r.* = 3.25: $\phi_{1,\,2}$ (UK_{Adopt}) = 0.28; *c.r.* = 1.98). Such results are hardly surprising as bricks and mortar companies traditionally depend on the co-existent relationships between supply chain strategy (SCS) and business strategy (BS) (H4) to achieve a sustainable competitive advantage.

By using the nested multiple group comparison, both of the adopter sub-groups (UK and Malaysia) provided a significant and positive correlation between supply chain strategy (SCS) and e-business adoption (EBA) (H5) $\phi_{2,3}$ (M_{Adopt}) = 0.77; c.*r.* = 5.55: $\phi_{2,3}$ (UK_{Adopt}) = 0.49; c.*r.* = 3.10 and between business strategy (BS) and e-business adoption (EBA) $\phi_{1,\,3}$ (M_{Adopt}) = 0.31; *c.r.* = 2.66: $\phi_{1,\,3}$ (UK_{Adopt}) = 0.45; *c.r.* = 2.94.

In comparison with non adopter sub-groups (UK and Malaysia), correlations between e-business adoption and supply chain strategy (H5) ($\phi_{2,3}$ (M_{N_Adopt}) = 0.02; *c.r.* = 0.15: ($\phi_{2,3}$ (UK_{N_Adopt}) = 0.02; *c.r.* = 0.15) and between e-business adoption and business strategy (H6) ($\phi_{1,3}$ (M_{N_Adopt}) = 0.12; *c.r.* = 0.52: $\phi_{1,2}$ (UK_{N_Adopt}) = 0.02; *c.r.* = 0.15) revealed a positive standardised, however, insignificant value (see Table 7.7). Figure 7.9 portrays the comparison of path coefficients (H1 to H3) across four sub-groups.

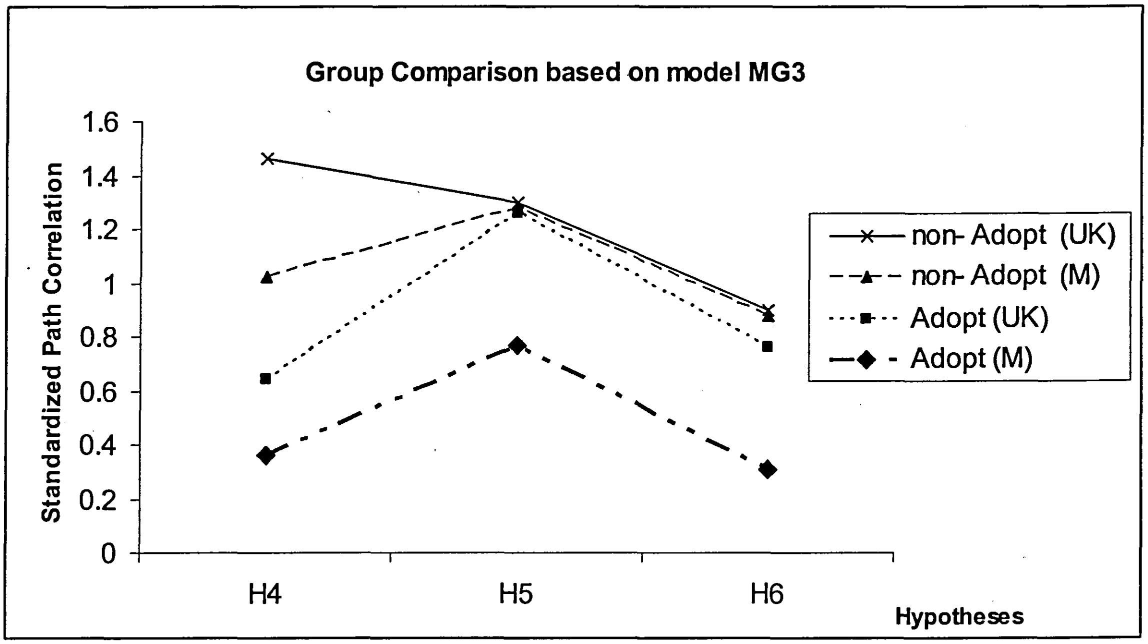


Figure 7.9 Group comparison of hypotheses H4 to H6 based on model MG3

7.5 EVALUATION OF MG2 MODEL

This section seeks to investigate the parameter estimates for the sub-hypotheses among adopters and non-adopter of e-business sub-groups. As described in Section 7.3.1, nested multiple group comparison using model MG2 (first order factor loadings to be invariant (the same) across the four sub-groups) with the assumption that second factor loadings (dimensions of technology, people and organisation) for SCS, EBA and BS constructs, path coefficients and factor correlations are feely estimated across four sub-groups.

Although the model MG2 only required first order factor loadings to be the same across the four sub-groups, this model produced a reasonable good fit with indices TLI = 0.91; CFI = 0.92, RMSEA = 0.03 as good as model MG3 (See Table 7.4). In MG2 model, it was assumed that items (variables) loaded on first order factor constructs have same (invariant) impact weight while second order factor loadings (TOP dimensions) were held unconstraint (unequal) across four sub-groups. The nested model comparison ($\Delta\chi^2$ = 86.71 with Δdf = 88; p = 0.54; p > 0.05) suggested that imposing additional restrictions did significantly worsen the overall model. The result provided the confidence that model MG2 had met the criteria to articulate and compare parameter estimates (see Table 7.8).

	Baseline MG1 Model	**Nested MG3 Model**	**Nested Comparison**
χ^2	3756.29	3842.46	$\Delta\chi^2 = 86.17$
df	3044	3132	$\Delta df = 88$
No. Parameters	400	312	$p = 0.54$ (Reject H_0; accept H_1)
χ^2/df	1.23	1.23	
TLI	0.91	0.91	
CFI	0.92	0.92	
IFI	0.92	0.92	
RMSEA	0.03	0.03	

Table 7.8 Measurement invariance for the EBC MG2 model

7.5.1 TOP Dimensions vs. Business Strategy

Table 7.9 illustrates that all of the factor loadings on second order construct for business strategy for the four groups displayed a positive and significant standardised value ranging from $\gamma_{2,1(UK_{N\_Adopt})}$ = 0.97 ("technology infrastructure") to $\gamma_{3,1(M_{Adopt})}$ = 0.76 ("organisation infrastructure") with *c.r.* > 2.96. The table also shows that traditional brick and mortar firms from both countries scored relatively higher standardised value of business strategy (BS) in comparison with the adopter of e-business. With factor loadings γ > 0.91 and *c.r.* > 2.96, the findings indicate a strong and significant business strategy (BS) factor. The standard error of the difference was determined by taking the square root of the sum of the squares of the standard errors of the individual coefficients (Joreskog and Sorbom, 1993).

Hypotheses		Standardised Weight (Critical Ratio, t-value)				Standard Error (S.E)			
		Adopt (M)	Adopt (UK)	non- Adopt (M)	non- Adopt (UK)	Adopt (M)	Adopt (UK)	non- Adopt (M)	non- Adopt (UK)
OI ← BS	$\gamma_{3,1}$	0.76 (Fixed)	0.93 (Fixed)	0.94 (Fixed)	0.91 (Fixed)	Fixed	Fixed	Fixed	Fixed
TI ← BS	$\gamma_{2,1}$	0.89 (7.41)	0.87 (7.77)	0.92 (8.64)	0.97 (8.53)	0.15	0.12	0.12	0.13
PS ← BS	$\gamma_{4,1}$	0.96 (7.07)	0.96 (6.88)	0.97 (7.81)	0.95 (7.68)	0.16	0.13	0.13	0.14
FM ← BP	$\beta_{11,1}$	0.94 (Fixed)	0.95 (Fixed)	0.93 (Fixed)	0.94 (Fixed)	Fixed	Fixed	Fixed	Fixed
CM ← BP	$\beta_{13,1}$	0.95 (10.97)	0.95 (9.96)	0.85 (8.50)	0.91 (8.87)	0.07	0.08	0.08	0.08
EM ← BP	$\beta_{12,1}$	0.95 (9.12)	0.99 (8.75)	0.97 (8.53)	0.95 (8.27)	0.07	0.08	0.08	0.09
SCR ← SCS	$\gamma_{7,2}$	0.70 (7.51)	0.77 (5.11)	0.50 (3.77)	0.80 (5.41)	0.10	0.18	0.13	0.14
OIn ← SCS	$\gamma_{6,2}$	0.98 (Fixed)	0.79 (Fixed)	0.91 (Fixed)	0.93 (Fixed)	Fixed	Fixed	Fixed	Fixed
TIn ← SCS	$\gamma_{5,2}$	0.94 (12.39)	0.92 (5.77)	0.85 (5.86)	0.89 (6.01)	0.08	0.21	0.17	0.19
OC ← EBA	$\gamma_{9,3}$	0.86 (Fixed)	0.77 (Fixed)	**0.25 (Fixed)**	**0.27 (Fixed)**	Fixed	Fixed	Fixed	Fixed
AC ← EBA	$\gamma_{10,3}$	0.69 (4.84)	0.74 (4.07)	**0.26 (0.43)**	**0.62 (1.29)**	0.09	0.12	11.23	0.41
TC ← EBA	$\gamma_{8,3}$	0.86 (6.15)	0.90 (6.84)	**0.24 (1.67)**	**0.29 (1.10)**	0.11	0.17	0.34	0.30

Table 7.9 Group comparison between (UK_{Adopt}, n = 80; UK_{N_Adopt}, n = 63; M_{Adopt}, n = 124; M_{N_Adopt}, n = 84) based on path coefficient and factor correlations for model MG3 with correspond t-value and (*c.r.*) based on model MG2. [The bold indices show statistical insignificant results].

Overall, in comparison with the non-adopter sub-groups, adopters sub-groups scored relatively weak, however highly significant impact on business strategy (BS). Organisation dimension ("organisation infrastructure") for the adopter of the Malaysian sub-group scored the weakest standardised factor loadings with $\gamma_{3,1(M_{Adopt})} = 0.76$.

7.5.2 TOP Dimensions vs. Supply Chain Strategy

Table 7.9 also demonstrates that technological dimension ("technology integration") produced a highly significant standardised second order factor loadings loading on supply chain strategy construct for the four sub-groups ranging from $\gamma_{5,2\ (M_{Adopt})} = 0.94$, *c.r.* = 12.39 to $\gamma_{5,2\ (UK_{N\_Adopt})} = 0.85$, *c.r.* = 5.86 indicating the strategic importance of technological issues when integrating e-business with supply chain strategy (SCS) which will indirectly impact on the business performance (BP).

The above statement is also applicable for "organisation integration" (OIn) dimension in which three of the sub groups (Adopt (M), non - Adopt (M), non - Adopt (UK)) produced a highly significant second factor loadings ranging from $\gamma_{6,2(M_{Adopt})} = 0.98$ to $\gamma_{6,2(M_{N\_Adopt})} = 0.91$. The only exception was the UK's adopter of e-business firms which had a low significant standardised value of $\gamma_{6,2\ (UK_{Adopt})} = 0.79$ indicating that organisation dimension has the weakest impact on the supply chain strategy (SCS).

"People" dimension ("supply chain relationship") had the relatively the weakest impact (however, significant standardised factor loadings) on supply chain strategy factor across all of four sub-groups. Traditional brick and mortar companies for the Malaysian sub-group had the weakest factor loading of $\gamma_{7,2(M_{N\_Adopt})} = 0.50$ with *c.r.* = 3.77. A relatively high standardised factor loadings of $\gamma_{7,2(UK_{N\_Adopt})} = 0.80$ with *c.r.* = 5.41 indicated that traditional brick and mortar companies in the UK had relatively better understanding of soft "supply chain relationship" dimension related with the supply chain strategy implementation.

7.5.3 TOP Dimensions vs. E-Business Adoption

UK and Malaysian adopter of e-business sub-groups demonstrated a strong positive and significant standardised value of TOP dimensions ranging from $\gamma_{(10,3M_{Adopt})} = 0.69$ to $\gamma_{8,3(UK_{Adopt})} = 0.90$ with critical ratio $c.r. = 4.84$ to $c.r. = 6.84$ impact on e-business adoption (EBA) factor (see Table 7.9). In addition, non-adopter of e-business sub-group procured a positive but insignificant standardised value with critical ratio range from $c.r. = 0.43$ to $c.r. = 1.67$; (where $c.r. < 1.96$ is insignificant).

7.5.4 TOP Dimensions vs. Business performance

Business performance (BP) was broken down into three types of measures namely, financial measure (FM), efficiency measure (EM) and coordination measures (CM). These score had a strong positive and significant standardised value ranging from $\gamma_{13,1(M_{N\_Adopt})} = 0.85$ to $\gamma_{12,1(UK_{Adopt})} = 0.99$ respectively with $c.r. = 8.27$ and $c.r. = 10.97$ across the four sub-groups (see Table 7.9).

7.6 COMPARING MULTIPLE GROUPS

In this study, multiple group analysis was performed in two ways (see Figure 7.10).

- Technique 1: Multi-group analysis was conducted to compare the similarity or differences among path coefficients, factor correlations, and first and second order factor loadings across four sub-groups simultaneously (combination of adopter and non-adopter from UK and Malaysia).

- Technique 2: Multi- group analysis was performed to compare the similarity or difference among path coefficients, factor correlations, first and second order factor loadings for adopter and non-adopter of e-business for the same sample (UK or Malaysia).

To confirm the validation of the analyses conducted in this chapter (Technique 1), MGC analyses were conducted between adopter and non-adopter of e-business sub-groups within the sample (Technique 2, Appendix 7.2). As seen in Appendix 7.2 when performing MGC using Technique 2, results obtained when compared with results from Technique 1 produced almost similar significant and positive paths (different weights) for the four sub-groups. For example, non-significant paths of e-business adoption (EBA) to business performance (BP) were observed for both non-adopters of e-business sub-groups in Technique 1 and Technique 2. In addition, non-significant correlations were observed between e-business adoption (EBA) to supply chain strategy (SCS) and business strategy (BS) when performing Technique 2 for both of the non-adopter of e-business sub-groups within the same sample respectively.

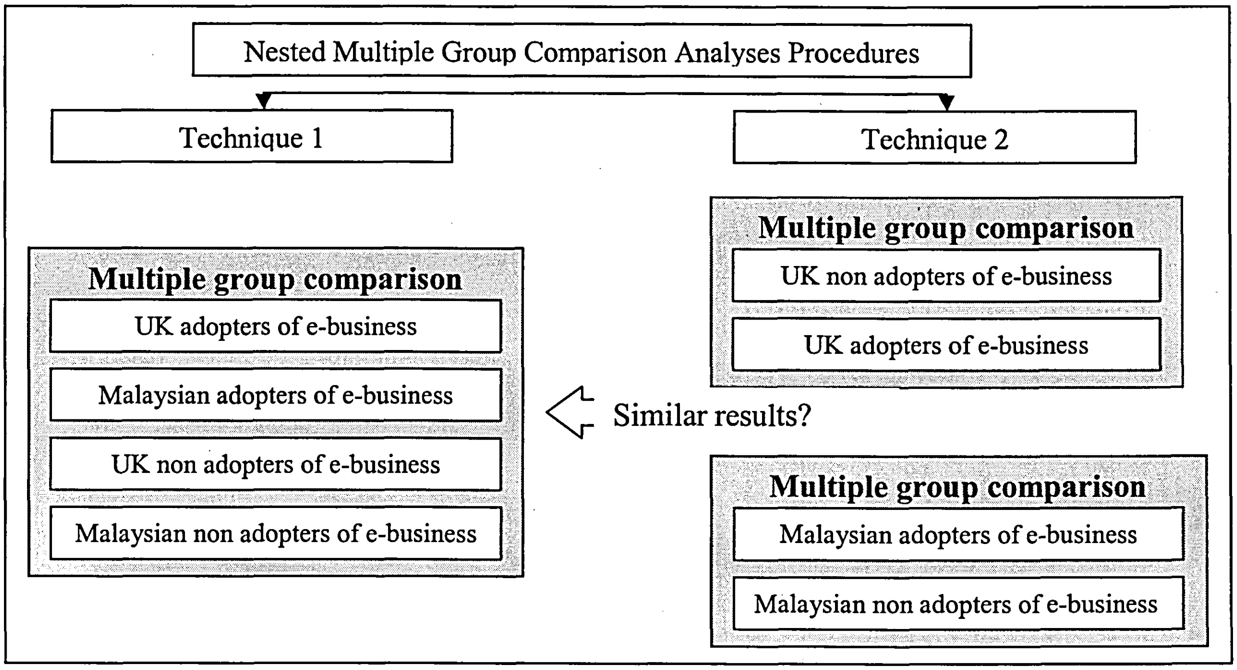


Figure 7.10 : Two techniques for performing multiple group analysis

The same conclusion could also be made when performing MGC for two sub-groups within UK sample, which yield the almost similar results with comparison of four sub-groups simultaneously. For example, both results showed that supply chain strategy (SCS) factor was still a positive but non-significant impact to business performance (BP) for the UK's e-business adopter sub-group. In addition, supply chain strategy remained the strongest influence for increased business performance for non-adopter of UK sub-group for both analyses.

In summary, this section demonstrated that the same measurement model can be applied across the four sub-groups and that there are some interesting differences in substantive effects. This means that the measures are valid and reliable, so the differences in effects are "real" and not due to sampling or statistical artefact. The remainder of the chapter will seek to interpret and discuss the parameters differences based on using Technique 1 multiple groups analysis.

7.7 RESULT DISCUSSIONS

This chapter conducts nested multiple group analysis to investigate whether the impact of e-business capability factors on business performance were invariant or different across four sub-groups (adopter and non-adopter of e-business) for the Malaysian and UK samples. If they were different across sub-groups, further analysis were conducted to assess how theses factors differ when incorporating "technology", "organisation" and "people" dimensions.

7.7.1 E-business Implications: Adopter of E-Business Sub-Groups

Table 7.9 has indicated the impact of business strategy on business performance is significantly important across four sub-groups. In addition, results obtained using Technique 2 in Section 7.6 and Appendix 7.1 also indicates the similar strategic important of this factor both samples (parameter estimates range from 0.28 to 0.37). As a result, it can be argued that the strategic implementation of business strategy is considered important to ensure e-business success regardless of geographical area (developed and developing country context) and therefore supported the result findings in Chapter 6. However, one of the major findings from the multiple group analysis indicates the strategic importance of business strategy (BS) for the developed country (UK) is different from the developing country (Malaysia).

E-business adoption (EBA) was also observed as a strong impact on "business performance" (BP) in comparison with other factors, and postulates a major reason towards a successful e-business adoption in the both samples. However, it was observed that the e-business adoption factor consists of "attitudinal capability (AC)" revealed the weakest, however significant standardised value of $\gamma_{10,3} = 0.74$ for UK adopters and $\gamma_{10,3} = 0.69$ for the Malaysian adopters sub-group (see Table 7.9). It can be argued that although respondents have initiated e-business within their organisation, the "readiness" and "willingness" of their business partners to support the initiatives will have a great influence on business success. Therefore, by identifying and overcoming the barriers and encourage the "(e)-readiness" among business partners, organisation from both countries will be able to reap the full benefits of e-business initiatives.

"Technology capability (TC)" and "organisation capability (OC)" were observed to be a strong influence to determine the success e-business implementation for the adopter of e-business in UK, which is inline with previous chapter discussions. In addition, the results also support the academic view that successful of e-business adoption will require a dedicated individual (usually the Chief Executive Office (CEO) paying attention to a multitude of good management practices to develop right attitudes for his/her employees to adopt organisational change (Tidd *et al.,* 2001).

Figure 7.11 illustrates the significant influence of the three e-business capability factors on business performance for UK adopters sub-group. As observed in the figure, supply chain strategy itself did not provide a direct significant impact on business performance. However, a strong correlation between e-business adoption (EBA) and supply chain strategy (SCS) factors indicates that the companies in UK that belong to this sub-group may already achieved a strong integration of their existing supply chain operation with Internet technology ((e)-supply chain). This may be due to UK reaching to a certain stage of e-business maturity in which adopters of e-business sub-group are able to acknowledge the important of these EBC factors.

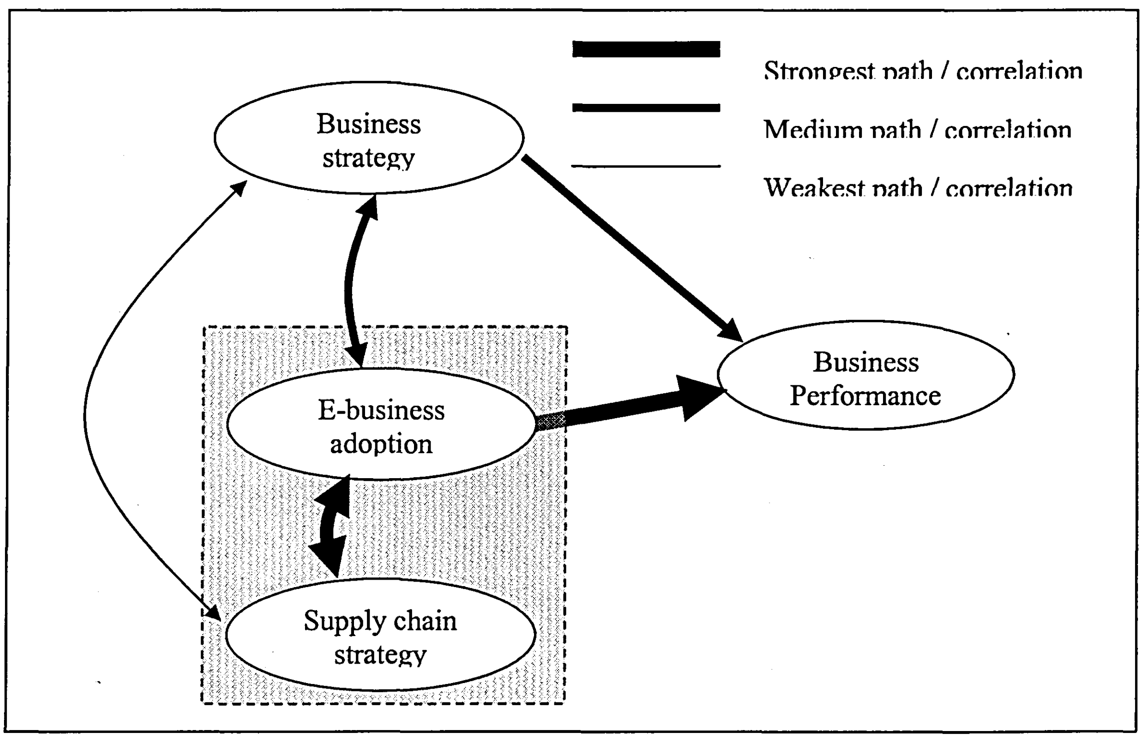


Figure 7.11 Parameter strengths for the UK adopter's of e-business sub-group

In contrast, adopters of e-business sub-group from Malaysia show three EBC factors have a positive and significant impact on business performance. However, as shown in Figure 7.12, the Malaysian e-business sub-group has similar characteristics to the UK adopters in terms of a strong and significant correlation between e-business adoption and supply chain strategy.

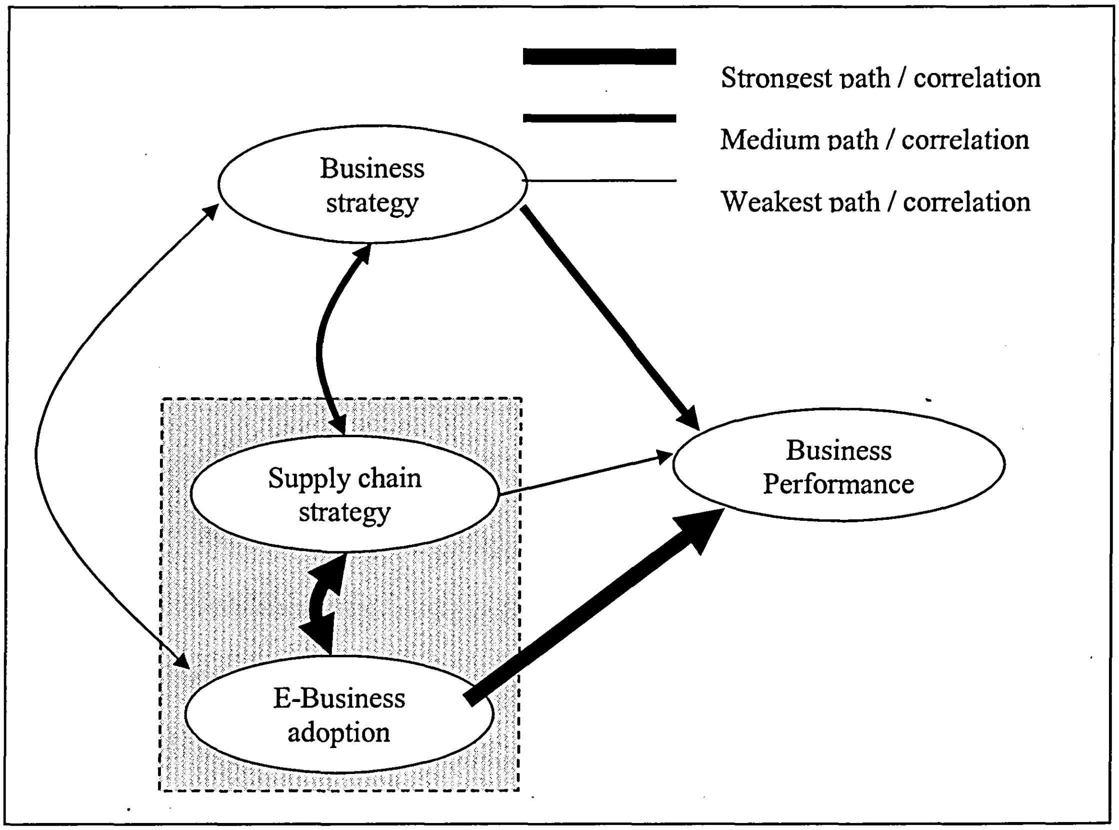


Figure 7.12 Parameter strengths for the Malaysian adopter's of e-business sub-group

7.7.2 E-business Implications: Non Adopter of E-Business Sub-Groups

In order to maintain the sustainability of their businesses, non-adopter of e-business sub-groups from both samples must strive to attract and retain new and existing customers by keeping up with rapid changes in technology. They need to realise that e-business as an enabling tool not only to offer a large variety of products in mass markets but also to personalise the sales environment and processes in such a way that they offer the customer value added as compared to the traditional buying process. As expected, e-business adoption had demonstrated a positive but insignificant impact business performance. It can be argued that companies that belong to this sub-group, have either no e-business strategy or unable to leverage this initiatives with business performance.

Table 7.7 indicates that for non-adopters of e-business sub-group (UK and Malaysia) company's business performances were contributed strongly by supply chain strategy (SCS). Supply chain strategy (SCS) incorporating TOP dimensions are still vital if the company do not utilise Internet technology to maximize their company performance. It is because they need to create competitive advantage through fulfilment to maintain their market share and position in the industry. As seen from the results, sub-groups from both samples had demonstrated the strongest impact of supply chain strategy on the business performance.

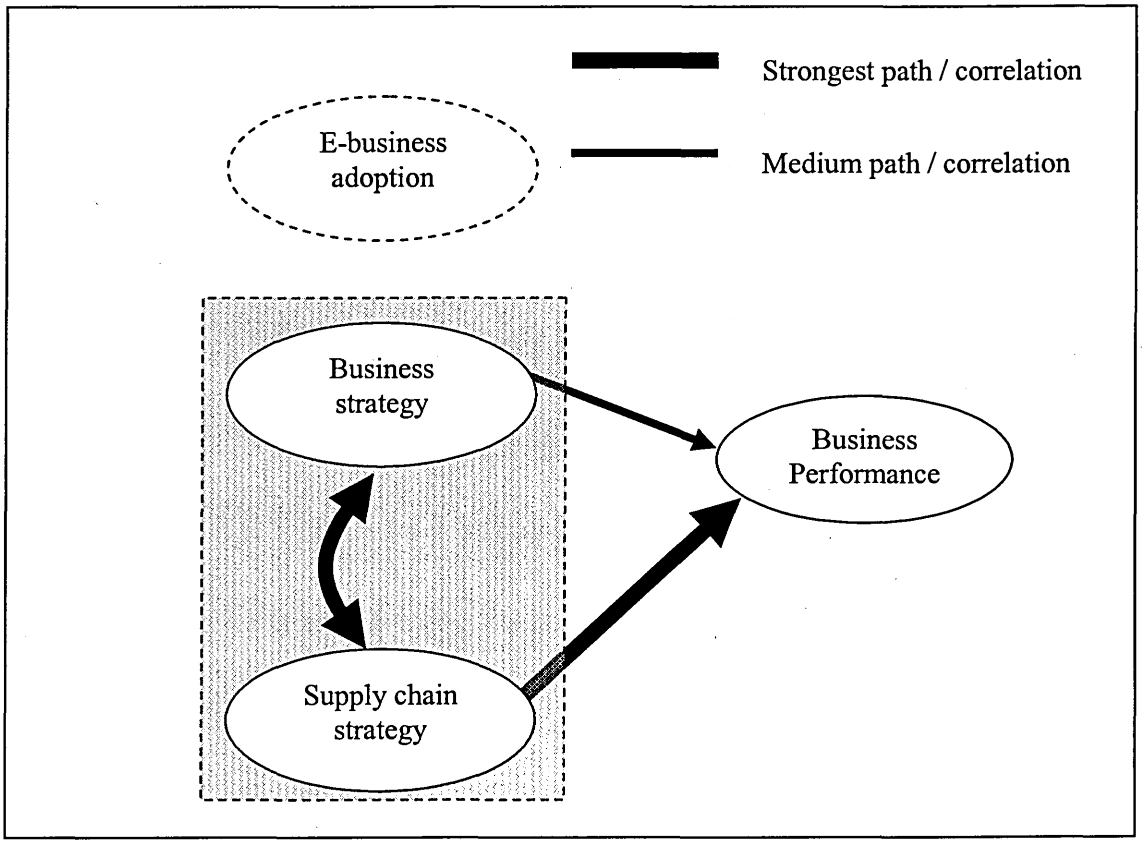


Figure 7.13 Parameter strengths for non-adopter's of e-business sub-group (both UK and Malaysian sub-samples)

It is not surprising that the business strategy and supply chain capabilities are the main contributor for business performance for non-adopter of e-business. It is apparent that for organisation to be successful, supply chain strategy needs to be given a higher level of strategic importance (Johnson and Whang, 2002; Lancioni *et al.,* 2003). The result also supported the view that organisations who articulate their strategic objectives and plans relating to supply chain strategy are likely to perceive business benefits for the traditional brick and mortar businesses (Figure 7.13).

The correlations among EBC factors were evaluated for the non-adopter of e-business for both sub-groups. In comparison with adopter of e-business group, only correlation between supply chain strategy and business strategy (H4) provided a positive mutual dependency. Meanwhile, a low and non - significant correlation were recorded between supply chain strategy and e-business adoption (H5) and business strategy and e-business adoption (H6). There were no significant causal paths found linking "technology capability (TC), organisation capability (OC) and attitudinal capability (AC) to e-business adoption" factors (see Table 7.9). Perhaps for this sub-groups, the barriers to e-business implementation are the unwillingness of mangers to be responsible for technological change (Kalakota and Robinson, 2001), complexity of available e-commerce services (Bodorick *et al.,* 2002) and lack of required skills and knowledge (Lawson *et al.,* 2003).

7.8 SUMMARY

In this study, nested multiple group analysis was chosen to compare multiple groups across the same measurement instrument (or multiple population groups) for a number of identified structural equation models. In this chapter, differences of parameter estimates from SEM analyses, among four sub-groups consisting of adopter and non-adopters of e-business, were discussed and evaluated. Based on the data collected from the questionnaire survey, this study developed and empirically tested a theoretical model for assessing the impacts of e-business capability factors; with each of the factors encompassing "technological", "organisational" and "people" dimensions on the surveyed company's performance.

Through instrument development and hypothesis testing, this study identified and validated nine sub factors within each of the proposed e-business capability factors. The theoretical model illustrated in this paper identified and confirmed that successful e-business adoption requires a comprehensive business strategy along with supply chain and e-business adoption; developed on the embedded e-technology as well as considering the organisational and attitudinal dimensions. In summary, it was observed from the above analysis that e-business adoption factors do not have a significant impact on business performance for non-adopters of e-business sub-groups from both samples. In addition, three of the EBC factors underlying TOP dimensions had positive and significant impacts on business performance for the Malaysian adopters of e-business sub-group. However, a strong mutual dependency between e-business adopters and supply chain strategy factors was observed, which supply chain strategy does not significantly impact on business performance for the UK's adopter of e-business sub-groups.

CHAPTER 8

RESEARCH IMPLICATIONS AND CONCLUSIONS

8.1 INTRODUCTION

This study as a whole has investigated factors that have impacted on the adoption and use of e-business. As a result of recognising the gaps that exist in the current empirical studies, this study was able to identify relevant dimensions and group these into three broad categories consisting of "technological", "organisational" and "people", embedded in three proposed e-business capability (EBC) factors (business strategy, supply chain strategy and e-business adoption). The main purpose of this study is to investigate whether any relationships exist among e-business capability factors and whether they impact on business performance. This is accomplished by developing a psychometrically sound e-business capability framework instrument that is designed specifically to investigate these issues.

In order to investigate the problem, it was necessary to perform a review of the related literature concerning the development of e-business in Chapter Two. Subsequently, Chapter Three discussed in depth the development of an E-Business Capability (EBC) framework and proposed the main hypotheses and sub-hypotheses to address the research objectives. The research design and methodology was presented in Chapter Four and the analysis of the results featured in Chapters Five, Six and Seven. In addition, the interpretation and discussion of quantitative results were addressed in Chapters Six and Seven, in relation to the literature, and in accordance with the hypotheses and postulations.

The research implications and conclusions reached from the above-mentioned chapters are considered in this chapter in order to reach a final conclusion on the proposed hypotheses that there is a positive relationship between the proposed EBC factors, incorporated with TOP dimensions, and business performance. This chapter is organised as follows: The first sections of this chapter revisit the research objectives for this study. The intention of this section is to demonstrate the accomplishment of three research objectives in this study by elaborating and validating (empirically tested) the E-Business Capability (EBC) model in the context of the UK and Malaysian samples. This is followed by a statement of the contribution to knowledge for this research, in particular of the theoretical and practical contributions. This chapter also highlights any limitations of the research and provides suggestions for any further research directions that have emerged, considering that this is a relatively new area of study.

8.2 REVISITING RESEARCH OBJECTIVES

With the aim to identify the factors that contribute to the success and failure of e-business implementation in a multi-country context, the three objectives set by the research (Section 1.3) are achieved as follows:

8.2.1 Development of E-Business Capability Theoretical Framework

Previous research on e-business adoption depends heavily on case studies and anecdotes with little empirical data to measure Internet-based initiatives or gauge the scale of their impact on firm performance (Section 2.7). Existing literature has suggested fragile connections between theories and measures. In addition, critique on literature review suggest that there is also a lack of empirical research on the issues of proposed suitable measures to empirical validation for reliability and validity.

From the assessment in Chapter Two, three limitations of the existing literature were identified:

Limitation (i)	There is a lack of a solid theoretical framework to identify factors that contribute towards e-business success.
Limitation (ii)	There is a lack of "empirical research" conducted to investigate and validate the relationships of the factors to e-business value (improved in business performance).
Limitation (iii)	A lot of the empirical research is based exclusively on one country data set instead of broad data.

In response to the identification of these limitations in e-business research, this study has been successful in closing the three identified research gaps. Chapter 2 successfully provided an overview of the relevant literature on e-business in general and then—more specifically—from the strategic, operational and behavioural perspectives, how specific factors can be perceived to have a significant impact on the success of adopting e-business within an organisation. The analysis of the literature review of e-business revealed some of the main characteristics and features in relation to business strategy, supply chain strategy and e-business adoption and more importantly their distinctive features. Table 8.2 postulates how this study (Chapter 2) has accomplished the first research objective.

Sub-Objectives in this study	First Objective met?	
To construct a specific theoretical framework to explore relationships between these factors and business performance	Theoretical Gap (i)	√
To empirically test the proposed theoretical framework with the intention to approve / disprove the model from data collected in the context of developed (UK) and developing (Malaysia) countries	Empirical Gap (ii)	√
	Focus Research Gap (iii)	√

Table 8.1 Accomplishment of Research Objective One

8.2.2 Identification of TOP Dimensions

This study has also successfully constructed a salient feature of the E-Business Capability framework to articulate the success of e-business implementation. Three mutually dependent concepts have been identified which are represented by business strategy, supply chain strategy and e-business adoption. In addition, this study has successfully appraised the impact of e-business capability factors on business performance in the context of well-known systems (i.e. technology, organisation and people) dimensions (see Table 8.3). Stevens (1989) differentiated contributory factors for supply chain integration into the 'hard' issues (such as technology) and the 'soft' (e.g. relations, attitudes, etc). Borrowing the concept from Stevens (1989), each factor is further incorporated into three sub-factors consisting of "technological", "organisational", and "people" dimensions.

This study suggests that Stevens' (1989) supply chain integration framework is applicable in the present day environment where companies want to move from a traditional business to e-business. Therefore, this study has successfully met the second research objective with the identification of these three dimensions (TOP) embedded within each of the EBC factors, and has demonstrated how these factors are well suited for evaluation of e-business success. Under the impression of the proposed theoretical framework and aforementioned discussions, the following six main hypotheses and nine sub-hypotheses were postulated to test the effectiveness of e-business adoption and related business performance (see Table 8.2).

<table>
<tr><th>Research Objectives 2</th><th colspan="4">Sub-Objective met?</th></tr>
<tr><td rowspan="11">To appraise the e-business adoption in the context of well known systems (i.e. technology, organisation and people dimensions</td><td rowspan="11">E-Business Capability Factors</td><td rowspan="3">Business strategy</td><td>Technological infrastructure</td><td>√</td></tr>
<tr><td>Organisational infrastructure</td><td>√</td></tr>
<tr><td>Partnership strategy</td><td>√</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="3">Supply Chain Strategy</td><td>Technology integration</td><td>√</td></tr>
<tr><td>Internal integration</td><td>√</td></tr>
<tr><td>Supply chain relationship</td><td>√</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="3">E-business Adoption</td><td>Technology capability</td><td>√</td></tr>
<tr><td>Organisation capability</td><td>√</td></tr>
<tr><td>Attitudinal capability</td><td>√</td></tr>
</table>

Table 8.2 Accomplishment of Research Objective Two

8.2.3 Empirical Study of Sub-Groups and Multi-Country Context

The critique of the literature in Chapters Two and Three successfully identified that most of the research models constructed are intended to exclusively investigate e-business implementation in the context of developed countries. In particular, previous research discussed extensively e-business development in the context of mature markets and industrialised countries (i.e. UK and USA) (Watson *et al.*, 1997; Zhu *et al.,* 2004). These theories need to be re-examined in the context of developing countries (e.g. Malaysian, Thailand) because these countries may have very different economic and regulatory environments. Therefore, this research sought to provide an international dimension to e-business investigations.

This thesis has tested and advanced the theoretical basis of the E-Business Capability framework incorporating technology-organisation-people (TOP) dimensions. The resulting analysis demonstrates the usefulness of this conceptual model by identifying factors affecting business performance. Multi-item constructs have been developed, including e-business adoption, business strategy, and supply chain strategy, have passed various reliability and validity tests, and could be used in future studies. Grounded in theory and empirical data, this research has successfully demonstrated the relationships among the TOP dimensions in relation to e-business capability factors. Six main hypotheses and nine sub-hypotheses were successfully tested for the Malaysian and UK samples. Table 8.3 and Table 8.4 depict the hypotheses propositions in this study.

Construction of Main Hypotheses (Chapter Three)
Path Coefficients
Hypothesis H1 : Business strategy is a significant determinant of perceived business performance
Hypothesis H2 : Supply chain strategy is a significant determinant of perceived business performance
Hypothesis H3 : E-business adoption is a significant determinant of perceived business performance
Factor Correlations
Hypothesis H4 : Successful e-business implementation is directly related to the level of mutual dependency between business strategy and supply chain strategy
Hypothesis H5 : Successful e-business implementation is directly related to the level of mutual dependency between supply chain strategy and e-business adoption
Hypothesis H6 : Successful e-business implementation is directly related to level of mutual dependency between business strategy and e-business adoption

Table 8.3 Main hypotheses identified in the study

Construction of Sub-Hypotheses (Chapter Three)
Sub-Hypotheses 1
Sub-hypothesis H1a: Organisational infrastructure is a significant determinant of business strategy
Sub-hypothesis H1b: Technological infrastructure is a significant determinant of business strategy
Sub-hypothesis H1c: Partnership strategy is a significant determinant of business strategy.
Sub-Hypotheses 2
Sub-hypothesis H2a: Technological integration is a significant determinant of supply chain strategy
Sub-hypothesis H2b: Organisational integration is a significant determinant of supply chain strategy
Sub-hypothesis H2c: Supply Chain Relationship is a significant determinant of supply chain strategy
Sub-Hypotheses 3
Sub-hypothesis H3a: Technological capability is a significant determinant of e-business adoption
Sub-hypothesis H3b: Organisational capability a significant determinant of e-business adoption
Sub-hypothesis H3c: Attitudinal capability a significant determinant of e-business adoption

Table 8.4 Sub-hypotheses identified in the study

The theoretical model confirms that successful e-business requires supply chain strategy, business strategy and e-business adoption, which have mutual dependency regardless of geographic and economic differences between the two samples (see Table 8.5 and Table 8.6 for hypotheses results). For the Malaysian sample (in the context of a developing country), the formation of business strategy and e-business adoption is dependent on the implementation of supply chain strategy. This is a critical factor for the Malaysian e-business development as most of the businesses operate in a larger geographical area compared to the UK companies.

One explanation of greater relevance of supply chain strategy in the Malaysian sample could be that some of the Malaysian sample surveyed function as a role of contractors to core nations, and may be more focused on primary products. Their success depends on being able to assemble resources and to deliver products on time. The success for the companies operating in core nations may depend more critically on finding new markets for the products. Such an explanation may be viewed as speculation, but the key results are broadly consistent with this sort of a "world systems" view. Results also suggest that the operational differences in managing a global trade and distribution chain are more prominent than any cultural differences in explaining the (limited) differences between the UK (developed) and Malaysian (developing) surveyed samples.

Main Hypothesis	**Main Hypotheses Supported? (Chapter 6)**	
	United Kingdom Sample (n = 143)	**Malaysian Sample (n = 208)**
Path Coefficients		
Hypothesis H1	Yes	Yes
Hypothesis H2	Yes	Yes
Hypothesis H3 :	Yes	Yes
Factor Correlations		
Hypothesis H4	Yes	Yes
Hypothesis H5	Yes	Yes
Hypothesis H6	Yes	Yes

Table 8.5 Summary of main hypotheses results for the Malaysian and UK total samples

Sub - hypotheses	Sub-Hypotheses Supported?	
	United Kingdom Sample (n = 143)	Malaysian Sample (n = 208)
Sub-hypothesis H1a	Yes	Yes
Sub-hypothesis H1b:	Yes	Yes
Sub-hypothesis H1c:	Yes	Yes
Sub-hypothesis H2a:	Yes	Yes
Sub-hypothesis H2b:	Yes	Yes
Sub-hypothesis H2c:	Yes	Yes
Sub-hypothesis H3a:	Yes	Yes
Sub-hypothesis H3b:	Yes	Yes
Sub-hypothesis H3c:	Yes	Yes

Table 8.6 Summary of sub-hypotheses results for the Malaysian and UK total samples

Further investigations revealed that supply chain factors are mutually dependent on business strategy, which in turn improves business performance. Research identified that companies from both surveyed samples acknowledge the importance of a clear understanding of their customers' and business partners' requirements. However, in-depth analyses conducted show that for the both (UK and Malaysian) samples, "people" dimensions scored relatively weakly on supply chain strategy. This signifies that firms need to facilitate collaboration and to re-engineer and integrate their internal supply chain planning processes and technologies in-line with employee skills and attitudes to develop unified solutions. In particular, companies will need to shift from traditional arms-length or adversarial attitudes to a partnership perspective. This would result in cooperation and freedom in information exchange. This relates to both samples regardless of geographical context. Comparisons using the structural model indicate that non-adopters lack appropriate e-business strategy for successful e-business implementation in their companies.

8.2.4 Implications of Multi-Country / Multi-Subgroups Study

By performing multiple group analysis between adopter and non-adopters, this study is able to identify specifically which EBC factors or TOP dimensions (e.g. "organisation infrastructure" for Malaysian adopters) contribute to e-business success. For example, "organisation infrastructure" for Malaysia played a less significant role in e-business implementation success, than others such as "partnership strategy" and "organisational integration" across the four sub-groups. Table 8.7 shows how this study was able to accomplish the third research objective.

Research Objective 3 To empirically test the applicability of the EBC framework in a developed (UK) and developing (Malaysia) country context.		
	Hypotheses testing the impact of EBC factors on business performance (total sample of UK and Malaysian samples) (Chapter 6)	√
	Multiple group analysis to test the hypotheses on the impact of EBC factors on business performance. (Chapter 7)	√

Table 8.7 Accomplishment of Research Objective Three

The results suggested that companies categorised as non-adopters of e-business must pay attention to their technological, organisational, and human capabilities for improving e-business performance. These capabilities are critical when firms are planning or at the very initial stage of e-business adoption, where most processes are at low integration levels and are full of manual work (Hsin and Shaw, 2005). Companies that intend to venture into e-business need to acknowledge and identify barriers caused by "organisation" dimensions by offering training and knowledge for system integration, standards development, and process automation as well as to overcome possible IT resistance.

The result findings indicate possible unfamiliarity of management with e-business models that prevent adopters and non-adopters of e-business sub-groups, from both surveyed samples (UK and Malaysia), initiating further in e-business development. Some of the possible reasons are, lack of market demand and difficulty in integrating online and offline business processes. Results indicate that these issues are not solely relevant for the sample in Malaysia but also in the United Kingdom and United States, where e-business is most developed; e-business business models are yet to be time-tested. New models are being introduced, but few have been systematically studied (Watson *et al.,* 1998; Calkins *et al.,* 2000).

Results obtained from adopters of e-business groups from the UK indicated that the significant drives for adopting e-business in their firms contributed much to business partner's willingness ("people dimension"), technological capability and empowerment ("organisational dimension"). The results suggest that in order to improve supply chain readiness for e-business management they may find the need to introduce support programs to increase partner willingness and offer initiatives such as training, on-site assistance, and financial resources to improve partner capability (Barua and Mukhopadhyay, 2002; Hsin and Shaw, 2005). Such initiatives in combination with suitable market power enable firms to have a higher chance of e-business success. The result also highlighted the crucial role of partner's collaboration as the firms start to implement more advanced e-business IT. Table 8.8 and Table 8.9 summarise the hypotheses results using multiple group analyses. Figure 8.10 provides the overall result findings in a graphical representation.

Main Hypothesis	**Hypothesis Supported? (Chapter 7)**			
	United Kingdom Sample (n = 143)		**Malaysian Sample (n = 208)**	
	Adopt (n = 80)	N_Aopt (n = 63)	Adopt (n =124)	N_Aopt (n = 84)
Path Coefficients				
Hypothesis H1 :	Yes	Yes	Yes	Yes
Hypothesis H2 :	Yes	**No**	Yes	Yes
Hypothesis H3 :	Yes	**No**	Yes	**No**
Factor Correlations				
Hypothesis H4 :	Yes	Yes	Yes	Yes
Hypothesis H5 :	Yes	**No**	Yes	**No**
Hypothesis H6	Yes	**No**	Yes	**No**

Table 8.8 Summary of main hypotheses results for the adopter and non-adopter sub-groups

Sub - hypotheses	**Hypothesis Supported? (Chapter 7)**			
	United Kingdom Sample (n = 143)		**Malaysian Sample (n = 208)**	
	Adopt (n = 80)	N_Aopt (n = 63)	Adopt (n =124)	N_Aopt (n = 84)
Sub-hypothesis H1a	Yes	Yes	Yes	Yes
Sub-hypothesis H1b	Yes	Yes	Yes	Yes
Sub-hypothesis H1c	Yes	Yes	Yes	Yes
Sub-hypothesis H2a	Yes	Yes	Yes	Yes
Sub-hypothesis H2b	Yes	Yes	Yes	Yes
Sub-hypothesis H2c	Yes	Yes	Yes	Yes
Sub-hypothesis H3a	Yes	**No**	Yes	**No**
Sub-hypothesis H3b	Yes	**No**	Yes	**No**
Sub-hypothesis H3c	Yes	**No**	Yes	**No**

Table 8.9 Summary of results for the adopter and non-adopter sub-groups

Tests conducted	Descriptions
Relationships of EBC factors on BP Mutual dependency among EBC factors (Chapter 6 and Chapter 7)	see tables below
Relationships of TOP dimensions on EBC factors (Chapter 6 and Chapter 7)	see tables below

Relationships of EBC factors on BP Mutual dependency among EBC factors (Chapter 6 and Chapter 7)

Main Hypotheses	Chapter 6 (Total Sample)		Chapter 7 (Sub-groups analyses)			
	UK	M	M_{Adopt}	UK_{Adopt}	M_{N_Adopt}	UK_{N_Adopt}
Hypothesis H1	**	**	**	**	**	**
Hypothesis H2	**	***	**	X	**	***
Hypothesis H3	**	*	***	***	X	X
Hypothesis H4	**	**	**	**	**	***
Hypothesis H5	**	**	***	**	X	X
Hypothesis H6	**	*	**	**	X	X

Legend:		
Estimates Strength		
> 0.51	Highly significant	***
0.41 – 0.50		
0.31 – 0.40	Moderate significant	**
0.21 – 0.30		
0.11 – 0.20	Significant	*
0.00 – 0.10		
Insignificant	X	

Relationships of TOP dimensions on EBC factors (Chapter 6 and Chapter 7)

Sub - Hypotheses	Chapter 6 (Total Sample)		Chapter 7 (Sub-groups analyses)			
	UK	M	M_{Adopt}	UK_{Adopt}	M_{N_Adopt}	UK_{N_Adopt}
Sub-hypothesis H1a	**	**	*	***	***	**
Sub-hypothesis H1b:	**	**	**	**	**	***
Sub-hypothesis H1c:	***	***	***	***	***	***
Sub-hypothesis H2a:	**	**	***	**	**	**
Sub-hypothesis H2b:	**	***	***	*	**	***
Sub-hypothesis H2c:	*	*	*	*	*	**
Sub-hypothesis H3a:	***	***	**	**	X	X
Sub-hypothesis H3b:	***	***	**	*	X	X
Sub-hypothesis H3c:	**	**	*	*	X	X

Legend:		
Estimates Strength		
> 0.98	Highly significant	***
0.96 – 0.98		
0.93 – 0.95		
0.90 – 0.92	Moderate significant	**
0.80 -0.89		
0.70 – 0.79	Significant	*
< 0.69		
Adopt	Adopters of e-business	
N_Adopt	Non-adopters of e-business	

Table 8.10 Summary of Research Findings

8.3 CONTRIBUTION TO KNOWLEDGE

8.3.1 Theoretical Contributions

Extensive reviews of pertinent literature reveal that despite the claims that e-business adoption lead to e-business success, there is a lack of empirical evidence to validate these. This study has added a theoretical contribution by filling gaps in the existing e-business implementation and adoption studies, with clear theoretical foundations. This study has empirically tested a theoretical model to assess the impact of the proposed e-business capability factors, namely; business strategy, supply chain strategy and e-business adoption on business performance to determine the extent of successful e-business implementation.

Therefore, this study has made an effort to reduce the research gap by investigating the development of e-business in the context of developing countries by taking Malaysian as the target sample. In addition, an adequate sample size (351 respondents) and a strong research design are key strengths of this study. Within the given time constraint, this study has successfully obtained a relatively high percentage of response rates from both countries (Section 5.2).

Another key strength is the methodological approach employed in this study. The study investigates the research questions using structural equation modelling analysis (SEM) technique. The SEM technique is recognised as a more comprehensive and flexible approach to research design and data analysis than any other standard statistical technique (Hoyle, 1995). In comparison to utilising a first generation of data analysis (regression, linear regression, LOGIT, ANOVA and MANOVA), this study employed SEM (second-generation data analysis) to conduct multi-level, multi-factor co-relational analysis.

i) The study specifies latent constructs (e.g. business strategy, supply chain strategy and e-business adoption and business performance). These are developed to provide separate estimates of relationships between latent constructs and their manifest indicators (items) (performing validity and reliability analysis: the measurement model) and the relationships among latent constructs (hypotheses testing: the structural model).

- By using SEM, psychometric properties of measures and estimates, relationships among constructs are assessed (Chapter 5).

- SEM provided a measure of global fit that enabled use of a comprehensive set of models that involved a large number of linear equations. The structural and measurement model in this study involved data collected from the UK and Malaysia samples (Chapter 6). Therefore, two separate analyses were needed which would have involved a relatively tedious analysis if traditional hypotheses testing procedure was used (i.e. those that involve factor analysis, path analysis, multiple regression). However, by using SEM techniques, all these steps were integrated and involved only a two-stage procedure (defining the appropriate measurement model then hypothesis testing using structural model).

ii) The capability to evaluate whether higher order constructs adequately account for relationships among lower-order development functions:

- The theoretical framework consists of multi level constructs that consist of first order level constructs (TOP dimensions incorporated in EBC capability factors) and second order level constructs (EBC capability factors).

- The main assumption here is that these second order EBC factors are conceptually distinct, however, the question remains whether they are empirically distinct? Before a hypothesis test was conducted, comparisons of test models were performed to ensure the independent constructs – SCS, BS and EBA – were in fact closely related but form three different concepts (Section 5.7). Analysis employed in SEM enabled the conclusion that the EBC concepts were related; however, these were three different concepts, based upon theory and empirical tests.

iii) A better ability to assess the multiple group comparison approaches to data analysis (comparison among measurement models or structural models).

- First generation data analysis would have difficulty in successfully performing the type of multiple group analysis that required complex equations and steps.

Via nested chi-square tests, this study can comparatively evaluate the fit of an alternative model (measurement or structural) that is different in complexity (Chapter 7). In this study, multiple group comparison was conducted between adopters and non-adopters of e-business across four sub-groups among the UK and Malaysian samples.

Utilising empirical methods based on a strong theoretical underpinning led to a rich understanding of the phenomena under investigation. The study's instruments have passed various reliability and validity tests; they could be used, and replicated for future studies to test the applicability and generalisability, of the theoretical framework. In addition, the rigorous design methodology and statistical technique employed improve the robustness of the theoretical model, which was intended to investigate the e-business implementation issues in the context of developed and developing countries.

8.3.2 Practical Contributions

The findings of this study are important and relevant to six industry sectors for the UK and Malaysian samples. These results have several contributions for management and practitioners in general. Firstly, this study offers a useful framework for practitioners and managers to assess the "technological" conditions incorporated into each of the e-business capability factors (business strategy, supply chain strategy, e-business adoption) under which e-business is implemented to pursue better business value (i.e. increase in business performance). The technological dimension (technological infrastructure, technological integration, technological adoption) provides the shared establishment of the technological capabilities for building business applications. This comprises technological components and a set of services such as management of data processing, provision of electronic exchange capabilities, or management of database (Croteau *et al.,* 2001). This requires management to focus on integrating this fragmented technological component in each of the capability factors, as diffusion of Internet technology makes these organisational and industry specific capabilities become more critical in determining business performance.

Secondly, management and practitioners are able to assess the appropriateness of e-business to certain organisational characteristics (organisation infrastructure, organisation integration, organisational capability) as suggested by the empirical findings in this study. Another implication is for companies seeking geographic expansion (into different regions and market segments) and product diversification. The study has provided a practical contribution to assist companies from developed countries (UK) wishing to expand their e-business adoption in a developing country (Malaysia) and vice versa. By identifying the strengths and weaknesses in each of the e-business capability factors, managers will be able to leverage e-business initiatives to facilitate coordination and achieve resource integration from their "parent" company.

Thirdly, the extent of e-business success is greatly influenced by the "people" dimension incorporated in each of the e-business capability factors. Results indicated d that the success of e-business implementation has a relatively great influence from the "people" dimension in comparison with either "technological" and "organisational" dimensions. This assumption is applicable to both surveyed samples from the UK and Malaysia. This implies that as an organisation moves further into the e-business developments stages, the key determinant of e-business success will further shift from "internal" and "technological" capabilities to "external" capabilities. Therefore, results obtained from this study encourage managers to concentrate on the investments for the appropriate for leveraging and improving the "readiness" of their organisations to ensure the success of e-business implementation.

Lastly, this study also offers practical contributions to the non-adopters of e-business to identify obstacles and possible explanations that might prevent them from initiating or progressing in e-business implementation. While the adopters of e-business sub-groups continue to develop their e-business capabilities and levels of sophistication within TOP dimensions, non-adopters of e-business sub-groups must acknowledge that the biggest challenge is the ability to change the mindset and attitudinal aspects of the managers and employees to realise the potential that e-business can deliver.

8.4 RESEARCH LIMITATIONS

Like any research, this study has acknowledged several limitations it possesses during the course of the research. These limitations must be taken into account in interpretation of the research results. Key limitations identified are as follows: Because the data set collected is cross-sectional in nature, this research is only able to illustrate the associations and cannot analyse any longitudinal aspects such as the development of e-business functionalities and their business value in dynamic context.

This study collected responses across six industry sectors for each country (UK and Malaysia). As results, the statistical results obtained are generalised across six industry sectors. If there was a sufficient sample size collected from each industry sector, the statistical results could be carried over to other industry sectors; however, the systematic nature of the investigations raise the belief that the conceptual model can be extended to other industry sectors. This is because some industries tend to be earlier adopters of e-business than others.

The ability to design an effective questionnaire in this study was important as statistical analysis and high-quality sampling techniques would have been of limited value if the data collected had been biased by poorly worded questionnaires or low response rate. In addition, surveys questionnaires can be subject to measurement bias, which can be significantly minimised through close attention to the questionnaire structure, design, and wording. There is a danger that using a questionnaire can have an inability to investigate intended responses. This study collected the quantitative data (via a structured questionnaire) using a 6 Likert point measurement (Scale from 0 to 5) approach, that gave limited flexibility for the respondent with respect to response format. Also like any other tool, performing quantitative analysis was unable to cleanse any biased information from the respondents.

Sample size is a limitation and may be the most critical impediment to the use of SEM in any empirical research. SEM uses Maximum Likelihood Estimation (MLE), which assumes multivariate normal data in order to test the hypothesis and this requires a reasonable sample size, e.g. about 100 observations. Therefore, having a sufficient sample size was important because an insufficient sample size could influence a number of factors (e.g., bias of parameter estimates, power, likelihood of inadmissible estimates) and interact with several other factors (e.g., degree of assumption violation, overall model complexity). Although this study was able to obtain a sufficient sample collected from both countries (Malaysia, n = 108; UK, n = 143), future research would need to have enough sample size (by country or sector) to run the EBC model to have confidence in the results and generate meaningful results.

The next limitation identified is associated with the result of causal relationships. Most applications of SEM are on non-experimental data but many interpret the final model as causal. Glymour *et al.* (1987) argued that causal inferences could be drawn from SEM based on non-experimental data. The quantitative results produced from SEM in this study described the significance of casual and associational relationships among factors. However, this quantitative method would not be able to perform interpretation of analysis results. This may be overcome by performing additional qualitative and subjective analysis such as case studies or interviews.

Another limitation of this research relate to the "completeness" of the proposed research model. Although tests such as reliability and validity have proven the robustness of the proposed EBC model for both samples, it could be argued that the research model could still be improved, i.e. by adding new constructs or variables depending on the research scope to be investigated. For example, business performance construct in the EBC model could be split into qualitative and quantitative measures where data collected could be in the financial sheets format. Similar techniques could be use to investigate other constructs in the EBC model.

One of the limitations observed in this research regards the method of selecting the sample size for each industry sector. This study employed the process of stratifying by sector, and using "unequal" (non-proportional) probabilities of selection (different random probabilities across sectors) to yield a sample that equally represents the six key sectors. Proportional or non-proportional samples may be characteristic of either stratified or cluster (multi-stage) samples. Multi-stage may consist of any combination of stratification, clustering, and SRS at various stages – so it is not really a distinctive "type". However, some issues with response rates need to be addressed. Firstly, this approach desired equal numbers of cases in each of the six sectors; fifty cases in each sector were randomly sampled. However, this does culminate in a sample with unequal numbers of observations in each stratum due to differential response rates. Therefore, the response rates overall, and stratum, were reported in Chapter 5.

Secondly, an unequal probability of selection across strata was deliberately chosen. It should be acknowledged that there is always a danger that survey results will be biased by low response rates or by unequal response rates across strata. The firms that chose to respond may be systematically different from those that did not respond. However, this research took consideration of this problem and it is not anticipated to be a huge problem. Thirdly, one must simply acknowledge the possibility that the actual measured cases are not a true random sample, even though the sample selected was random.

Unless there is some plausible reason to anticipate bias, however, the burden of proof lies with the critic.

8.5 GENERALISABILITY OF THE THEORETICAL MODEL

The main aim of this chapter was to review the available literature to identify existing gaps in the body of knowledge developed through previous work and then to develop, based on these gaps, the research questions that specify exactly what is going to be investigated in this research work. This study has successfully achieved two major contributions. Firstly, this study has reduced current e-business limitations by identifying and investigating the factors that have a positive impact on the adoption and use of e-business. Secondly, this study has developed a sound and solid method to empirically test the theoretical framework using multi-country samples.

During the investigation and identification of factors contributing to the success of e-business adoption in Chapter 2, the author has taken a more focused approach into consideration when selecting and critiquing the existing e-business. In other words, any e-business related studies perceived by this author to have relatively important weight in the field have been taken into consideration. In addition, although the focus of the study is to investigate how the identified factors will have an impact on companies in the multi-country context, success factors identified in this study are considered universally and do not take into consideration the cross-cultural aspect between countries (leadership, government policies, socio-economic and education background), i.e., the review takes into account all research and study on the subject and does not simply concentrate on an element in Malaysia or the UK, but rather as a whole entity. Therefore, the questionnaire survey and theoretical model in this study were constructed through a generalised approach that can be adopted to investigate e-business adoption issues either in multi-country context.

However, there are a few issues that need to be addressed on the context of generalisability in the applicability of the theoretical model. Due to the limitations factors such as time and resources (i.e. contacts, financial) this study has only taken consideration of two target samples i.e. the UK (developed country) and Malaysia (developing country). Although the current empirical results obtained from Malaysia and the UK were obtained using a generalised approach in both the model and the questionnaire, to say that these are strong generalised conclusions is a little premature. Therefore, in order to have more solid empirical results in a multi-country context, these results need to be verified and tested to test the robustness and applicability of the theoretical model in different countries from the developed and developing country perspective.

This study can, however, conclude that there are two promising implications for future research: they are, first that the e-business capability model developed can be used as a solid foundation for further investigation. Moreover, equally importantly the empirical method used can be strongly recommended for future investigation. Future research programmes can make use of both of these to further investigate developing /developed country context to produce empirically underpinned generalised models.

8.6 RECOMMENDATIONS FOR FUTURE RESEARCH

This research constitutes substantial steps forward in understanding the factors that influence e-business implementation, and the effectiveness of the proposed e-business capability factors towards company's business performance. The limitations discussed in the previous section provide avenue for further research. In order to gain a more comprehensive understanding of the proposed factors, further research is needed to extend this study.

Firstly, in order to investigate the dynamic nature of the e-business adoption and its impact, more recent data is needed to analyse the model beyond year 2003 data. Therefore, future study could investigate the effects of time on multiple dimensions of e-business capability factors and business performance for the UK and Malaysian samples. MANOVA procedure can be utilised based on the General Linear Model (GLM) and on the full parameterisation (i.e. a parameter is created for every factor) (Hair *et al.,* 1995).

It would be an added benefit to expand findings obtained from the quantitative study by conducting qualitative investigations in a case study format. As stated by Patton (1987), "case studies are useful where one needs to understand some particular problems in great depth and identify rich information that can be learned from few exemplars of the phenomenon in question". The future research could be conducted as a complementary study, to further assess and test the applicably of the e-business capability factors of e-business and to identify and investigate any potential benefits, obstacles or emerging themes associate with it. Several organisations (minimum three organisations from each industry) that expressed their interests and met the criteria from both samples could be contacted for face-to-face interview. These cases could be from either existing respondents or new respondents. A few organisations from each industry consisting of non-adopters of e-business sub-groups from both surveyed samples could also be chosen to investigate in depth the slow uptake of e-business in their organisations. It is hoped that this combination of quantitative and qualitative study will further support and verify the applicability and robustness of the conceptual model proposed in this study. In addition, a longitudinal study could be pursued to see how the survey companies have moved on their e-business maturity using Earl's (2000) model in particular.

The research into e-business development is "not static" but an ongoing development, testing, refinement, and recognising new emerging themes and issues. Although the conceptual model has empirically passed the reliability, convergent validity, and discriminant validity in the data set in both samples, further confirmatory studies are necessary to determine the level of external validity of the results. Since the focus of this study concentrate on the geographical scope (developed and developing countries), future research is needed to investigate factors such as the product scope (i.e. do different geographical scopes sell similar/different products/services?) and leadership aspects (i.e. is leadership and management style different in geographical scope?).

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Date

Address

Dear:

E-Business has attracted much managerial attention because of its huge potential competitive impact. Experience, however, demonstrates that managers have adopted a variety of disparate approaches to E-Business implementation. The emergence of Internet technology has transformed how companies use their current business operations to achieve competitive advantage. Companies have used IT to support their business strategies. Therefore, it is essential that the successful of e-business implementation rely on the management and exploitation of information and Internet technology.

The purpose of this research is to:

1. Identify a comprehensive set of potential factors influencing the successful of e-business implementation;
2. Measure the impact of e-business on business performance.

To help clarify the nature and role of Internet technologies to quantify its competitive impact, we are currently hoping to get a further in sight of how E-Business companies in Malaysia / United Kingdom are coping with this. Because of your position as a key knowledge holder within the company, we are asking you to contribute to the insight generated by this study. Since the successful of this study is highly dependent on the number of questionnaire return, your valuable feedback, therefore very important.. The enclosed survey was designed to minimise the amount of time required to complete it—the survey takes about 15 to 20 minutes to complete. All information received will be kept as anonymity and confidentiality.

We would be pleased to send you an executive summary of the key research findings and once again we would like to thank you for your support and kind co-operations.

All the best

Your Sincerely,

Keoy Kay Hooi
PhD Research Student
Computing Research Center
Stoddart Building
Sheffield Hallam University,
School of Computing and Management Science,
Sheffield,
S1 1WB,
United Kingdom
E mail: kay.h.keoy@student.shu.ac.uk

Instructions

1. We would like to thank you for your contribution to this project.
2. Strict confidentiality will be maintained throughout the project.
3. Please fill out the entire questionnaire using a scale between (0 – 5) where:

"0" – Not applicable, "1" –strongly disagree, "2" –disagree, "3" – neither disagree nor agree, "4" – agree, "5" – Strongly agree

4. After the entire questionnaire have been completed, please **save** the documents.
5. Please **attach** the latest Questionaire.doc questionnaire and email to : kay.h.keoy@student.shu.ac.uk
6. If you have any questions concerning the project, please contact us at:

Mr Keoy Kay Hooi kay.h.keoy@student.shu.ac.uk
Dr Khalid Hafeez K.Hafeez@shu.ac.uk

Section 1 : About You

Your name :			
Position:	CIO, CTO, VP of IS IS manager, director, planner Other manger in IS department	IS Position	☐
	CEO, president, managing director COO, business operations manager CFO, administration / finance manager Others (IS analyst, marketing VP, other manager)	Non IS Position	☐
Your E-mail address:			
Your Telephone Number (Optional):			

About Your Company/Organisation

What is the main business activity of your company? (please tick one box only)

☐ Manufacturing

☐ Services

☐ IT

☐ Finance, Insurance and Real Estate

☐ Wholesale and Retails Trade

☐ Others (agriculture, communication, utility services, non classified)

E-business practices

Has your business implemented or planned to implement any of the following E-business practices?
Note : Please tick only one box

	Implemented already	Plan to implement within the next 6 - 12 months
Secondary e-business activities		
Marketing/Advertising goods and services over a Internet	☐	☐
Basic communication i.e. emails, fax, telephone	☐	☐
Searching for/evaluating suppliers over a Internet	☐	☐
Primary e-business activities		
Selling goods and/or services over a Internet (inc. EDI)	☐	☐
Buying from suppliers over a Internet (inc. EDI)	☐	☐
Sharing information with partner organisations over a Internet (e.g., for joint working on technical documents or CAD files)	☐	☐

Note: If your company only support secondary e-business activities, please answer the following questions based in your opinions for future implementations

Section 2.A : Business Strategy

As of today, which best describes your organization using the following scale, where 1 indicates that you strongly disagree with the statement and 5 indicates that you strongly agree with the statement and 0 indicates not applicable to your organization, please rate the following statements:

"0" – Not applicable, "1" –strongly disagree, "2" –disagree, "3" – neither disagree nor agree, "4" – agree, "5" – Strongly agree

Our organisation...

	0	1	2	3	4	5
Technological Infrastructure						
(a) Our employee actively involve in engagement and collaboration of individual in all aspects of IT in the organisation...	☐	☐	☐	☐	☐	☐
(b) Our telecommunication network and computer systems are compatible to support enterprise-wide application and inter-organizational systems.....................	☐	☐	☐	☐	☐	☐
(c) We are able to sense and response to the Web based opportunities to create unique customers knowledge and customer relationships....................................	☐	☐	☐	☐	☐	☐
(d) We are able to create a powerful set of new core operations capabilities in company's core business processes..	☐	☐	☐	☐	☐	☐
Organisation Infrastructure						
(a) Articulate the value proposition, that is, the value created for users by the offering based on the technology;..	☐	☐	☐	☐	☐	☐
(b) Estimate the cost structure and profit potential of producing the offering, given the value proposition and value chain structure chosen...............................	☐	☐	☐	☐	☐	☐
(c) Our firm is able to restructure the organizations and behavioral drivers such as compensation and budgets to ensure departmental alignment and follow through	☐	☐	☐	☐	☐	☐
(d) Has effective communicate (e)-business strategy to the rest of the organisation	☐	☐	☐	☐	☐	☐
Partnership Strategy						
(a) My firm established a program to integrate and facilitate individual customer requirements across our strategic business units..	☐	☐	☐	☐	☐	☐
(b) My firm actively pursues business relationships and programs designed to achieve customer involvement over and above individual sales transactions..........	☐	☐	☐	☐	☐	☐
(c) My firm is committed to sharing responsibility with suppliers and customers in new product/service development and commercialization................................	☐	☐	☐	☐	☐	☐

Section 2.B : Supply Chain Strategy

As of today, which best describes your organization using the following scale, where 1 indicates that you strongly disagree with the statement and 5 indicates that you strongly agree with the statement and 0 indicates not applicable to your organization, please rate the following statements:

"0" – Not applicable, "1" –strongly disagree, "2" –disagree, "3" – neither disagree nor agree, "4" – agree, "5" – Strongly agree

Our organisation...

	0	1	2	3	4	5
Internal Integration						
(a) My firm has reduced formal organizational structure to more fully integrate operations.........	☐	☐	☐	☐	☐	☐
(b) My firm is actively involved in initiatives to standardized supply chain practices and operations..	☐	☐	☐	☐	☐	☐
(c) My firm has substantially reduced operating complexity by developing separate operations focused on individual channel over the past years..	☐	☐	☐	☐	☐	☐
(d) My firm successfully utilizes time based logistics solutions like continuous replenishment, quick response and Just In Time with customers/suppliers..	☐	☐	☐	☐	☐	☐

Supply Chain Relationship

(a) My firm clearly defines specific roles and responsibilities jointly with our supply chain partners....	☐	☐	☐	☐	☐	☐
(b) My firm has guideline for developing, maintaining and monitor supply chain relationships by clearly defined a legal framework	☐	☐	☐	☐	☐	☐
(c) My firms has supply chain arrangement with supplier and customer that operate under principles of share rewards and risks	☐	☐	☐	☐	☐	☐

Technology Integration

(a) My firm has appropriate level of investments they should invest for Internet based supply chain system	☐	☐	☐	☐	☐	☐
(b) Logistics operating and planning database are integrate across applications within my firm	☐	☐	☐	☐	☐	☐
(c) My firm has adequate ability to share both standardized and customized information externally with suppliers and/or customers	☐	☐	☐	☐	☐	☐
(d) My firms obtain information directly from customers to facilitate operation plans and reduce reliance on forecasting	☐	☐	☐	☐	☐	☐

Section 2.C E-Business Adoption

As of today, which best describes your organization using the following scale, where 1 indicates that you strongly disagree with the statement and 5 indicates that you strongly agree with the statement and 0 indicates not applicable to your organization, please rate the following statements:

note :If the company is low in e-business activities, please answer based on the consideration of your company moving to e-business implementation.

"0" – Not applicable, "1" –strongly disagree, "2" –disagree, "3" – neither disagree nor agree, "4" – agree, "5" – Strongly agree

Our organisation...

Organisational Capability

	0	1	2	3	4	5
(a) consists of E-business teams that combine talent from the various functional areas within the organization (marketing, finance, HR .etc.) that have the job-relevant knowledge and skills	☐	☐	☐	☐	☐	☐
(b) Able to foster awareness and internalization of the mission, vision and core values needed to execute the strategies for E-Commerce implementation	☐	☐	☐	☐	☐	☐
(c) Posses employee's skill and core competencies embedded in organisational to implement new concepts and strategies easily	☐	☐	☐	☐	☐	☐

Attitudinal Capability

(a) Effectively share operational information externally with selected suppliers and/or customers to increase operation flexibility through external collaboration	☐	☐	☐	☐	☐	☐
(b) Has developed performance measurement across business partners relationships which has agree upon	☐	☐	☐	☐	☐	☐
(c) Consists of business partners that are ready to improve coordinate and collaborative with us online by having a Internet-based systems	☐	☐	☐	☐	☐	☐

Technology Capability

(a) Able to effectively integrate our legacy system(s) (mainframe, EDI, client/server, etc.) as part of our E-business applications with well defined technology standards	☐	☐	☐	☐	☐	☐
(b) Consists of E-business applications that are capable of handling significant growth in number of transactions, customers, or employees	☐	☐	☐	☐	☐	☐
(c) Has the necessary technology infrastructure (hardware, software, people) to execute our E-business initiatives	☐	☐	☐	☐	☐	☐

Section 3 : Business Performance

As of today, how do/would best describe your company business performance with the e-business efforts (low or high implementation) using the following scale, where 1 indicates that you strongly disagree with the statement and 5 indicates that you strongly agree with the statement and 0 indicates not applicable to your organization, please rate the following statements:

note :If your company is low in e-business activities, please answer based on your current business performance

"0" – Not applicable, "1" –strongly disagree, "2" –disagree, "3" – neither disagree nor agree, "4" – agree, "5" – Strongly agree

Our e-business efforts have....

	0	1	2	3	4	5
Impact on Commerce						
(a) Sales Increased..	☐	☐	☐	☐	☐	☐
(b) Customer Service Improved	☐	☐	☐	☐	☐	☐
(c) Market Share Increased (Market Expansion	☐	☐	☐	☐	☐	☐
(d) International Sales Increased (Sales area widened).............................	☐	☐	☐	☐	☐	☐
Impact on Efficiency						
(a) Reduced costs by electronic order taking over the Internet......................	☐	☐	☐	☐	☐	☐
(b) staff productivity increased..	☐	☐	☐	☐	☐	☐
(c) Internal processes more efficient..	☐	☐	☐	☐	☐	☐
Impact on Coordination (Upstream and Downstream)						
(a) Improved Coordination with Suppliers and business partners	☐	☐	☐	☐	☐	☐
(b) Decreased Procurement Cost..	☐	☐	☐	☐	☐	☐
(c) Transaction cost with business partners deceased...............................	☐	☐	☐	☐	☐	☐

Do you wish to have a copy of result analysis? ☐ Yes ☐ No

Dimensions	Coding
Organisation Infrastructure (BSO)	
Articulate the value proposition, that is, the value created for users by the offering based on the technology	BSO_1
Estimate the cost structure and profit potential of producing the offering, given the value proposition and value chain structure chosen	BSO_2
Our firm is able to restructure the organizations and behavioral drivers such as compensation and budgets to ensure departmental alignment and follow through	BSO_3
Has effective communicate (e)-business strategy to the rest of the organisation	BSO_4
Partnership Strategy (BSP)	
My firm established a program to integrate and facilitate individual customer requirements across our strategic business units	BSP_6
(b) My firm actively pursues business relationships and programs designed to achieve customer involvement over and above individual sales transactions	BSP_8
(c) My firm is committed to sharing responsibility with suppliers and customers in new product/service development and commercialisation	BSP_9
Technological Infrastructure (BST)	
Our employee actively involve in engagement and collaboration of individual in all aspects of IT in the organisation	BST_10
Our telecommunication network and computer systems are compatible to support enterprise-wide application and inter-organizational systems	BST_11
We are able to sense and response to the Web based opportunities to create unique customers knowledge and customer relationships	BST_12
We are able to create a powerful set of new core operations capabilities in company's core business processes	BST_13

Table 4.2.1 Business strategy coding independent variables in the research.

Dimensions	Coding
Organisational Capability (EBAO)	
(a) consists of E-business teams that combine talent from the various functional areas within the organization (marketing, finance, HR .etc.) that have the job-relevant knowledge and skills	EBAO_1
(b) Able to foster awareness and internalization of the mission, vision and core values needed to execute the strategies for E-Commerce implementation	EBAO_2
(c) Posses employee's skill and core competencies embedded in organisational to implement new concepts and strategies easily	EBAO_3
Attitudinal Capability (EBRP)	
(a) Effectively share operational information externally with selected suppliers and/or customers to increase operation flexibility through external collaboration	EBAP_9
(b) Has developed performance measurement across business partners relationships which has agree upon	EBAP_11
(c) Consists of business partners that are ready to improve coordinate and collaborative with us online by having a Internet-based systems.	EBAP_12
Technology Adoption (EBAT)	
(a) Able to effectively integrate our legacy system(s) (mainframe, EDI, client/server, etc.) as part of our E-business applications with well defined technology standards	EBAT_5
(b) Consists of E-business applications that are capable of handling significant growth in number of transactions, customers, or employees	EBAT_6
(c) Has the necessary technology infrastructure (hardware, software, people) to execute our E-business initiatives	EBAT_7

Table 4.2.2 E-business adoption coding independent variables in the research

Dimensions	Coding
Internal Integration (SCSO)	
My firm has reduced formal organizational structure to more fully integrate operations	SCSO_1
My firm is actively involved in initiatives to standardized supply chain practices and operations	SCSO_2
My firm has substantially reduced operating complexity by developing separate operations focused on individual channel over the past years	SCSO_3
My firm successfully utilizes time based logistics solutions like continuous replenishment, quick response and Just In Time with customers/suppliers	SCSO_4
Technology and Planning Integration (SCST)	
My firm has appropriate level of investments they should invest for Internet based supply chain system	SCST_5
Logistics operating and planning database are integrate across applications within my firm	SCST_6
My firm has adequate ability to share both standardized and customized information externally with suppliers and/or customers	SCST_7
My firms obtain information directly from customers to facilitate operation plans and reduce reliance on forecasting	SCST_8
Relationship Integration (SCSP)	
My firm clearly defines specific roles and responsibilities jointly with our supply chain partners	SCSP_9
My firm has guideline for developing, maintaining and monitor supply chain relationships by clearly defined a legal framework	SCSP_10
My firms has supply chain arrangement with supplier and customer that operate under principles of share rewards and risks	SCSP_11

Table 4.2.3 Supply chain strategy coding independent variables in the research.

Dimensions	Coding
Impact on Commerce (FM)	
(a) Sales Increased	BPFM_1
(b) Customer Service Improved	BPFM _2
(c) Market Share Increased (Market Expansion	BPFM_3
(d) International Sales Increased (Sales area widened	BPFM_4
Impact on internal efficiency (EM)	
(a) Reduced costs by electronic order taking over the Internet.	BPEM _5
(b) staff productivity increased	BPEM _7
(c) Internal processes more efficient	BPEM _8
Impact on Coordination (Upstream and Downstream) (CM)	
(a) Improved Coordination with Suppliers and business partners	BPCM_9
(b) Decreased Procurement Cost	BPCM_10
(c) Transaction cost with business partners deceased	BPCM_11

Table 4.2.4 Business performance coding dependent variables in the research.

Sector	Definitions
Information Technology	The information technology industry is defined as those organizations involve in computer science and technology, design, development, installation, and implementation of information systems and applications for other organisations. Jobs related : • Computer Systems Analysts, Engineers, and Scientists • Applications programmers • Systems programmers • Computer Operators Consists of organisations which provide services directly related to computers, like: hardware and software consultation services, data processing services, database production services, office machinery maintenance and repair services and other computer related services. Jobs related : • Computer and Programming Consultancy • Computer Maintenance • Computer Personal Servicing And Repair
Manufacturing	Manufacturing is defined as organisation involve in the physical or chemical transformation of materials or components into new products, whether the work is performed by power-driven machines or by hand, whether it is done in a factory or at home, and whether the products are sold at wholesale or retail.
Finance, Insurance and Real Estate;	The financial, insurance and real estate sector differs from other sectors such as manufacturing or retailing, and its use of IT and e-business technologies reflect those differences. This sector is linked to customers and each other in an extensive network of interrelationships that is more complex, reciprocal, and less linear than traditional manufacturing and retailing industries. There is a primary market in which customers interact with financial institutions such as retail banks, insurance agencies, real estate agencies and stock brokers. This sector also deals with secondary market in which those institutions interact with each other and with others such as mortgage brokers, commercial banks, insurance companies, and investment bankers.
Services	Activities, which are primarily concerned with providing services for the benefit of the population and/or other industries.
Retailing, wholesaling and warehousing	This industry includes all activities in connection with the selling of goods or services at retail, including the operation of retail stores and other retail establishments, the wholesaling and warehousing and other distribution of commodities
Others	This industry shall include all the organisation involve in other business activities such as agriculture, communication, utility services and non classified)

Appendix 4.3 Sector by definitions

UNIVERSITY OF CALIFORNIA, RIVERSIDE

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO • SANTA BARBARA • SANTA CRUZ

DEPARTMENT OF SOCIOLOGY
RIVERSIDE, CALIFORNIA 92521-0419

Friday, March 24, 2006

To Whom It May Concern:

Mr. Kay H. Keoy has asked that I provide a letter for his general use documenting our interaction regarding the methodology used in his dissertation research (structural equation modeling). I'm very happy to do so, and to offer the opinion that Mr. Keoy's work in this area is at the highest professional standard.

Mr. Keoy approached me a couple years ago for advice on applying two-level hierarchical factor analysis methods to the data on Malaysian and English firms adoption of e-business practices. Since his initial contact, we have interacted extensively and regularly, and I have carefully reviewed the technical aspects of the analyses in his dissertation and associated conference papers.

I was challenged by Kay's early questions, as the approach he was taking is often recommended, but seldom pursued in the research literature because of its complexity. The choice of this particular form of structural equation modeling (i.e. two-level confirmatory factor analysis) is the ideal approach to the data and research question that Kay is pursuing. Most researchers, however, would have been daunted by the technical difficulties of the method itself. Kay has been truly impressive in his ability to independently pursue learning of the method using multiple texts, web resources, and professional consultations. By the end of the analysis process, I believe that Kay's mastery is at the level of the very best practicing professionals in this field.

As a result of the proper and careful application of SEM to his research question, I think that Kay's dissertation will make a significant contribution to both the substance and the methods in his field. If I can provide any further information in this matter, please do not hesitate to contact me.

Sincerely,

Robert A. Hanneman
Professor of Sociology

Appendix 5.1

Item loads	Factor Loading on 1st Order Factor Constructs (Business Strategy)					
	Malaysia (n = 208)			UK (n = 143)		
	TS	PS	OI	TS	PS	OI
BSO_1	0.62	0.66	**0.83***	0.72	0.74	**0.86***
BSO_2	0.53	0.57	**0.71***	0.49	0.50	**0.59***
BSO_3	0.46	0.49	**0.62***	0.50	0.51	**0.60***
BSO_4	0.56	0.60	**0.76***	0.67	0.69	**0.81***
BSP_6	0.57	**0.66***	0.53	0.50	**0.59***	0.50
BSP_8	0.57	**0.65***	0.52	0.56	**0.66***	0.56
BSP_9	0.60	**0.69***	0.56	0.63	**0.75***	0.64
BST_10	**0.64***	0.56	0.48	**0.60***	0.51	0.49
BST_11	**0.89***	0.77	0.66	**0.92***	0.78	0.76
BST_12	**0.87***	0.75	0.65	**0.81***	0.69	0.67
BST_13	**0.88***	0.77	0.66	**0.86***	0.73	0.72

Legend
TS Technological Strategy; PS Partnership Strategy; OI Organisational Infrastructure
* Significant at P<0.00

Appendix 5.1.1 Factor loadings of confirmatory factory analysis for Business Strategy construct item pairs for the Malaysian and UK samples

Item loads	Factor Loadings on 1st Order Factor Constructs (E-Business Adoption)					
	Malaysia (n = 208)			UK (n = 143)		
	AC	TC	OC	AC	TC	OC
EBAP_12	**0.88***	0.77	0.76	**0.88***	0.75	0.75
EBAP_11	**0.83***	0.72	0.72	**0.73***	0.63	0.63
EBAP_9	**0.73***	0.64	0.63	**0.72***	0.62	0.62
EBAT_7	0.68	**0.78***	0.69	0.65	**0.76***	0.69
EBAT_6	0.75	**0.86***	0.76	0.69	**0.81***	0.73
EBAT_5	0.73	**0.84***	0.74	0.72	**0.84***	0.76
EBAO_3	0.75	0.77	**0.87***	0.75	0.78	**0.87***
EBAO_2	0.77	0.79	**0.89***	0.71	0.75	**0.83***
EBAO_1	0.81	0.83	**0.94***	0.78	0.82	**0.91***

Legend
AC Attitudinal Capability; OC Organisational Capability; TA Technological Capability
* Significant at P<0.00

Appendix 5.1.2 Factor loadings of confirmatory factory analysis for E-Business Adoption construct item pairs for the Malaysian and UK samples

Item loads	Factor Loading of 1st Order Factor Constructs (Business Performance)					
	Malaysia (n = 208)			UK (n = 143)		
	CM	EM	FM	CM	EM	FM
BPCM_12	**0.90***	0.78	0.76	**0.93***	0.83	0.80
BPCM_11	**0.89***	0.77	0.75	**0.90***	0.81	0.78
BPCM_9	**0.69***	0.60	0.59	**0.69***	0.62	0.60
BPEM_8	0.73	**0.85***	0.76	0.80	**0.90***	0.83
BPEM_7	0.60	**0.69***	0.63	0.69	**0.77***	0.71
BPEM_5	0.52	**0.60***	0.54	0.51	**0.57***	0.53
BPFM_4	0.59	0.62	**0.69***	0.56	0.60	**0.65***
BPFM_3	0.57	0.61	**0.68***	0.61	0.65	**0.70***
BPFM_2	0.79	0.84	**0.93***	0.80	0.85	**0.93***
BPFM_1	0.78	0.83	**0.92***	0.78	0.83	**0.90***

Legend
CM Coordination Measures EM Efficient Measures FM Financial Measures
* Significant at P<0.00

Appendix 5.1.3 Factor loadings of confirmatory factory analysis for Business Performance construct item pairs for the Malaysian and UK samples

Item loads	Factor Loading of 1st Order Factor Constructs (Supply Chain Strategy)					
	Malaysia (n = 208)			UK (n = 143)		
	SCR	TIn	OIn	SCR	TIn	OIn
SCSO_1	0.52	0.77	**0.91***	0.38	0.44	**0.58***
SCSO_2	0.53	0.79	**0.93***	0.48	0.57	**0.74***
SCSO_3	0.46	0.69	**0.82***	0.53	0.62	**0.81***
SCSO_4	0.46	0.69	**0.82***	0.51	0.60	**0.79***
SCST_5	0.43	**0.79***	0.67	0.46	**0.67***	0.51
SCST_6	0.44	**0.81***	0.68	0.52	**0.76***	0.59
SCST_7	0.39	**0.72***	0.61	0.49	**0.73***	0.56
SCST_8	0.51	**0.92***	0.78	0.53	**0.78***	0.60
SCSP_9	**0.76***	0.42	0.43	**0.64***	0.44	0.42
SCSP_10	**0.78***	0.43	0.44	**0.83***	0.56	0.54
SCSP_11	**0.83***	0.45	0.47	**0.65***	0.44	0.42

Legend
SCR Supply Chain Relationship TIn Technological Integration OIn Organisation Integration
* Significant at P<0.00

Appendix 5.1.4 Factor loadings of confirmatory factory analysis for Supply Chain Strategy construct item pairs for the Malaysian and UK samples

Appendix 5.2

Paths			Standardized Weight, λ	Standard Error (S.E)	Critical Ratio t-value
OI	←	BS	0.83 0.91	(Fixed) (Fixed)	(Fixed) (Fixed)
TI	←	BS	0.90 0.91	0.11 0.10	9.87 9.45
PS	←	BS	0.97 0.93	0.12 0.12	8.57 8.38
BSO_1	←	OI	0.83 0.86	(Fixed) (Fixed)	(Fixed) (Fixed)
BSO_2	←	OI	0.71 0.59	0.09 0.11	10.63 7.42
BSO_3	←	OI	0.62 0.60	0.09 0.10	8.99 7.55
BSO_4	←	OI	0.76 0.81	0.09 0.09	11.40 11.35
BSP_6	←	PS	0.66 0.59	0.12 0.13	8.33 6.47
BSP_8	←	PS	0.65 0.66	0.12 0.13	8.29 7.22
BSP_9	←	PS	0.69 0.75	(Fixed) (Fixed)	(Fixed) (Fixed)
BST_10	←	TI	0.64 0.60	0.08 0.10	10.46 7.75
BST_11	←	TI	0.89 0.92	0.06 0.07	17.93 14.88
BST_12	←	TI	0.87 0.92	0.06 0.08	17.15 12.15
BST_13	←	TI	0.88 0.81	(Fixed) (Fixed)	(Fixed) (Fixed)

Legend

BS	Business Strategy	PS	Partnership Strategy
TI	Technological Infrastructure	OI	Organisation Infrastructure
	Malaysian Sample		UK Sample

Note: All of the loadings are significant at $P < 0.01$

Appendix 5.2.1 SEM estimates, critical ratios, standard error and correlations for BS measurement model (Final Test)

Paths			Standardized Weight, λ	Standard Error (S.E)	Critical Ratio t-value
OC	←	EBA	0.94 0.95	(Fixed) (Fixed)	(Fixed) (Fixed)
AC	←	EBA	0.92 0.90	0.06 0.08	11.27 8.68
TA	←	EBA	0.94 0.94	0.07 0.09	13.89 11.06
EBAO_1	←	OC	0.94 0.91	(Fixed) (Fixed)	(Fixed) (Fixed)
EBAO_2	←	OC	0.89 0.83	0.04 0.07	21.44 13.78
EBAO_3	←	OC	0.87 0.87	0.05 0.06	19.89 15.03
EBAT_5	←	TC	0.84 0.84	(Fixed) (Fixed)	(Fixed) (Fixed)

EBAT_6	←	TC	0.86 0.81	0.07 0.08	15.17 11.36
EBAT_7	←	TC	0.78 0.76	0.07 0.09	13.15 10.37
EBAP_9	←	AC	0.73 0.72	(Fixed) (Fixed)	(Fixed) (Fixed)
EBAP_11	←	AC	0.83 0.73	0.10 0.12	11.79 8.31
EBAP_12	←	AC	0.88 0.88	0.10 0.11	12.46 9.74

Legend

EBA E-Business Adoption; OC Organisational Capability

TA Technological Capability; AC Attitudinal Capability

Malaysian Sample; UK Sample

Note: All of the loadings are significant at $P < 0.01$

Appendix 5.2.2 SEM estimates, critical ratios, standard error and correlations for EBA measurement model (Final Test)

Paths			Standardized Weight, λ	Standard Error (S.E)	Critical Ratio t-value
SCR	←	SCS	0.61 0.76	0.09 0.11	7.26 5.53
OIn	←	SCS	0.93 0.94	(Fixed) (Fixed)	(Fixed) (Fixed)
TIn	←	SCS	0.91 0.91	0.10 0.15	10.93 6.82
SCSO_1	←	OIn	0.91 0.58	0.06 0.10	16.51 6.80
SCSO_2	←	OIn	0.93 0.74	0.06 0.10	16.93 9.08
SCSO_3	←	OIn	0.81 0.81	(Fixed) (Fixed)	(Fixed) (Fixed)
SCSO_4	←	OIn	0.82 0.79	0.07 0.10	13.93 9.65
SCST_5	←	TIn	0.79 0.67	0.06 0.10	15.01 7.81
SCST_6	←	TIn	0.81 0.76	0.06 0.10	15.65 8.99
SCST_7	←	TIn	0.72 0.73	0.07 0.12	12.80 8.51
SCST_8	←	TIn	0.92 0.78	(Fixed) (Fixed)	(Fixed) (Fixed)
SCSP_9	←	SCR	0.76 0.64	0.08 0.15	10.80 6.20
SCSP_10	←	SCR	0.78 0.83	0.08 0.19	11.03 7.03
SCSP_11	←	SCR	0.83 0.65	(Fixed) (Fixed)	(Fixed) (Fixed)

Legend

SCS Supply Chain Strategy; SCR Supply Chain Relationship

TIn Technological Integration; OIn Organisational Integration

Malaysian Sample; UK Sample

Appendix 5.2.3 SEM estimates, critical ratios, standard error and correlations for SCS measurement model (Final Test)

Paths			Standardized Weight, λ	Standard Error (S.E)	Critical Ratio t-value
FM	←	BP	0.94 0.94	(Fixed) (Fixed)	(Fixed) (Fixed)
CM	←	BP	0.90 0.91	0.07 0.09	10.26 8.73
EM	←	BP	0.96 0.91	0.07 0.10	13.93 7.14
BPFM_1	←	FM	0.92 0.90	(Fixed) (Fixed)	(Fixed) (Fixed)
BPFM _2	←	FM	0.93 0.93	0.04 0.06	23.20 17.53
BPFM _3	←	FM	0.68 0.70	0.07 0.08	11.91 10.26
BPFM _4	←	FM	0.69 0.65	0.07 0.09	12.26 9.03
BPEM _5	←	EM	0.60 0.57	(Fixed) (Fixed)	(Fixed) (Fixed)
BPEM _7	←	EM	0.69 0.77	0.15 0.19	7.93 6.89
BPEM _8	←	EM	0.85 0.90	0.16 0.20	8.97 7.49
BPCM _9	←	CM	0.69 0.69	(Fixed) (Fixed)	(Fixed) (Fixed)
BPCM _11	←	CM	0.89 0.90	0.11 0.13	11.54 9.96
BPCM _12	←	CM	0.90 0.93	0.11 0.12	11.66 10.21

Legend

BP	Business Performance	EM	Efficiency Measures
FM	Financial Measures	CM	Coordiantion Measures
	Malaysian Sample		UK Sample

Note: All of the loadings are significant at P < 0.01

Appendix 5.2.4 SEM estimates, critical ratios, standard error and correlations for BP measurement model (Final Test)

Appendix 5.3

Constructs		Item	Standardized Loadings	Indication measurement error	Composite reliability	Variance extracted
E-Business Adoption	AC	EBAP_1	0.94	0.12	**0.93**	**0.81**
		EBAP_2	0.89	0.21		
		EBAP_3	0.87	0.24		
	TC	EBAT_5	0.84	0.29	**0.87**	**0.68**
		EBAT_6	0.86	0.26		
		EBAT_7	0.78	0.39		
	OC	EBAO_9	0.73	0.47	**0.86**	**0.67**
		EBAO_11	0.83	0.31		
		EBAO_12	0.88	0.23		
Supply chain Strategy	OIn	SCSO_4	0.82	0.33	**0.93**	**0.76**
		SCSO_3	0.82	0.33		
		SCSO_2	0.93	0.14		
		SCSO_1	0.91	0.17		
	TIn	SCST_8	0.92	0.15	**0.89**	**0.66**
		SCST_7	0.72	0.48		
		SCST_6	0.81	0.34		
		SCST_5	0.79	0.38		
	SCR	SCSP_11	0.83	0.31	**0.83**	**0.62**
		SCSP_10	0.78	0.39		
		SCSP_9	0.76	0.42		
Business Performance	FM	BPFM_1	0.92	0.15	**0.88**	**0.66**
		BPFM_2	0.93	0.14		
		BPFM_3	0.68	0.54		
		BPFM_4	0.69	0.52		
	EM	BPEM_5	0.60	0.64	**0.76**	**0.52**
		BPEM _7	0.69	0.52		
		BPEM _8	0.85	0.28		
	CM	BPCM _9	0.69	0.52	**0.87**	**0.69**
		BPCM _11	0.89	0.21		
		BPCM _12	0.90	0.19		
Business Strategy	OI	BSO_4	0.76	0.42	**0.82**	**0.54**
		BSO_3	0.62	0.62		
		BSO_2	0.71	0.50		
		BSO_1	0.83	0.31		
	PS	BSP_9	0.69	0.52	**0.71**	**0.49**
		BSP_8	0.65	0.58		
		BSP_6	0.66	0.56		
	TI	BST_13	0.88	0.23	**0.89**	**0.68**
		BST_12	0.87	0.24		
		BST_11	0.89	0.21		
		BST_10	0.64	0.59		

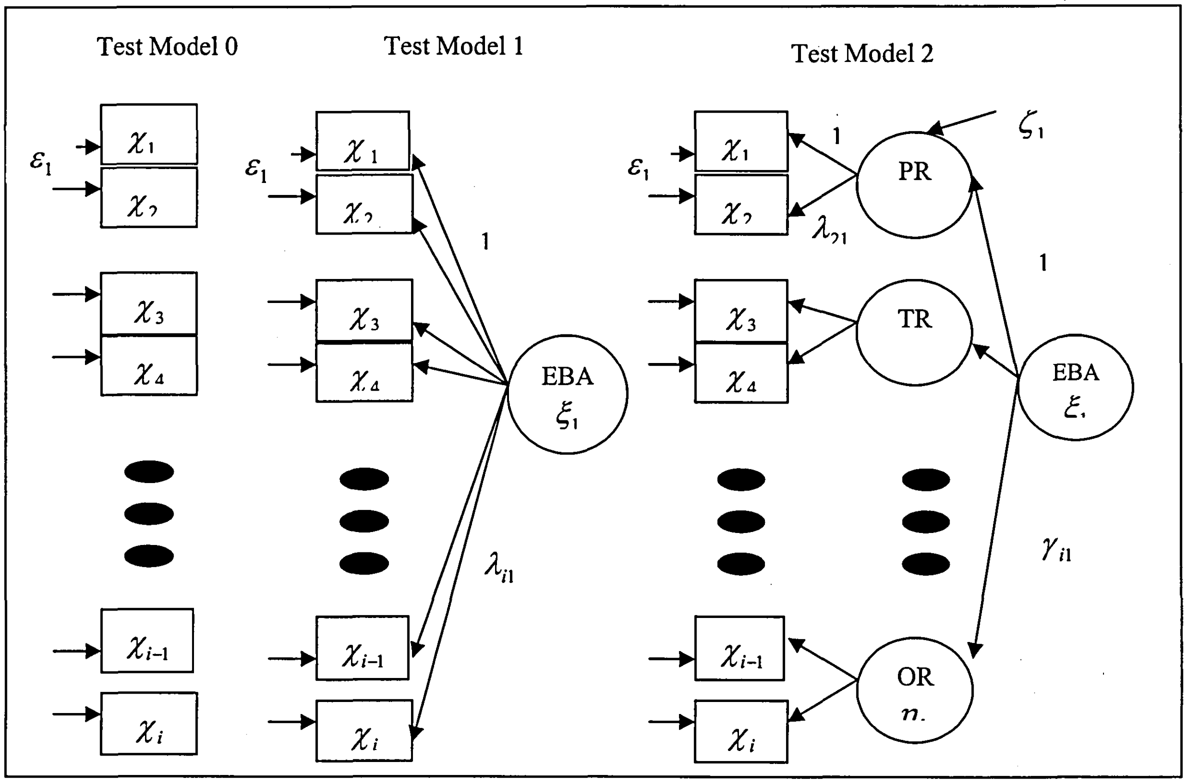
Appendix 5.3.1 Composite reliability (CR) and variance extracted (AVE) for the Malaysian Sample (n = 208)

Constructs		Item	Standardized Loadings	Indication measurement error	Composite reliability	Variance extracted
E-Business Adoption	AC	EBAP_1	0.91	0.17	**0.90**	**0.76**
		EBAP_2	0.83	0.31		
		EBAP_3	0.87	0.24		
	TC	EBAT_5	0.84	0.29	**0.85**	**0.65**
		EBAT_6	0.81	0.34		
		EBAT_7	0.76	0.42		
	OC	EBAO_9	0.72	0.48	**0.82**	**0.61**
		EBAO_11	0.73	0.47		
		EBAO_12	0.88	0.23		
Supply chain Strategy	OIn	SCSO_4	0.79	0.38	**0.82**	**0.54**
		SCSO_3	0.81	0.34		
		SCSO_2	0.74	0.45		
		SCSO_1	0.58	0.66		
	TIn	SCST_8	0.78	0.39	**0.83**	**0.54**
		SCST_7	0.73	0.47		
		SCST_6	0.76	0.42		
		SCST_5	0.67	0.55		
	SCR	SCSP_11	0.65	0.58	**0.75**	**0.51**
		SCSP_10	0.83	0.31		
		SCSP_9	0.64	0.59		
Business Performance	FM	BPFM_1	0.90	0.19	**0.88**	**0.65**
		BPFM_2	0.93	0.14		
		BPFM_3	0.70	0.51		
		BPFM_4	0.65	0.58		
	EM	BPEM_5	0.57	0.68	**0.80**	**0.58**
		BPEM _7	0.77	0.41		
		BPEM _8	0.90	0.19		
	CM	BPCM _9	0.69	0.52	**0.88**	**0.72**
		BPCM _11	0.90	0.19		
		BPCM _12	0.93	0.14		
Business Strategy	OI	BSO_4	0.81	0.34	**0.81**	**0.53**
		BSO_3	0.60	0.64		
		BSO_2	0.59	0.65		
		BSO_1	0.86	0.26		
	PS	BSP_9	0.75	0.44	**0.71**	**0.51**
		BSP_8	0.66	0.56		
		BSP_6	0.59	0.65		
	TI	BST_13	0.86	0.26	**0.88**	**0.65**
		BST_12	0.81	0.34		
		BST_11	0.92	0.15		
		BST_10	0.60	0.64		

Appendix 5.3.2 Composite reliability (CR) and variance extracted (AVE) for the UK Sample (n = 143)

Appendix 5.4

Procedure to test the convergent validity and discriminant validity of scales were adopted in this study using Widaman's (1985) three comparison: According to several authors (Bienstock, Mentzer and Bird, 1997; Mentzer, Flint and Kent 1999; Widaman, 1985), significant χ^2 statistics in the comparison of Model 0 with Model 1 suggest convergent validity and in the comparison of Model 1 with Model 2 provides evidence of discriminant validity.



Following a procedure outlined by Bienstock, Mentzer, and Bird (1997), the three comparison models were Model 0, Model 1, and Model 2. Model 0 with individual measurement items as unique factors in a construct; Model 1 with individual items loading on one unique first order factor, and Model 2 with individual items loaded on any one of the appropriated first order factors that, in turn, are loaded on the second order factor (Min and Mentzer, 2004). Bienstock, Mentzer, and Bird (1997), along with Widaman (1985) contended that comparison of Model 0 with Model 1 provides evidence of convergent validity, and comparison of Model 1 with Model 2 provides evidence of discriminant validity.

Appendix 5.5

EBA Subscale	AC			TC			OC		
Items	1	2	3	4	5	6	7	8	9
1. EBAP_12	**1.00**								
2. EBAP_11	**0.73***	**1.00**							
3. EBAP_9	**0.65***	**0.61***	**1.00**						
4. EBAT_7	0.60	0.56	0.50	**1.00**					
5. EBAT_6	0.66	0.62	0.55	**0.67***	**1.00**				
6. EBAT_5	0.65	0.61	0.54	**0.66***	**0.73***	**1.00**			
7. EBAO_3	0.66	0.62	0.55	0.60	0.66	0.65	**1.00**		
8. EBAO_2	0.68	0.64	0.57	0.62	0.68	0.67	**0.78***	**1.00**	
9. EBAO_1	0.71	0.67	0.59	0.65	0.71	0.70	**0.81***	**0.84***	**1.00**
Note *p < 0.01									

Appendix 5.5.1 Inter-correlation scores among items for each subscale of EBA for the Malaysia sample (n=208)

EBA Subscale	AC			TC			OC		
Items	1	2	3	4	5	6	7	8	9
1. EBAP_12	**1.00**								
2. EBAP_11	**0.65***	**1.00**							
3. EBAP_9	**0.64***	**0.53***	**1.00**						
4. EBAT_7	0.57	0.48	0.47	**1.00**					
5. EBAT_6	0.61	0.51	0.50	**0.62***	**1.00**				
6. EBAT_5	0.63	0.53	0.52	**0.64***	**0.69***	**1.00**			
7. EBAO_3	0.65	0.55	0.54	0.60	0.64	0.66	**1.00**		
8. EBAO_2	0.63	0.53	0.52	0.57	0.61	0.63	**0.73***	**1.00**	
9. EBAO_1	0.68	0.57	0.56	0.62	0.66	0.69	**0.79***	**0.76***	**1.00**
Note *p < 0.01									

Appendix 5.5.2 Inter-correlation scores among items for each subscale of EBA for the UK Companies (n = 143)

SCS Subscale	CM				EM			FM		
Items	1	2	3	4	5	6	7	8	9	10
1. BPCM_12	**1.00**									
2. BPCM_11	**0.80***	**1.00**								
3. BPCM_9	**0.62***	**0.61***	**1.00**							
4. BPEM_8	**0.66***	**0.65***	**0.51***	**1.00**						
5. BPEM_7	0.54	0.53	0.41	0.59	**1.00**					
6. BPEM_5	0.46	0.46	0.36	0.50	**0.41***	**1.00**				
7. BPFM_4	0.53	0.52	0.40	0.53	**0.43***	**0.37***	**1.00**			
8. BPFM_3	0.52	0.51	0.40	0.52	0.42	0.36	0.47	**1.00**		
9. BPFM_2	0.71	0.70	0.55	0.71	0.58	0.50	0.64	**0.63***	**1.00**	
10. BPFM_1	0.70	0.69	0.54	0.70	0.58	0.50	0.64	**0.62***	**0.86***	**1.00**
Note *p < 0.01										

Appendix 5.5.3 Inter-correlation Scores among items for each subscale of BP for the Malaysia sample (n = 208)

EBE Subscale		CM				EM			FM		
	Items	1	2	3	4	5	6	7	8	9	10
1.	BPCM_12	**1.00**									
2.	BPCM_11	**0.84***	**1.00**								
3.	BPCM_9	**0.65***	**0.62***	**1.00**							
4.	BPEM_8	**0.75***	**0.72***	**0.56***	**1.00**						
5.	BPEM_7	0.64	0.62	0.48	0.69	**1.00**					
6.	BPEM_5	0.48	0.46	0.35	0.52	**0.44***	**1.00**				
7.	BPFM_4	0.52	0.50	0.39	0.54	**0.46***	**0.34***	**1.00**			
8.	BPFM_3	0.57	0.55	0.42	0.58	0.50	0.37	0.45	**1.00**		
9.	BPFM_2	0.75	0.72	0.55	0.77	0.66	0.49	0.60	**0.65***	**1.00**	
10.	BPFM_1	0.73	0.70	0.54	0.75	0.64	0.48	0.58	**0.64***	**0.84***	**1.00**
Note *p < 0.01											

Appendix 5.5.4 Inter-correlation Scores among items for each subscale of BP for UK sample (n = 143)

SCS Subscale		OIn				TIn				SCR		
	Items	1	2	3	4	5	6	7	8	9	10	11
1.	SCSO_1	**1.00**										
2.	SCSO_2	**0.85***	**1.00**									
3.	SCSO_3	**0.76***	**0.78***	**1.00**								
4.	SCSO_4	**0.75***	**0.77***	**0.69***	**1.00**							
5.	SCST_5	0.72	0.74	0.66	0.65	**1.00**						
6.	SCST_6	0.68	0.69	0.62	0.61	**0.66***	**1.00**					
7.	SCST_7	0.59	0.60	0.54	0.53	**0.57***	**0.53***	**1.00**				
8.	SCST_8	0.80	0.82	0.73	0.72	**0.78***	**0.73***	**0.63***	**1.00**			
9.	SCSP_9	0.45	0.46	0.41	0.41	0.42	0.39	0.34	0.46	**1.00**		
10.	SCSP_10	0.49	0.50	0.45	0.44	0.46	0.43	0.37	0.51	**0.65***	**1.00**	
11.	SCSP_11	0.47	0.49	0.43	0.43	0.44	0.41	0.36	0.49	**0.63***	**0.69***	**1.00**
Note *p < 0.05												

Appendix 5.5.5 Inter-correlation Scores among items for each subscale of SCS for the Malaysia sample (n = 208)

SCS Subscale		OIn				TIn				SCR		
	Items	1	2	3	4	5	6	7	8	9	10	11
1.	SCSO_1	**1.00**										
2.	SCSO_2	**0.43***	**1.00**									
3.	SCSO_3	**0.47***	**0.60**	**1.00**								
4.	SCSO_4	**0.45***	**0.58***	**0.64***	**1.00**							
5.	SCST_5	0.30	0.38	0.42	0.40	**1.00**						
6.	SCST_6	0.34	0.44	0.48	0.46	**0.51***	**1.00**					
7.	SCST_7	0.32	0.41	0.45	0.44	**0.49***	**0.55***	**1.00**				
8.	SCST_8	0.35	0.45	0.49	0.47	**0.52***	**0.60***	**0.57***	**1.00**			
9.	SCSP_9	0.24	0.31	0.34	0.33	0.29	0.33	0.32	0.34	**1.00**		
10.	SCSP_10	0.31	0.40	0.44	0.42	0.38	0.43	0.41	0.44	**0.53**	**1.00**	
11.	SCSP_11	0.24	0.31	0.34	0.33	0.30	0.34	0:32	0.35	**0.42**	**0.54**	**1.00**
Note *p < 0.01												

Appendix 5.5.6 Inter-correlation Scores among items for each subscale of SCS for the UK Companies (n=143)

BS Subscale	OI				PS			TI			
Items	1	2	3	4	5	6	7	8	9	10	11
1. BSO_1	**1.00**										
2. BSO_2	**0.51***	**1.00**									
3. BSO_3	**0.52***	**0.35***	**1.00**								
4. BSO_4	**0.70***	**0.48***	**0.49***	**1.00**							
5. BSP_6	0.43	0.30	0.30	0.41	**1.00**						
6. BSP_8	0.48	0.33	0.34	0.45	**0.38***	**1.00**					
7. BSP_9	0.55	0.38	0.38	0.52	**0.44***	**0.49**	**1.00**				
8. BST_10	0.43	0.29	0.30	0.18	0.30	0.33	0.38	**1.00**			
9. BST_11	0.66	0.45	0.46	0.27	0.46	0.51	0.58	**0.55**	**1.00**		
10. BST_12	0.58	0.40	0.40	0.24	0.40	0.45	0.51	**0.48**	**0.74**	**1.00**	
11. BST_13	0.62	0.42	0.43	0.25	0.43	0.48	0.55	**0.51**	**0.79**	**0.70**	**1.00**
Note *p < 0.01											

Appendix 5.5.7 Inter-correlation Scores among items for each subscale of BS for UK sample (n = 143)

BS Subscale	OI				PS			TI			
Items	1	2	3	4	5	6	7	8	9	10	11
1. BSO_1	**1.00**										
2. BSO_2	**0.59***	**1.00**									
3. BSO_3	**0.51***	**0.44***	**1.00**								
4. BSO_4	**0.63***	**0.54***	**0.47**	**1.00**							
5. BSP_6	0.44	0.37	0.32	0.40	**1.00**						
6. BSP_8	0.43	0.37	0.32	0.39	**0.43***	**1.00**					
7. BSP_9	0.46	0.40	0.34	0.42	**0.46***	**0.45***	**1.00**				
8. BST_10	0.40	0.34	0.30	0.36	0.37	0.36	0.39	**1.00**			
9. BST_11	0.55	0.47	0.41	0.50	0.51	0.51	0.54	**0.57**	**1.00**		
10. BST_12	0.54	0.46	0.40	0.49	0.50	0.49	0.52	**0.56**	**0.77**	**1.00**	
11. BST_13	0.55	0.47	0.41	0.50	0.50	0.50	0.53	**0.57**	**0.79**	**0.77**	**1.00**
Note *p < 0.01											

Appendix 5.5.8 Inter-correlation Scores among items for each subscale of BS for the Malaysia sample (n = 208)

	Business Strategy			Supply Chain Strategy			E-Business Adoption			Business Performance		
	1	2	3	4	5	6	7	8	9	10	11	12
EBCQ												
Business Strategy												
1	0.81	0	0	0	0	0	0	0	0	0	0	0
2	0.77	0	0	0	0	0	0	0	0	0	0	0
3	0.62	0	0	0	0	0	0	0	0	0	0	0
4	0.73	0	0	0	0	0	0	0	0	0	0	0
6	0	0.69	0	0	0	0	0	0	0	0	0	0
8	0	0.61	0	0	0	0	0	0	0	0	0	0
9	0	0.71	0	0	0	0	0	0	0	0	0	0
10	0	0	0.63	0	0	0	0	0	0	0	0	0
11	0	0	0.89	0	0	0	0	0	0	0	0	0
12	0	0	0.86	0	0	0	0	0	0	0	0	0
13	0	0	0.90	0	0	0	0	0	0	0	0	0
Supply Chain Strategy												
1	0	0	0	0.91	0	0	0	0	0	0	0	0
2	0	0	0	0.94	0	0	0	0	0	0	0	0
3	0	0	0	0.81	0	0	0	0	0	0	0	0
4	0	0	0	0.81	0	0	0	0	0	0	0	0
5	0	0	0	0	0.80	0	0	0	0	0	0	0
6	0	0	0	0	0.82	0	0	0	0	0	0	0
7	0	0	0	0	0.73	0	0	0	0	0	0	0
8	0	0	0	0	0.90	0	0	0	0	0	0	0
9	0	0	0	0	0	0.84	0	0	0	0	0	0
10	0	0	0	0	0	0.77	0	0	0	0	0	0
11	0	0	0	0	0	0.84	0	0	0	0	0	0

E-Business Adoption												
1	0	0	0	0	0	0	0.94	0	0	0	0	0
2	0	0	0	0	0	0	0.89	0	0	0	0	0
3	0	0	0	0	0	0	0.87	0	0	0	0	0
5	0	0	0	0	0	0	0	0.84	0	0	0	0
6	0	0	0	0	0	0	0	0.87	0	0	0	0
7	0	0	0	0	0	0	0	0.78	0	0	0	0
9	0	0	0	0	0	0	0	0	0.72	0	0	0
10	0	0	0	0	0	0	0	0	0.84	0	0	0
11	0	0	0	0	0	0	0	0	0.88	0	0	0
Business Performance												
1	0	0	0	0	0	0	0	0	0	0.93	0	0
2	0	0	0	0	0	0	0	0	0	0.93	0	0
3	0	0	0	0	0	0	0	0	0	0.68	0	0
4	0	0	0	0	0	0	0	0	0	0.68	0	0
5	0	0	0	0	0	0	0	0	0	0	0.59	0
7	0	0	0	0	0	0	0	0	0	0	0.72	0
8	0	0	0	0	0	0	0	0	0	0	0.83	0
9	0	0	0	0	0	0	0	0	0	0	0	0.69
11	0	0	0	0	0	0	0	0	0	0	0	0.90
12	0	0	0	0	0	0	0	0	0	0	0	0.89

Appendix 6.1. Factor co relational and uniqueness for the EBC and BP factors for the Malaysian sample

	Business Strategy			Supply Chain Strategy			E-Business Adoption			Business Performance		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
EBCQ												
Business Strategy												
1	0.90	0	0	0	0	0	0	0	0	0	0	0
2	0.59	0	0	0	0	0	0	0	0	0	0	0
3	0.62	0	0	0	0	0	0	0	0	0	0	0
4	0.77	0	0	0	0	0	0	0	0	0	0	0
6	0	0.52	0	0	0	0	0	0	0	0	0	0
8	0	0.57	0	0	0	0	0	0	0	0	0	0
9	0	0.89	0	0	0	0	0	0	0	0	0	0
10	0	0	0.57	0	0	0	0	0	0	0	0	0
11	0	0	0.88	0	0	0	0	0	0	0	0	0
12	0	0	0.84	0	0	0	0	0	0	0	0	0
13	0	0	0.89	0	0	0	0	0	0	0	0	0
	1	2	3	4	5	6	7	8	9	10	11	12
Supply Chain Strategy												
1	0	0	0	0.61	0	0	0	0	0	0	0	0
2	0	0	0	0.78	0	0	0	0	0	0	0	0
3	0	0	0	0.80	0	0	0	0	0	0	0	0
4	0	0	0	0.74	0	0	0	0	0	0	0	0
5	0	0	0	0	0.63	0	0	0	0	0	0	0
6	0	0	0	0	0.78	0	0	0	0	0	0	0
7	0	0	0	0	0.76	0	0	0	0	0	0	0
8	0	0	0	0	0.76	0	0	0	0	0	0	0
9	0	0	0	0	0	0.72	0	0	0	0	0	0
10	0	0	0	0	0	0.72	0	0	0	0	0	0
11	0	0	0	0	0	0.71	0	0	0	0	0	0

E-Business adoption												
1	0	0	0	0	0	0	0.92	0	0	0	0	0
2	0	0	0	0	0	0	0.84	0	0	0	0	0
3	0	0	0	0	0	0	0.85	0	0	0	0	0
5	0	0	0	0	0	0	0	0.79	0	0	0	0
6	0	0	0	0	0	0	0	0.88	0	0	0	0
7	0	0	0	0	0	0	0	0.75	0	0	0	0
9	0	0	0	0	0	0	0	0	0.69	0	0	0
10	0	0	0	0	0	0	0	0	0.77	0	0	0
11	0	0	0	0	0	0	0	0	0.88	0	0	0
Business Performance												
1	0	0	0	0	0	0	0	0	0	0.90	0	0
2	0	0	0	0	0	0	0	0	0	0.93	0	0
3	0	0	0	0	0	0	0	0	0	0.71	0	0
4	0	0	0	0	0	0	0	0	0	0.63	0	0
5	0	0	0	0	0	0	0	0	0	0	0.58	0
7	0	0	0	0	0	0	0	0	0	0	0.80	0
8	0	0	0	0	0	0	0	0	0	0	0.87	0
9	0	0	0	0	0	0	0	0	0	0	0	0.68
11	0	0	0	0	0	0	0	0	0	0	0	0.90
12	0	0	0	0	0	0	0	0	0	0	0	0.94

Appendix 6.2 Factor co-relational and uniqueness for the EBC and BP factors for the UK Sample

<table>
<tr><td colspan="9">Test Models and Description</td></tr>
<tr><td colspan="9">Measurement goodness of fit analysis</td></tr>
<tr><td colspan="9">MG1</td></tr>
<tr><td colspan="9">• No invariance constraints imposed, and parameters for the a-priori model are fit separately for each group.</td></tr>
<tr><td colspan="9">MG2</td></tr>
<tr><td colspan="9">• Only first order factor loadings are constrained to be equal across the 2 groups.
• This MG2 is used to evaluate the multiple group comparison between adopters and non adopters of e-business on second order twelve factor loadings (technological, organisation and people dimensions), correlations among second order constructs (i.e. H1, H2 and H3) and path coefficients (i.e. H4, H5 and H6).</td></tr>
<tr><td colspan="9">MG3</td></tr>
<tr><td colspan="9">• Constraints / invariants are imposed on the first order and second order loadings to measure the difference between the two groups. The path coefficients and correlations with the first and second order factor loadings are equal across the two groups</td></tr>
<tr><td>MG4</td><td>MG5</td><td>MG6</td><td>MG7</td><td>MG8</td><td>MG9</td><td>MG10</td><td colspan="2">MG11</td></tr>
<tr><td colspan="9">• The invariance of the factor loadings are imposed in combination with the invariance of additional sets of parameters on factor correlations and second order factor loadings. The aim is to assess if the imposition of these added invariance constraints will affect the goodness of fit indices in comparison with models MG1 and MG2 respectively.</td></tr>
<tr><td colspan="9">Structural goodness of fit analysis</td></tr>
<tr><td>MG12</td><td>MG13</td><td>MG14</td><td>MG15</td><td>MG16</td><td>MG17</td><td>MG18</td><td>MG19</td><td>MG20</td></tr>
<tr><td colspan="9">• Focus specifically on the structural component of the model – the path coefficients that are critical to test predictions based on the EBC model. For Models MG2-MG19, some combination of parameters is required to be invariant across the two groups.</td></tr>
</table>

Appendix 7.1 : A brief description of the 20 test models (MG1 to MG20)

Appendix 7.2: Tests of invariance over Two Groups for UK and Malaysian samples

7.2.1 Cross-Group Generalizability: Evaluation of Parameter Estimates between Adopter and Non Adopter of E-Business for Malaysia Sample

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	Full E- Business Capabitlity (EBC) Model	
Total Group Sample							CFA Invariant (constraint)	Freely Estimate
TG1	932.91	761	1.23	0.97	0.97	0.03		
Multiple Group CFA								
MG1	1910.94	1522	1.26	0.93	0.92	0.04	-	1st FL, 2nd FL, FC,
MG2	**1949.94**	**1554**	**1.25**	**0.93**	**0.92**	**0.04**	-	$FC^{(H4-H6)}$, $PC^{(H1-H3)}$, 2nd FL
MG3	**1956.86**	**1559**	**1.25**	**0.92**	**0.92**	**0.04**	**2nd FL**	$FC^{(H4-H6)}$, $PC^{(H1-H3)}$
MG4	1968.84	1557	1.26	0.92	0.92	0.04	$FC^{(H4-H6)}$	2nd FL.
MG5	1992.03	1562	1.28	0.92	0.91	0.04	2nd FL, $FC^{(H4-H6)}$	-
MG6	1951.50	1555	1.25	0.93	0.92	0.04	FC^{H4}	$FC^{(H4, H5)}$
MG7	1950.31	1555	1.25	0.93	0.92	0.04	FC^{H5}	$FC^{(H4, H6)}$
MG8	2040.98	1557	1.31	0.91	0.90	0.04	FC^{H6}	$FC^{(H4, H5)}$
MG9	1959.54	1560	1.26	0.92	0.92	0.04	2nd FL, FC^{H4}	$FC^{(H5, H6)}$
MG10	1956.40	1560	1.25	0.93	0.92	0.04	2nd FL, FC^{H5}	$FC^{(H4, H6)}$
MG11	1987.83	1560	1.27	0.92	0.91	0.04	2nd FL· FC^{H6}	$FC^{(H4, H5)}$

Note. All of the tested model has SEM invariant = 1st FL and freely estimated = FV . 1st FL = Factor loading for first order factors, 2nd FL = Factor loadings for second order factor, FC(H4-H6) = Factor Correlations, FV = Factor Variances, FC(H4) = Factor Correlation between EBR and BS, FC(H5) = Factor Correlation between SCS and EBA, FC(H6) = Factor Correlation between EBA and BS, PC(H1-H3) = Path Coefficients , PCH1 = Path Coefficient from BS to BP, PCH2 = Path Coefficient from SCS to BP, PCH3 = Path Coefficient from EBA to BP. In Model TG1 (see parameter estimates in Table 1) the ECC model was fit to the total group, whereas for Models MG1-MG20 the ECC model was fit separately for each of the 2 groups representing different groups. For Models MG2-MG19, some combination of parameters is required to be invariant across the 2 groups.

Table 7.2.1 Goodness of Fit for EBC Model fit to the Total Group and Multiple (Adopter and Non Adopter E-Business) Malaysia Sample (n= 208) Measurement Analysis

Model	χ^2	*df*	χ^2/df	CFI	TLI	RMSEA	Full E-Business Capabilities (EBC) Model	
Multiple Group SEM							SEM Invariant (constraint)	Freely Estimate
MG12	1956.34	1562	1.25	0.93	0.92	0.04	2nd FL,$PC^{(H1-H3)}$	$FC^{(H4-H6)}$
MG13	1949.94	1556	1.25	0.93	0.92	0.04	$PC^{(H1-H3)}$	$FC^{(H4-H6)}$, 2nd FL
MG14	1949.83	1554	1.25	0.93	0.92	0.04	PC^{H1}	$FC^{(H4-H6)}$, 2nd FL
MG15	1950.04	1555	1.25	0.93	0.92	0.04	PC^{H2}	$FC^{(H1-H3)}$, 2nd FL
MG16	1949.98	1555	1.25	0.93	0.92	0.04	PC^{H3}	$FC^{(H4-H6)}$, 2nd FL
MG17	1956.19	1560	1.25	0.93	0.92	0.04	2nd FL, PC^{H1}	$FC^{(H4-H6)}$
MG18	1956.24	1560	1.25	0.93	0.92	0.04	2nd FL, PC^{H2}	$FC^{(H4-H6)}$
MG19	1956.33	1560	1.25	0.93	0.92	0.04	2nd FL, PC^{H3}	$FC^{(H4-H6)}$
MG20	1992.67	1565	1.27	0.92	0.92	0.04	2nd FL, $FC^{(H4-H6)}$, $PC^{(H1-H3)}$	-

Note. All of the tested model has SEM invariant = 1st FL and freely estimated = FV

Table 7.2.2 Goodness of Fit for EBC Model fit to the Total Group and Multiple (Adopter and Non Adopter E-Business) Malaysian Group (n= 208) Structural Analysis

7.2.2 Comparison of Parameter Estimates for Hypotheses H1 - H6 across two groups based on Model MG3

Hypotheses					Standardized Weight, (Critical Ratio ($c.r$) (t - value))		Standard Error (S.E)	
					Adopters	non-Adopters	Adopters	non-Adopters
Paths Coefficients								
H1	BP	←	BS	$\gamma_{1,1}$	0.31 (3.88)	0.33 (2.72)	0.11	0.14
H2	BP	←	SCS	$\gamma_{1,2}$	0.28 (2.12)	0.32 (2.57)	0.13	0.13
H3	BP	←	EBA	$\gamma_{1,3}$	0.40 (2.85)	**0.14 (0.79)**	0.14	**0.52**
Factor Correlations								
H4	BS	←→	SCS	$\phi_{1,2}$	0.36 (3.21)	0.37 (2.72)	0.05	0.07
H5	SCS	←→	EBA	$\phi_{2,3}$	0.76 (5.43)	**0.01 (0.04)**	0.08	**0.03**
H6	BS	←→	EBA	$\phi_{1,3}$	0.30 (2.56)	**0.01 (0.04)**	0.05	**0.03**

Table 7.2.3 Comparison between Adopter (n = 124) and Non Adopter Groups (n = 84) based on Path Coefficient and Factor Correlations Malaysia sample for model **MG3**

7.2.3 Comparison of parameter estimates for second factor loadings across two groups for Malaysian sample based on model MG2

Hypotheses					Standardized Weight, (Critical Ratio ($c.r$) (t - value))		Standard Error (S.E)	
					Adopters	non-Adopters	Adopters	non-Adopters
Paths Coefficients								
H1	BP	←	BS	$\gamma_{1,1}$	0.31 (3.71)	0.31 (2.41)	0.12	0.15
H2	BP	←	SCS	$\gamma_{1,2}$	0.28 (2.15)	0.31 (2.43)	0.13	0.13
H3	BP	←	EBA	$\gamma_{1,3}$	0.41 (2.97)	**0.13 (0.71)**	0.13	**0.54**
Factor Correlations								
H4	BS	←→	SCS	$\phi_{1,2}$	0.36 (3.13)	0.37 (2.66)	0.05	0.07
H5	SCS	←→	EBA	$\phi_{2,3}$	0.76 (5.44)	**0.03 (0.16)**	0.08	**0.04**
H6	BS	←→	EBA	$\phi_{1,3}$	0.30 (2.52)	**0.19 (0.91)**	0.05	**0.04**

Table 7.2.4 Comparison between adopter (n = 124) and non adopter groups (n = 84) based on path coefficients and factor correlations for Malaysia groups on model **MG2**

2nd Factor Loadings				Standardized Weight, λ (Critical Ratio ($c.r$) (t - value))		Standard Error (S.E)	
Path Coefficients				Adopter	non - Adopter	Adopter	non - Adopter
OI	←	BS	$\gamma_{3,1}$	0.75 (Fixed)	0.93 (Fixed)	(Fixed)	(Fixed)
TI	←	BS	$\gamma_{2,1}$	0.89 7.12	0.92 8.17	0.16	0.13
PS	←	BS	$\gamma_{4,1}$	0.96 6.60	0.92 7.15	0.17	0.14
FM	←	BP	$\beta_{11,1}$	0.94 (Fixed)	0.93 (Fixed)	(Fixed)	(Fixed)
CM	←	BP	$\beta_{13,1}$	0.95 9.65	0.85 7.84	0.08	0.09
EM	←	BP	$\beta_{12,1}$	0.95 8.11	0.97 7.62	0.09	0.10
SCR	←	SCS	$\gamma_{7,2}$	0.70 7.27	0.49 3.74	0.11	0.14
OIn	←	SCS	$\gamma_{6,2}$	0.98 (Fixed)	0.90 (Fixed)	(Fixed)	(Fixed)
TIn	←	SCS	$\gamma_{5,2}$	0.94 11.71	0.85 5.78	0.09	0.17
OC	←	EBA	$\gamma_{9,3}$	0.86 (Fixed)	**0.54** (Fixed)	(Fixed)	(Fixed)
AC	←	EBA	$\gamma_{10,3}$	0.73 4.48	**0.56** **1.08**	0.10	**0.34**
TC	←	EBA	$\gamma_{8,3}$	0.87 5.82	**0.32** **1.50**	0.12	**0.50**

Table 7.2.5 Comparison between adopter (n = 124) and non adopter groups (n = 84) based on second factor loadings for Malaysian sample for model **MG2**

7.2.4 Cross-Group Generalizability: Evaluation of Parameter Estimates between Adopter and Non Adopter of E-Business in UK

Model	χ^2	df	$\chi^2/_{df}$	CFI	TLI	RMSEA	Full E-Business Capabilities (EBC) Model	
Total Group Sample							CFA Invariant (constraint)	Freely Estimate
TG1	871.10	761	1.14	0.97	0.97	0.03		
Multiple Group CFA								
MG1	1832.20	1522	1.20	0.90	0.90	0.04		1st FL, 2nd FL, FC
MG2	**1871.21**	**1554**	**1.20**	**0.90**	**0.90**	**0.04**	-	FC(H4-H6), PC (H1-H3), 2nd FL
MG3	**1869.14**	**1559**	**1.20**	**0.90**	**0.90**	**0.04**	**2nd FL**	FC(H4-H6), PC (H1-H3)
MG4	1882.93	1557	1.21	0.90	0.89	0.04	FC (H4-H6)	2nd FL.
MG5	1880.17	1562	1.20	0.90	0.90	0.04	2nd FL, FC (H4-H6)	-
MG6	1876.33	1555	1.21	0.90	0.89	0.04	FCH4	FC(H4, H5)
MG7	1872.39	1555	1.20	0.90	0.90	0.04	FCH5	FC(H4, H6)
MG8	1876.62	1555	1.21	0.90	0.89	0.04	FCH6	FC(H4, H5)
MG9	1872.60	1560	1.20	0.90	0.90	0.04	2nd FL, FCH4	FC(H5, H6)
MG10	1870.95	1560	1.20	0.90	0.90	0.04	2nd FL, FCH5	FC(H4, H6)
MG11	1873.28	1560	1.20	0.90	0.90	0.04	2nd FL· FCH6	FC(H4, H5)

Table 7.2.6 Goodness of fit for EBC model fit to the total group and multiple (adopter and non adopter e-business) UK Sample (n = 143) measurement analysis

Model	χ^2	*df*	χ^2/df	CFI	TLI	RMSEA	Full E-Business Capabilities (EBC) Model	
Multiple Group SEM							SEM Invariant (constraint)	Freely Estimate
MG12	1883.39	1565	1.20	0.90	0.90	0.04	2^{nd} FL, PC $^{(H1-H3)}$	FC $^{(H4-H6)}$
MG13	1868.06	1554	1.20	0.90	0.90	0.04	PC $^{(H1-H3)}$	FC $^{(H4-H6)}$, 2^{nd} FL
MG14	1865.42	1552	1.20	0.90	0.90	0.04	PC^{H1}	FC$^{(H4-H6)}$, 2^{nd} FL
MG15	1871.22	1554	1.20	0.90	0.90	0.04	PC^{H2}	FC$^{(H1-H3)}$, 2^{nd} FL
MG16	1871.56	1554	1.20	0.90	0.90	0.04	PC^{H3}	FC$^{(H4-H6)}$, 2^{nd} FL
MG17	1870.02	1560	1.20	0.90	0.90	0.04	2^{nd} FL, PC^{H1}	FC$^{(H4-H6)}$
MG18	1869.18	1560	1.20	0.90	0.90	0.04	2^{nd} FL, PC^{H2}	FC$^{(H4-H6)}$
MG19	1872.09	1560	1.20	0.90	0.90	0.04	2^{nd} FL, PC^{H3}	FC$^{(H4-H6)}$
MG20	1883.39	1565	1.20	0.90	0.90	0.04	2^{nd} FL, FC$^{(H4-H6)}$, PC $^{(H1-H3)}$	-
Note. All of the tested model has SEM invariant = 1^{st} FL and freely estimated = FV								

Table 7.2.7 Goodness of Fit for EBC Model fit to the Total Group and Multiple (Adopter and Non Adopter E-Business) UK Sample (n = 143) Structural Analysis

7.2.5 Comparison of parameter estimates for hypotheses H1 - H6 across two groups based on Model MG3

Hypotheses					Standardized Weight, (Critical Ratio (*c.r*) (t - value))		Standard Error (S.E)	
					Adopters	non-Adopters	Adopters	non-Adopters
Paths Coefficients								
H1	BP	←	BS	$\gamma_{1,1}$	0.29 (2.65)	0.27 (2.02)	0.13	0.15
H2	BP	←	SCS	$\gamma_{1,2}$	**0.09 (0.85)**	0.45 (3.05)	**0.14**	0.15
H3	BP	←	EBA	$\gamma_{1,3}$	0.60 (3.90)	**0.13 (0.84)**	0.20	**0.38**
Factor Correlations								
H4	BS	←→	SCS	$\phi_{1,2}$	0.28 (1.96)	0.45 (2.70)	0.06	0.10
H5	SCS	←→	EBA	$\phi_{2,3}$	0.47 (2.77)	**0.09 (0.43)**	0.07	**0.05**
H6	BS	←→	EBA	$\phi_{1,3}$	0.46 (2.86)	**0.18 (0.94)**	0.07	**0.05**

Table 7.2.8 A Comparison between adopter (n = 80) and non adopter groups (n = 63) based on path coefficients and factor correlations for UK for model **MG3**

7.2.6 Comparison of parameter estimates for second factor loadings across Two categories for UK sample based on model MG2

Hypotheses					Standardized Weight, (Critical Ratio (*c.r*) (t - value))		Standard Error (S.E)	
					Adopters	non-Adopters	Adopters	non-Adopters
Paths Coefficients								
H1	BP	←	BS	$\gamma_{1,1}$	0.30 (2.74)	0.29 (2.13)	0.12	0.16
H2	BP	←	SCS	$\gamma_{2,1}$	**0.11 (0.97)**	0.45 (2.95)	**0.13**	0.15
H3	BP	←	EBA	$\gamma_{3,1}$	0.58 (4.03)	**0.13 (0.75)**	0.17	**0.62**
Factor Correlations								
H4	BS	←→	SCS	$\phi_{1,2}$	**0.28 (1.93)**	0.44 (2.61)	**0.07**	0.09
H5	SCS	←→	EBA	$\phi_{2,3}$	0.46 (2.73)	**0.00 (0.01)**	0.07	**0.04**
H6	BS	←→	EBA	$\phi_{1,3}$	0.44 (2.83)	**0.11 (0.53)**	0.07	**0.03**

Table 7.2.9 A comparison between adopter (n = 80) and non adopter groups (n = 63) based on path coefficient and factor correlations for UK sample for model **MG2**

2nd Factor Loadings				Standardized Weight, λ (Critical Ratio (*c.r*) (t - value))		Standard Error (S.E)	
Path Coefficients				Adopter	non - Adopter	Adopter	non - Adopter
OI	←	BS	$\gamma_{3,1}$	0.92 (Fixed)	0.91 (Fixed)	(Fixed)	(Fixed)
TI	←	BS	$\gamma_{2,1}$	0.87 (7.36)	0.96 (7.86)	0.12	0.14
PS	←	BS	$\gamma_{4,1}$	0.87 (6.39)	0.96 (7.25)	0.14	0.15
FM	←	BP	$\beta_{11,1}$	0.95 (Fixed)	0.94 (Fixed)	(Fixed)	(Fixed)
CM	←	BP	$\beta_{13,1}$	0.95 (8.12)	0.91 (7.62)	0.10	0.10
EM	←	BP	$\beta_{12,1}$	0.99 (6.67)	0.94 (6.39)	0.10	0.11
SCR	←	SCS	$\gamma_{7,2}$	0.79 (4.51)	0.81 (4.51)	0.17	0.15
OIn	←	SCS	$\gamma_{6,2}$	0.79 (Fixed)	0.88 (Fixed)	(Fixed)	(Fixed)
TIn	←	SCS	$\gamma_{5,2}$	0.90 (5.38)	0.88 (5.10)	0.21	0.23
OC	←	EBA	$\gamma_{9,3}$	0.85 (Fixed)	**0.49** (Fixed)	(Fixed)	(Fixed)
AC	←	EBA	$\gamma_{10,3}$	0.75 (2.95)	**0.63 (1.43)**	0.14	**0.55**
TA	←	EBA	$\gamma_{8,3}$	0.83 (4.12)	**(0.61 (1.49)**	0.17	**0.71**

Table 7.2.10 A comparison between adopter (n = 80) and non adopter groups (n = 63) based on second factor loadings for UK sample for model **MG2**