FACTORS INFLUENCING ELECTRONIC COMMERCE ADOPTION IN MALAYSIAN SMALL AND MEDIUM SIZED ENTERPRISES (SMES)

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THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTORATE OF PHILOSPHY

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ABSTRACT

Electronic commerce (E-commerce) plays an important role in growth of Small and medium-sized enterprises (SMEs) as it allow them compete efficiently in both domestic and international markets.

This study identifies factors that influence adoption of e-commerce in SMEs, in order to formulate a proposed model for e-commerce. These factors act as a set of guidelines that are needed by SMEs for the successful and comprehensively secure implementation of e-commerce within their businesses. This study uses the IS success model by Molla and Licker (2001), as the basis for this research. The model proposes a partial extension and respecification of the Delone and McLean model of IS success for e-commerce systems. It is posited that e-commerce system quality, content quality, trust, and support services, effect the use and customer satisfaction that leads to e-commerce success. The factors of the IS success model are included in the proposed holistic model.

The case study uses data collected from five different Malaysian SME industries. The study adopts an explanatory mixed-method approach (i.e., using questionnaires, interviews, and observation); where data is collected from both business owners and Chief Executive Officers (CEO). The two study groups involved in this study are the government based organization - SME Corporation (SMEcorp), and the non-government organization – namely the Association of Bumiputra Women Entrepreneur Network of Malaysia (WENA).

Descriptive statistics are created to verify the factors for a secure and successful adoption of e-commerce within SMEs. Transactional security, loyalty, intellectual property rights, and implementation factors, are deemed to be the most important elements needed for the success of B2C e-commerce in Malaysia. The conceptual

model is then verified using the Confirmatory Factor Analysis (CFA) of AMOS; where the 32 factors that were collected during the literature review were verified to both develop and confirm the model. This model is later validated by conducting interviews and observations with SMEs. The prototype system is developed based on a model for e-commerce evaluated by SME managers, CEOs, and business owners during focus group sessions.

This study contributes to existing knowledge by studying success factors including security factors to develop a holistic e-commerce model that can be implemented in SMEs belonging to any five industries. In the future, this model can be further tested in different regions and countries to further verify its validity.

ABSTRAK

Perdagangan elektronik (E-dagang) memainkan peranan penting dalam pertumbuhan perusahaan bersaiz sederhana (PKS) Kecil dan kerana ia membolehkan mereka bersaing dengan berkesan dalam kedua-dua pasaran domestik dan antarabangsa.

Kajian ini mengenal pasti faktor-faktor yang mempengaruhi penggunaan e-dagang dalam PKS, untuk merangka model dicadangkan untuk e-dagang. Faktor-faktor ini bertindak sebagai satu set garis panduan yang diperlukan oleh PKS bagi pelaksanaan e-dagang yang berjaya dan selamat keseluruhanya dalam perniagaan mereka. Kajian ini menggunakan model kejayaan IS oleh Molla dan Licker (2001) sebagai asas untuk kajian ini. Model ini mencadangkan pengembangan dan spesifikasi semula model kejayaan IS oleh Delone dan Mclean (1992) untuk sistem e-dagang. Ia dicadangkan bahawa kualiti, kualiti kandungan, amanah, dan perkhidmatan sokongan sistem e-dagang mempengaruhi penggunaan dan kepuasan pelanggan yang membawa kejayaan kepada e-dagang. Faktor-faktor model kejayaan IS adalah termasuk di dalam model selamat yang dicadangkan.

Kajian kes ini menggunakan data yang dikumpul daripada lima industri PKS Malaysia yang berbeza. Kajian ini menggunakan pendekatan kaedah penjelasan campuran (iaitu, soal selidik, temubual, dan pemerhatian) di mana data dikumpulkan daripada kedua-dua pemilik perniagaan dan Ketua Pegawai Eksekutif. Kedua-dua kumpulan kajian yang terlibat dalam kajian ini adalah organisasi-organisasi berasaskan kerajaan dan bukan kerajaan.

Statistik deskriptif dicipta untuk mengesahkan faktor-faktor bagi pelaksanaan selamat e-dagang dalam PKS. Keselamatan transaksi, kesetiaan, hak harta intelek, dan pelaksanaan faktor-faktor dianggap sebagai elemen yang paling penting yang diperlukan untuk kejayaan e-dagang B2C di Malaysia. Model konseptual kemudian

disahkan melalui Pengesahan Analisis Faktor (CFA) AMOS di mana 32 faktor-faktor yang telah dikumpulkan semasa kajian literatur telah disahkan untuk membangunkan dan mengesahkan model tersebut. Model ini kemudiannya disahkan dengan mengadakan temu bual dan pemerhatian dengan PKS. Sistem prototaip dibangunkan berdasarkan model selamat untuk e-dagang yang dinilai oleh pengurus PKS, CEO, dan pemilik perniagaan semasa sesi-sesi kumpulan fokus.

Kajian ini menyumbang kepada pengetahuan yang sedia ada dengan menggabungkan dua topik aliran utama keselamatan dan faktor kejayaan e-dagang untuk membangunkan suatu model bersepadu e-dagang yan selamat yang boleh dilaksanakan dalam PKS yang dimiliki oleh mana-mana lima industri. Pada masa yang akan datang, model ini boleh diuji selanjutnya di kawasan-kawasan dan negara-negara yang berbeza untuk mengesahkan lagi kesahihannya.

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LIST OF ABBREVIATIONS

ICT	:	Information and Communication Technology
IS	:	Information System
MIS	:	Management Information System
IT	:	Information Technology
IT	:	Information Technology
E-commerce	:	Electronic commerce
B2C	:	Business to Consumer
B2B	:	Business to Business
WWW	:	World Wide Web
SMEs	:	Small and Medium-sized Enterprises
SMI	:	Small and Medium-sized Industries
EDI	:	Electronic Data Interchange
EFT	:	Electronic File Transfer
CSF	:	Critical Success Factors
NSDC	:	National SME Development Council
WENA	:	Association of Bumiputra Women Entrepreneurial
SMECorp. Malaysia	:	SME Corporation Malaysia
GDP	:	Gross Domestic Product
SEM	:	Structural Equation Modelling
EFA	:	Exploratory Factor Analysis
CFA	:	Confirmatory Factor Analysis
AMOS	:	Analysis of Moment Structures
TAM	:	Technology Acceptance Model

MIDA	:	Malaysian Industrial Development Authority
Manufacturing (incl. Agro Based)	:	Manufacturing (including. Agro Based)
CFI	:	Comparative-Fit Index
TLI	:	Tucker-Lewis Index
RFI	:	Relative Fit Index
RMSEA	:	Root Mean Squared Error of Approximation

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

Electronic commerce (e-commerce) is a subset of e-business. E-business activities and applications range from the simple e-mail to e-enable supply chain (Fusilier & Durlabhji, 2003; Pavic, Koh, Simpson, & Padmore, 2007; Brown & Jayakody, 2009). When e-commerce was first introduced in 1990, it was understood as a simple transaction over the Internet. However, as e-commerce evolved, its horizon has in turn expanded to selling, buying and logistics activities as well as other organisation-management activities via the Web (Schneider, 2001; Sung, 2006; Jahanshahi, Zhang, & Brem, 2013). Business to consumer (B2C) e-commerce, which is the main focus of this research is referred to as the process of buying and selling products and services using electronic data transmission via the Internet and World Wide Web (WWW) (Grandon & Pearson, 2004; Sung, 2006).

Small and Medium-Size Enterprises (SMEs) are one of the major sources of employment, technological advancement and competitive advantage for both developed and developing countries (Jahanshahi, et al., 2013; Savrul, Incekara, & Sener, 2014). In the contemporary business environment, SMEs are increasingly using e-commerce to achieve performance improvement, sustainable competitive advantage and opportunities to secure long-term success (Ghobakhloo, Arias-Aranda, & Benitez-Amado, 2011). Consistently, many governments have acknowledged the contribution of SMEs and have strived to provide relevant and incentives to support utilization of e-commerce among SMEs (Thong & Yap, 1995) .

The adoption of e-commerce technologies is important for the on-going survival of SMEs (Jahanshahi, et al., 2013). E-commerce has stripped many large firms of their competitive advantages (Taylor & Owusu, 2012), thus providing an opportunity to SMEs by providing cost-effective ways to market and promote their business (Senarathna, et al., 2013). This has also made it possible for the smaller firms to improve communication and information flow with their customers, introduce new products to the market and identify potential partner/suppliers. E-commerce allows SMEs to have the advantage of built-in flexibility, fast decision making, low-cost structure, maintenance, and fully dedicated customer service (Hanim & Taha, 2010). Although e-commerce provides numerous advantages for SMEs, its use remains limited, specifically in SMEs (Turban, 2010).

Although customers are usually comfortable with providing their general information, such as preference, name, and age, etc., they are reluctant to provide sensitive information, such as credit card numbers as they fear that deficiencies remain when it comes to the Internet and e-commerce security. Customers are concerned about on-line payment security, lack of privacy policies and reliability of companies (Suh & Han, 2003; Shah, Okeke, & Ahmed, 2013).

In order for on-line sales channels to succeed, e-commerce firms must provide customers with a high level of security for their transactions, and reassure customers that their security and privacy requirements are being met (Turner, Zavod, & Yurcik, 2001; Shah, et al., 2013). Indeed, many studies have been conducted on the success factors and security factors of e-commerce. However, there is very limited research when it comes to the integrated model for success and security factors of e-commerce. This research therefore attempts to identify factors that influence e-commerce adoption in SMEs and developed a holistic model based on the identified factors, thus providing

a comprehensive approach toward successful and secure adoption of e-commerce in SMEs. The term 'Adoption' for e-commerce in SMEs is used in this research. It is because SMEs does not develop or implement e-commerce system from the scratch. Instead, they are using out of self, vendors and downloadable systems such as an e-cart system to implement their e-commerce.

The Information System (IS) success model by Molla & Licker (2001) provides the basis for this research. Figure 1.1 shows a model of e-commerce success by Molla & Licker (2001), is an extension of the IS success model proposed by DeLone & McLean (1992). Molla and Lickers extended the original model of DeLone & McLean (1992) to measure the e-commerce system success. In a review of the e-commerce success literature it is observed that Molla and Lickers (2001) model of e-commerce success appears to be the most accepted model for e-commerce success (Luarn & Lin, 2003; Lin & Lee, 2006). Customer e-commerce satisfaction is proposed to be dependent variable to e-commerce success and its relationship with e-commerce system quality, content quality, use, trust and support are defined. Molla and Licker (2001) in their research focus on trust including security and privacy as important factors for the success of e-commerce, these factors are further explored later in this research.

As noted by Molla &Licker (2001), a website has additional attributes (e.g. 24/7 availability, page loading speed, accessibility, up-to-date accuracy, accessibility and so forth) which distinguish it from a traditional information system (Belkhamza, 2012). All of the factors in the model, as well as their underlying variables, are included in a conceptual model for secure e-commerce in section 2.10, Chapter 2. This model is later tested in section 5.4.1, Chapter 5 in order to gauge its suitability for application in SMEs. The Molla and Licker (2001) model is chosen because elements of the model cover the research and conceptual model extensively and provide a basis for this

research (Refer to Table 2.4, section 2.8 in Chapter 2 for more detail regarding Molla and Licker (2001) model)

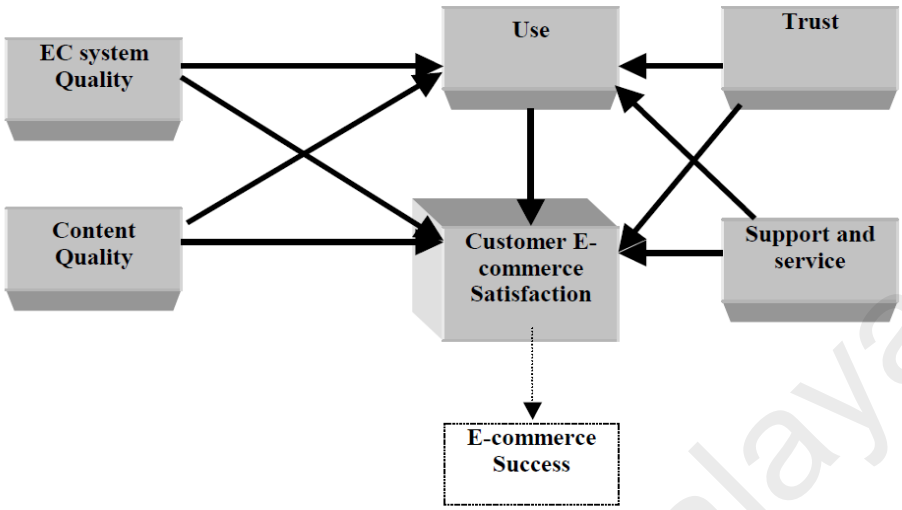

Figure 1.1: Molla & Licker (2001) Model

1.2 Problem Statement

Today e-commerce is continuing to grow, although there remain many online consumers who hesitate to provide their private information such as credit card and personal information due to concerns regarding security and privacy. The reasons and barriers on future growth of e-commerce are security concerns among a consumer (Lanier, 2008; Liao, Liu, & Chen, 2011; Zhang & Wang, 2014). Survey consistently shows that consumer associates a great deal of risk with financial transaction on internet (Gabriel & Nyshadham, 2008; Zendehdel & Paim, 2012; Zhang, 2013). Consumer security and privacy concerns are not new; consumers have worried for years about how personal data are used by the government and more recently by businesses (Adelola, Dawson, & Batmaz, 2015). The consumer security and privacy concerns are increasing in importance as the number of people accessing Internet resources grows exponentially and the public become more Internet savvy (Udo, 2001; Martín & Camarero, 2008; Zendehdel & Paim, 2012).

Although there are many research conducted on the success factors and security factors of e-commerce and there are many models on it but there is very limited research on the holistic model for factors influencing e-commerce adoption in SMEs (Chang Liu & Arnett, 2000; Fang, Chiu, & Wang, 2011; Xu, Benbasat, & Cenfetelli, 2013). This study focuses on an integrated model of e-commerce success in SMEs by combining two mainstream domains: e-commerce success factors and e-commerce security factors, to provide a complete holistic model for e-commerce adoption in SMEs.

There is also less literature on model implementation for secure e-commerce in SMEs in developing countries, Malaysia for example. Ahmad, et al., (2015) and (Chin, 2015) mentioned there are lack of strong empirical work to enable the establishment of a model to find out the factors that can explain the adoption of e-commerce in this part of the region. There are a total of 252.4 million Internet users in south-east Asia, with Malaysia emerging as the third country that recorded the highest percentage of Internet user at 67% after Singapore and Brunei. While 2015 has been a fruitful year for all online businesses and e-commerce, Malaysia's share of total retail e-commerce market is still very low at 2% (SMEBiz, 2016). Although there are a high number of internet users in Malaysia and yet there are many consumers who are not using e-commerce due to security and privacy concern (Harris, Guru, & Avvari, 2015; Sobihah, et al., 2015).

Having presented the current state of e-commerce adoption in Malaysia SMEs, the Malaysian SMEs are considered to be a suitable case to understand security and privacy concern in e-commerce. The case study will help to learn Malaysian SMEs current business practices and their challenges, and find the factors that influence the successful and secure adoption of e-commerce among SMEs (Refer to chapter 4 for detail case study on Malaysian SMEs).

1.3 Research Objectives

The aim of this study is to identify factors influencing the adoption of e-commerce in SMEs. These factors help to develop a holistic model for e-commerce. The model provides as guideline to assists SMEs in adopting e-commerce in their respective organisations. Each factor is discussed in detail (refer to section 2.5 and 2.6 in Chapter 2) whilst the relationship between each factor is shown in a proposed model (refer to Figure 2.6 in Chapter 2). Hence the objectives of this research are:

1. To investigate e-commerce practices in Malaysian SMEs based on industries and employees.
2. To identify factors influencing the adoption of e-commerce in SMEs.
3. To develop a holistic e-commerce model for SMEs that integrates success factors and security factors and to develop a secured e-commerce prototype system.

1.4 Research Questions

Based on the objectives of the research, the following research questions are proposed:

1. What are practices of Malaysian SMEs in adoption of e-commerce?
2. What are the factors influencing adoption of e-commerce in SMEs?
3. What are the components of holistic e-commerce model for SMEs?
4. What are the system requirements components in development of holistic e-commerce prototype system?

Table 1.1 shows the mapping of research objectives and research questions.

Table 1.1: Research Objectives and Questions Mapping

Research Objectives	**Research Questions**
RQ1: To investigate e-commerce practices in Malaysian SMEs based on industries and employees.	**RO1:** What are practices of Malaysian SMEs in adoption of e-commerce?
RQ2: To identify factors influencing the adoption of e-commerce in SMEs.	**RO2:** What are the factors influencing adoption of e-commerce in SMEs?
RQ3: To develop a holistic e-commerce model for SMEs that integrates success factors and security factors and to develop a secured e-commerce prototype system.	**RO3:** What are the components of holistic e-commerce model for SMEs? **RO4:** What are the system requirements components in development of holistic e-commerce prototype system?

1.5 Expected Outcome

The outcome for this thesis is a holistic e-commerce model for SMEs. Holistic according to Cambridge Dictionary (2016) is characterised by comprehension of the parts of something as intimately interconnected and explicable only by the reference to the whole. Holistic also means relating to or concerned with entire system rather than individual parts. In this research, we will look into all the possible factors that influence e-commerce adoption in SMEs.

The holistic e-commerce model is developed by combining two mainstreams of research: e-commerce success factors and e-commerce security factors. There are researches conducted on success models and security model but limited researches have been done on integrating these models. In this study, the two research streams are combined to developed integrated model for secure and successful adoption of e-commerce in SMEs.

1.6 Research Design

The research started with defining the research problem, objectives and question. The detailed review of the relevant literature is then conducted, finding factors influencing e-commerce adoption in SMEs with the aim of developing a conceptual model.

For data collection a sequential mixed research method is used, comprising both quantitative and qualitative techniques to address the research questions and objectives. The first sequential data collection involved quantitative data collection and analysis. The questionnaire is e-mailed to SMEs in Klang Valley, Malaysia (Refer to Appendix B & D). The questionnaire provides a tool through which to collect a vast amount of data quickly. On the other hand, interviews and observations are conducted with the management of SMEs to collect in-depth insights and verify factors that arise from the questionnaire.

Descriptive statistic conducted to identify and verify factors that influence e-commerce adoption in SMEs. A SEM via CFA is done to developed e-commerce holistic model. The qualitative analysis will then be carried out to collect in-depth information from management of SMEs regarding factors they consider influence e-commerce adoption in SMEs. The data collected from mix method is then used to develop and verify holistic model for e-commerce. Figure 1.2 show the research process, input and output expected from this research.

Two prototype systems are developed. The first system is developed based on a proposed integrated secured and successful e-commerce model, whilst the second system is developed without all the factors of a holistic model. This is done to compare the difference between the proposed model and systems that is currently available in the market. Next, these systems are tested by conducting a focus group research method

among SMEs. In the focus group, both systems are reviewed by the SMEs' representative, interviews, questionnaires and observations are conducted to analyse the systems. The same SMEs representatives were used that previously participated in data collection. During the final phase, the systems are reviewed; an analysis of the responses is conducted in order to verify that the prototype system developed based on integrated e-commerce model is accepted in reality. This assists in achieving answer to the fourth research question. The integrated model and it prototype system is compare against the establish model Lee & Kozar (2006) to validate holistic model effectiveness in real world.

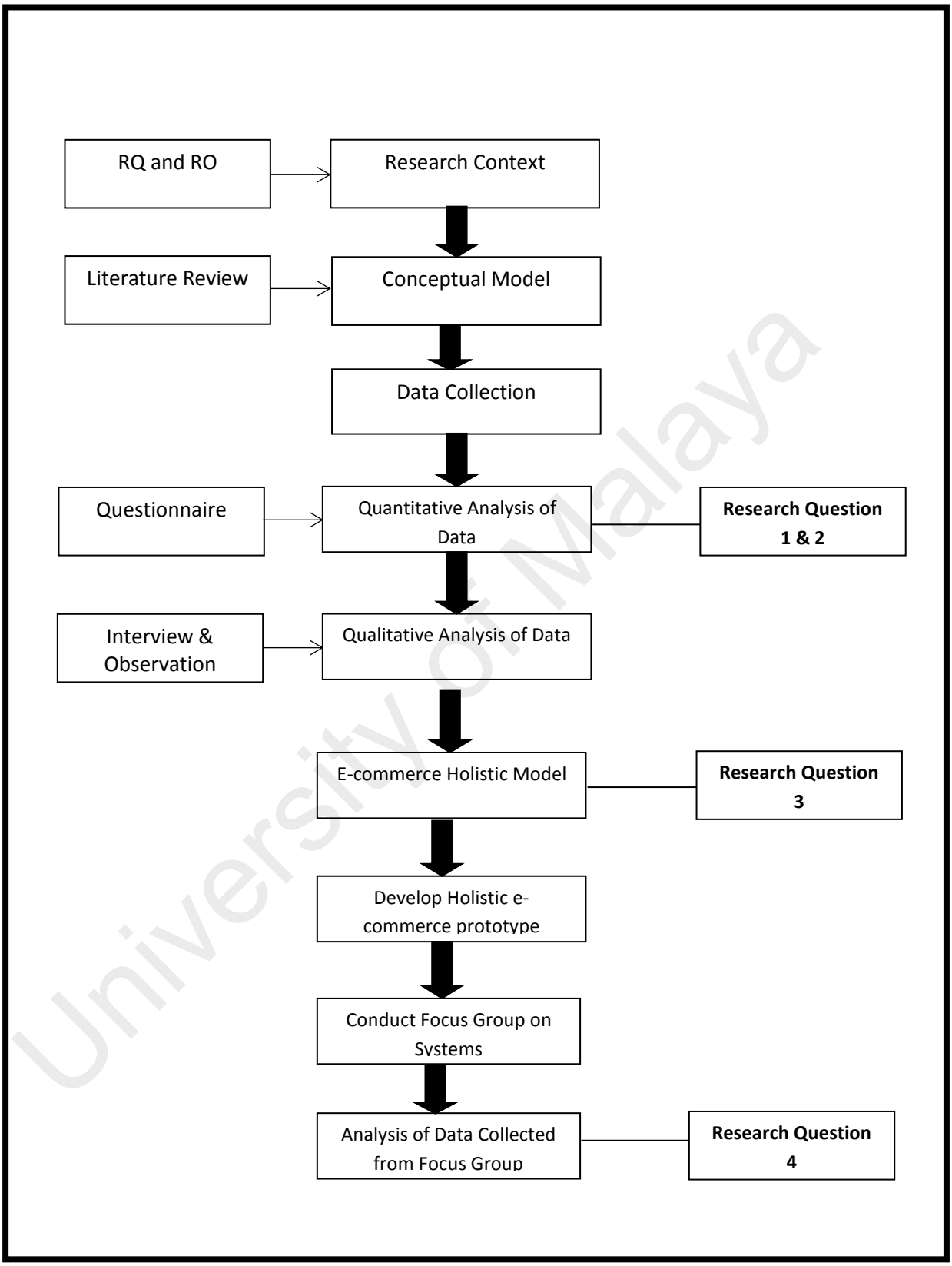

Figure 1.2: Research Design

1.7 Scope of Research

This study focus on Business-to-Consumer (B2C) e-commerce as it helps to better understand the security and privacy concern among consumers. In this study will refer to Business-to-Consumer (B2C) e-commerce simply as e-commerce. The study focuses on SMEs in Klang valley, Malaysia; the selected SMEs must have e-commerce to run their business. The data is collected from CEO and business owner. CEO's are chosen as a point of contact as they are best people to provide in-depth information on company direction and policies toward e-commerce.

1.8 Significance of the Study

This study holistically examines the factors required for secure and successful e-commerce adoption in SMEs. This research combines two mainstream topics of e-commerce, namely the success factor and security factors for e-commerce, thus helping to generate a comprehensive integrated model for secure and successful e-commerce adoption model for SMEs.

This study uses IS success model by Molla & Licker (2001) as a basis for the research. The study uses elements such as e-commerce system quality, content quality, use, customer e-commerce satisfaction, trust and support services from Molla & Licker's (2001) model to propose a holistic model of e-commerce. The elements of the model are tested alongside with other factors to verify the compatibility of the proposed holistic model for SMEs. The further research can be conducted to verify this model to improve theoretical base and operational constructs of the model.

This research contributes to the existing body of knowledge by developing a holistic e-commerce model for SMEs. This proposed model allows for adoption of an e-

commerce solution in any SMEs regardless of the industry to which they belong. This research involves six different SMEs industries in Malaysia, which include Manufacturing (including agro based), Manufacturing-related Services, Mining and Quarrying, Services (including ICT), Construction and Primary Agriculture (Refer to chapter 5 for detail regarding each SMEs industry).

The research proposes an e-commerce system based on the holistic model for SMEs. This system is later validated through a focus group study, thus providing guidelines for SMEs to conduct their business using e-commerce system. It is hoped that the outcome of this research can encourage SMEs by providing them confidence in the development, implementation and usage of a secured e-commerce system.

1.9 Outline of Project

The organisation of the thesis is as follows:

Chapter 1 - Introduction: Provides an introduction to the present study as well as a detailed discussion of previous research relating to e-commerce, including its adoption and acceptance in SMEs. This chapter explains exactly what the author is attempting to achieve in this thesis and the way in which this may actually be plausible.

Chapter 2 – Literature Review: It provides a review of the literature on e-commerce in SMEs, e-commerce evaluation, success factors and security factors, as well as e-commerce models. Based on this literature review a conceptual model is developed, which will aid the data collection process.

Chapter 3 - Research Methodology: This chapter focuses on the research methodology used in the present thesis. The chapter is divided into two parts, Part A discusses about data collection, and Part B discusses system development. The Part A includes

discussion of data collection methods as well as the reasons why these particular methods have been selected for this research topic. The chapter first explains why case study research is used in comparison with other research methods. Following this is a discussion regarding the research methods, as well as why the study employs a mixed-method approach. In addition to this, there will be an explanation of the design used in developing the measurement scale. The chapter explains the data collection methods used for this research, including questionnaire, interview and observation. The data analysis method is then explained, following which is an explanation of the ways in which to verify the validity and reliability of the gathered data. Part B includes prototyping tools and requirements for system development.

Chapter 4 – Case study: The chapter discusses the case study conducted on Malaysian SMEs industries such as: Manufacturing (including agro-based), Manufacturing-related Services, Mining and Quarrying, Services (including ICT), Construction and Primary Agriculture. The chapter describes each industry in detail, including ICT usage, and challenges faced by that industry. Figures and tables are used to provide further explanation and illustration.

Chapter 5 – Data Presentation & Analysis: This chapter presents and analyses the data gathered via the questionnaires and interviews from the management of several SMEs located in Malaysia. Different software such as SPSS and AMOS is used to analyse quantitative data. Descriptive statistics and Confirmatory Factor Analysis (CFA) are used to analyse and present the data. The qualitative data collected is used to verify the quantitative data. Based on analysis of the data, the outcome of this thesis will be generated.

Chapter 6 – System Development and Testing: Based on the findings from the data analysis, the outcome of holistic e-commerce model is validated and verified in this chapter. Two e-commerce systems are developed, first of which is based on the research outcome 'holistic e-commerce model', whilst the second is developed based on the prototype of Malaysian websites. Comparative analysis is conducted through a focus group among SMEs, in order to validate the research outcome/model.

Chapter 7 – Conclusion: This chapter concludes the thesis by summarising the overall research process, explaining research objectives, answering the research question. It also provides a research conclusion, contributions, and suggestions regarding future research and investigation.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter begins with a brief introduction of e-commerce and its history, followed by a definition of SMEs and their usage of e-commerce. This is followed by an identification and explanation of e-commerce success factors and security factors for SMEs. In order to identify the factors, a detailed literature review is conducted, with a focus on e-commerce, SMEs, success and security models for e-commerce and information systems. Finally, a conceptual model is proposed for e-commerce security.

2.2 Electronic Commerce

With the advent of the Internet and its post-1994 commercialisation since, a new medium of commerce, popularly known as e-commerce, has rapidly emerged into a modern global economy (Vaithianathan, 2010). E-commerce is often simply defined as buying, selling or exchanging a product, services and information using computer networks, including the Internet (Turban, King, & Lang, 2011; Varela, et al., 2016) . However, according to Bocij (2003) and Hande, Ghosh, & Govil (2015), it also covers the pre and post sales activities across a supply chain.

Globalisation of the Internet and the World Wide Web (WWW) has propelled e-commerce to its current standing as one of the most effective media through which to share information. In addition, it has also had a revolutionary effect on business, as it allows for the sharing of information between business partners and within organisations. E-commerce refers to conducting business among firms with the support of network Information and Communication Technologies (ICT), and especially with the Internet. The e-commerce consists of Electronic Data Interchange (EDI), Electronic

Fund Transfer at Point of Sale (EFTPOS), electronic banking, digital cash, and other forms of electronic payment systems. E-commerce is used to enhance transaction and communication between stakeholders such as customers, suppliers, business partners, managers, employees, the public at large, financial institution and government regulators. E-commerce has changed, and is still changing the way in which companies conduct business globally (Chong & Bauer, 2001; Mazzarol, 2015).

2.3 Small and Medium-sized Enterprise

The definition of SMEs varies from industry to industry and from country to country, it is mostly based on the number of people employed, turnover and/or ownership structure of the business (Ayyagari, Beck, & Demirguc-Kunt, 2007; Poon, 2007). Some definitions of SMEs have been offered in quantitative terms, whilst some have been presented in qualitative terms. According to certain researchers, the definition should involve both the quantitative dimension, e.g. the number of employees, measures of transactions, financial, non-financial resources and liquidity, and the qualitative dimension, including the method of organising and function performance (McGregor & Vrazalic, 2004). SMEs are primarily defined by their number of employees and upper and lower size limit. Although most resources define the SME cut-off range as 1-250 employees, this can comprise a single part-time owner of the business or a professional organisation employing up to 199 people (Seyal, et al., 2012; A. B. o. Statistics, 2013).

SMEs are generally independent, multi-tasking, cash-limited and owner-based (actively managed by the owners), with a highly personalised and informal structure; largely localised enterprises in their area of operations which are heavily dependent on internal sources for the growth of finance (Perrini, Russo, & Tencati, 2007; Jahanshahi, et al., 2013). When we look at the history of large companies, it is apparent that most of them

began as small or medium establishments or even micro enterprises, before graduating to what they are today.

2.4 E-commerce in Small & Medium-Size Enterprises (SMEs)

SMEs vary across different countries and cultures, but are characterised by multi-tasks, independent and cash limits as well as being based on informality and personal relationship. SMEs play a basic role in the improvement and promotion of economic indices as a major economic sector of any country and thus adopting creative and modern methods and tools for performing business processes and affairs plays an important role in the success of any organisation (Abbasi, et al., 2010).

In the past, SMEs have been restricted from participating in the technological revolution because of costs and personnel limitations. In the present time and environment, the cost of evolving technology is far smaller when compared with past changes since most SMEs already have an IT infrastructure. SMEs are leaning toward the adoption of innovation and opportunities more quickly than larger firms (Lomerson, McGrath, & Schwager, 2004). Recent studies show that an increasingly number of SMEs are moving toward new internet-based technologies (Poon, 2007).

It is believed that the recent emergence of e-commerce in the early 90s could provide different opportunities to SMEs with regard to overcoming their technological, organisational, environmental and managerial inadequacies (Al-Qirim, 2012). On the other hand however, SMEs are slow when it comes to the uptake and use of e-commerce (Al-Qirim, 2012) , as most SMEs have an internet presence in the form of a corporate website but only a few use it to conduct transactions with customers and suppliers (Purao & Campbell, 1998; Chong & Bauer, 2001; Dholakia & Kshetri, 2004).

SMEs are interested in e-commerce due to its potential to help them improve their business processes, reduce costs and achieve a closer relationship with their clients. Beyond this, the adoption of e-commerce in SMEs has become a necessity in a context dominated by the globalisation of markets (Huy & Filiatrault, 2006). E-commerce not only helps large businesses to increase their visibility and profit, but also helps small and medium-sized enterprises to achieve all of these benefits (Taylor & Owusu, 2012). During this economic period, SMEs are contributing to economic growth, social structure, employment, as well as regional and local development; consequently, they have become an important sector of the economy (Scupola, 2001; Senarathna, et al., 2013). As defined by Neergaard (1992), there are four major reasons behind SMEs' acceptance of e-commerce; (1) It increases output, (2) It improves services to customers, (3) It simplifies the work process and (4) It keeps a record.

E-commerce orientation, experience and perception of e-commerce success differ from one SME to another. For example, a particular SME may feel it has achieved a great deal by employing e-mail for its marketing efforts while another may think there is the need for a fully integrated supply-chain management (Pham & Nguyen, 2011).

2.5 E-commerce Success Factors

The concept of Critical Success Factors (CSF) was first presented by D. Ronald Daniel in the 1960s. It was later used by John F. Rockart of MIT's to build and popularise the idea of helping mangers in order to define the key information needed by top level management (Rockart, 1979). He also draws conclusions on his idea of CSF as areas of activity that should receive constant and careful attention from management. Critical success factors are also known as key success factors (McGinnis, 2006; Yang, Chou, & Liu, 2012) meaning factors which are of the utmost importance and critical for success.

On the other hand, success factors are important for the success of a system. This study examines both critical success factors and success factors in terms of their relevance to the success of e-commerce. Critical success factors act as independent factors whilst success factors are dependent factors in order to cover all the factors for e-commerce success.

There are many studies that delve into success factors for e-commerce. Turban et al. (2004) define eight critical success factors for SMEs in order for them to be successful in e-commerce. These factors include; product is critical, payment methods must be flexible, e-payment method must be secure, capital investment should be kept at minimum, inventory control is crucial, logistical services must be quick and reliable, high visibility on the Internet. Hande, Ghosh, & Govil (2015) discuss the success factors for e-commerce include visual design and quality of contents, availability of information, ease of navigation, website user experience, product portfolio and availability, product price, promotion, ease of payment, delivery and product replacement policy (warranty). AlGhamdi, Drew, & Al-Ghaith (2011) define four critical factors such as education program and building awareness for e-commerce, government support, trust and security.

According to Fox (2001), success factors in e-commerce service include targeting the right clients, examining the client relationship from the client's perspectives, streamlining business processes, letting clients help themselves, owning the clients' total experience (one-stop shopping), adding value by assisting clients with their jobs, personalising services to your clients, and developing a community which your clients are proud to be part of. Dholakia & Kshetri (2004) discuss the importance of internal and external organisation factors which can impact usage of the Internet among SMEs. The internal factors include, firm size, self-efficiency, past experiences with related

technologies and past use of marketing media. In contrast, the external factors are comprised only of the perceived competitive pressure. Molla & Licker (2001) present an extension to Delone & Mclean's (1992) model of Information System (IS) success to e-commerce success. Customer e-commerce satisfaction is proposed as a dependent variable to e-commerce success whilst its relationship with e-commerce system quality, content quality, use, trust and support is defined and discussed (Molla & Licker, 2001).

The e-commerce success factors are summarised in Table 2.1. These factors are identified from the exhaustive literature review, which examines the last 25 years of research conducted in the field of e-commerce success factors. These critical success factors are then categorised into six main sections, namely Organisational, Management, Technological, Individual, Implementation, Trust, and Environmental. These success factors are identified to develop a conceptual model of integrated e-commerce factors shown in section 2.10.

Table 2.1: E-commerce Success Factors

Success Factors	**Bakos (1991)**	**Clarke, (1993)**	**Neches at el (1994)**	**Vladimir Zwass (1996)**	**Tan, Teo (1998)**	**Tetteh (1999)**	**Lowry, Singh, Scollary (1999)**	**Molla, Licker (2001)**	**Ling (2001)**	**Rashid, Al-Qirim (2001)**	**Jennex, Amoroso (2002)**	**Torkzadeh, Dhillon (2002)**	**Daniel, Wilson, Myers (2002)**	**Cloete, Courtney, Fintz (2002)**	**Qualyle (2002)**
Technological															
Technical Infrastructure	X		X	X	X	X	X			X	X		X	X	
Business Infrastructure		X		X							X			X	
Communication					X				X				X		
Individual Factors										X	X				
IT Skill and Expertise	X						X				X				
Education & Awareness											X		X		
Implementation Factors			X												
Payment				X			X				X	X			
Delivery				X			X				X	X			
Ease of use												X			
Customer Service	X				X		X	X			X	X			
Usefulness (Number of hits)								X				X			
Detailed product specification								X							
Customization															
Hardware software stability															
good page loading															
Visual Appearance															
System architecture								X							
24 hours availability & accessibility															
System accessibility								X							
Marketing/Advertising				X			X				X				
User satisfaction								X							
Product & Services				X			X	X							
High quality Product & Services												X			
Environmental						X				X					
Government Support			X		X						X				
Industry						X			X						
National									X		X				
Competitive Pressure															
Organizational					X				X	X					
Firm Size															X
Enterprise Resources															
Number of Employees						X									
Management Factor					X	X									X
Manager/CEO support							X						X		
Good project management team															
Resources Commitment															
International web use															

Table 2.1: E-commerce Success Factors (Continued)

Success Factors	**Kuzic, Fisher, Scollary (2002)**	**LE, Koh (2002)**	**Buhalis, Diemezi (2003)**	**Murray E. Jennex (2003)**	**Sung (2004)**	**Dholakia, Kshetri (2004)**	**Sharma, Wickramasinhe, (2004)**	**Tan, Ouyang (2004)**	**Chau, Turner (2004)**	**Qualyle (2002)**	**Stephen Hawk (2004)**	**Piscitello, Sgobbi (2004)**	**Quayle, Christian (2004)**	**Purcell, Toland, Huff (2004)**
Technological														
Technical Infrastructure			X	X		X	X	X	X					X
Business Infrastructure							X	X	X					
Communication			X											X
Individual Factors														
IT Skill and Expertise	X		X				X							X
Education & Awareness	X		X				X					X		X
Implementation Factors													X	
Payment	X				X		X				X			
Delivery	X				X		X				X			
Ease of use					X									
Customer Service						X	X		X				X	
Usefulness (Number of hits)					X									
Detailed product specification					X									
Customization														
Hardware software stability														
Good page loading														
Visual Appearance														
System architecture														
24 hours availability & accessibility														
System accessibility														
Marketing/Advertising	X													
User satisfaction					X									
Product & Services									X					
high quality Product & Services					X									
Environmental								X						
Government Support		X		X			X	X	X					
Industry												X		
National								X						X
Competitive Pressure	X	X				X								
Organizational								X						
Firm Size	X						X							
Enterprise Resources														
Number of Employees						X								
Management Factor	X									X				
Manager/CEO support														
Good project management team	X													
Resources Commitment														
International web use														

Table 2.1: E-commerce Success Factors (Continued)

Success Factors	**Golden, Hughes, Ruane (2004)**	**Auer, Franz (2004)**	**Hin, Subramanian (2004)**	**Poon, Huang, 2004**	**Mira Kartiwi (2006)**	**Huy, Filiatrult (2006)**	**Todd, Javalgi (2007)**	**Lomerson, McGrath, Schwager (2006)**	**Brown, Jayakody (2009)**	**Abbasi (2010)**	**Ghandour, Deans, Benwell (2011)**	**Yang, Chou,Liu,(2012)**	**Sambhanthan, Good (2013)**	**Zhang & Okoroafo, (2014)**	**Hande, Ghosh, & Govil (2015)**	**Varela et al., (2016)**
Technological																X
Technical Infrastructure			X			X	X		X			X		X	X	X
Business Infrastructure		X	X				X					X				
Communication															X	X
Individual Factors																
IT Skill and Expertise	X		X			X										
Education & Awareness			X			X										
Implementation Factors	X															
Payment													X		X	X
Delivery													X		X	X
Ease of use									X	X		X	X		X	X
Customer Service										X	X	X	X	X	X	X
Usefulness (Number of hits)									X	X	X		X		X	X
Detailed product specification											X	X	X		X	X
Customization													X		X	X
Hardware software stability															X	X
Good page loading													X		X	X
Visual Appearance															X	X
System architecture											X				X	X
24 hours availability & accessibility															X	X
System accessibility											X		X		X	X
Marketing/Advertising											X		X		X	
User satisfaction													X		X	
Product & Services	X							X		X	X	X			X	X
High quality Product & Services												X			X	X
Environmental									X					X		X
Government Support			X		X	X								X		X
Industry														X		
National																
Competitive Pressure						X						X		X		
Organizational	X											X				
Firm Size						X	X									
Enterprise Resources																
Number of Employees						X						X				
Management Factor	X			X		X					X			X		
Manager/CEO support					X			X						X		
Good project management team											X	X				
Resources Commitment												X				
International web use																

To show the independent factors and dependents factors identified in Table 2.1, a diagram is shown in Figure 2.1. These factors shown in Figure 2.1, will help to develop a conceptual model of integrate e-commerce factors in section 2.10. The elements of the model is discussed in the following section.

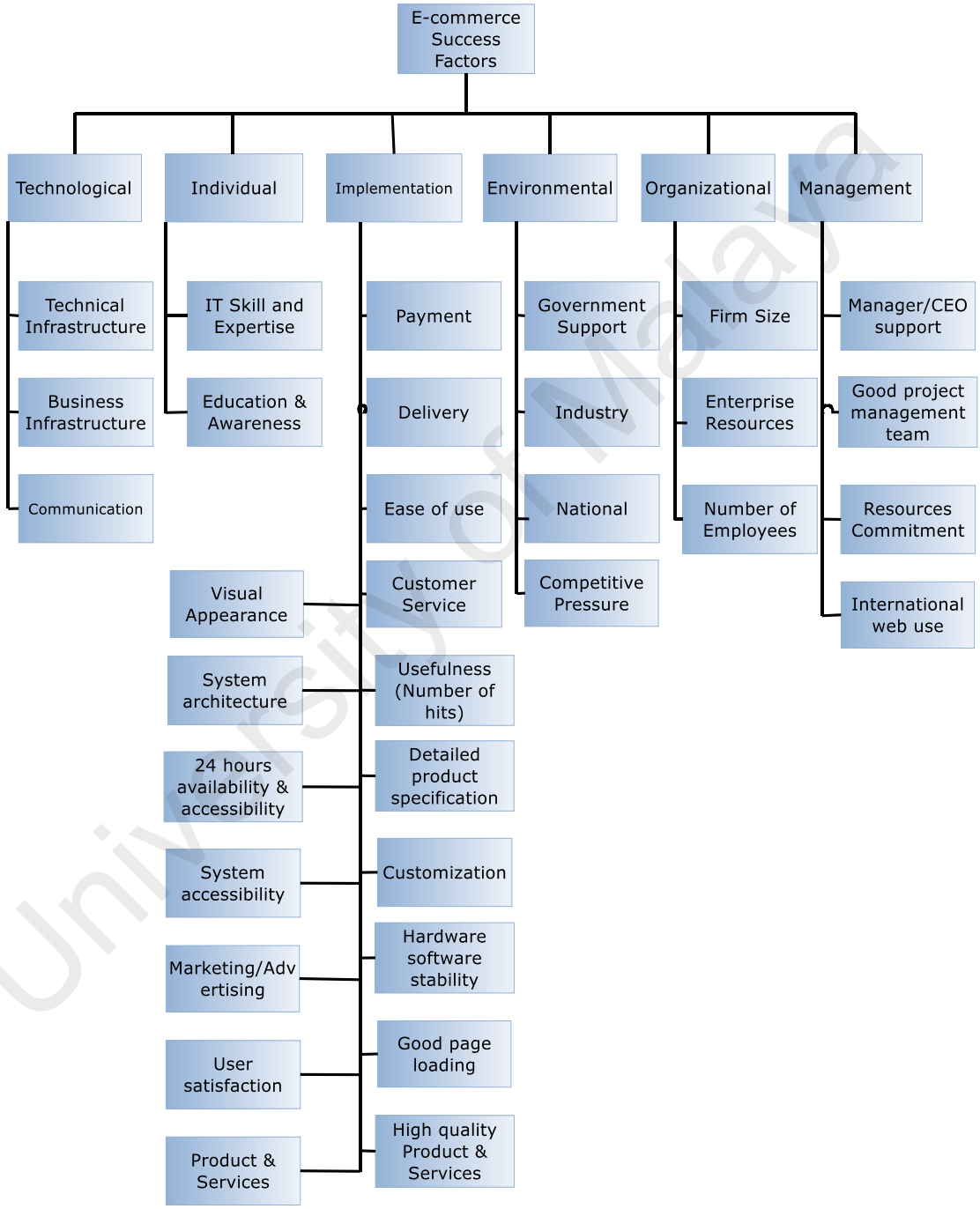

Figure 2.1: E-commerce Success Factors in SMEs

2.5.1 Technological Factors

The research literature identifies a number of technological-related factors that influence e-commerce adoption in SMEs. Technical infrastructure involves intranet, extranet, email, and all technologies related infrastructures, that are necessary for the implementation of e-commerce.

(a) Business Infrastructure: For any business to start using e-commerce there is a need for a business infrastructure that becomes the basis of the e-commerce implementation within the company (Gilaninia, et al., 2011). According to Jennex, Amoroso et al. (2004), attributes of business infrastructure consist of a business plan, an in-place business organization, business processes, cost/cast control processes, advertising, client contact methods, and a payment process.

(b) Communications: Network technologies for communications include TCP/IP, which is a protocol used to create and transfer information packets across the Internet; HTTP (Hypertext Transfer Protocol), which is a set of rules for transferring files over the Internet; and POP (Post Office Protocol), SMTP (Simple Mail Transfer Protocol), IMAP (Internet Message Access Protocol) that manages emails and network management issues such as Quality of Service (QOS) (Ngai & Wat, 2002).

(c) Innovation: Innovation considers to be the most commonly investigated characteristics to promote the adoption of technology (Chong & Bauer, 2001). The factors of innovation were developed by Rogers (1995) and are adopted as a perceived relative advantage (the perceived benefits and impact of e-commerce), complexity (ease of use or learning e-commerce), trial ability (the degree by which e-commerce can be pilot tested or experimented), compatibility (both technical and organizational), and observability (the extent to which e-commerce benefit or gain is clear) (Chong & Bauer, 2001; Huy & Filiatrault, 2006).

2.5.2 Individual Factors

People are the most important factor in the implementation of e-commerce. Human factors can be divided amongst customers, staff, and top management, as they are the people mostly affected by the change.

(a) IT Skills and Expertise: One of the major internal issues related to the non-adoption of e-commerce, is the lack of staff expertise and commitment (M. Tan & Teo, 1998; Dholakia & Kshetri, 2004; Zaied, 2012). Adopting new technologies requires change in employee work attitude, qualifications, performance, and knowledge of e-commerce technology (Huy & Filiatrault, 2006; Zaied, 2012). Therefore, management commitment is crucial; where skills need to be redefined and adequate training is needed (Cloete, Courtney, & Fintz, 2002; Ghobakhloo, et al., 2011). There is always a need for appropriate training to guide users (i.e., company staff) to prevent hesitation and confusion of new systems (Saif-Ur-Rehman, 2016). Seminars, lectures, and internal workshops, can be conducted to make users aware of system functions, in order to eliminate this hesitation or confusion.

(b) Education and Awareness: Employees that already know about e-commerce within organizations may be more disposed to adapt to e-commerce (Huy & Filiatrault, 2006). Knowledge of information technology and e-commerce possessed by managers has an effect on adoption of e-commerce and influences the usage of e-commerce within an organization (Rashid & Al-Qirim, 2001; Huy & Filiatrault, 2006).

2.5.3 Implementation Factors

According to Kartiwi (2006), implementation consists of a website development loop, which comes after the initial assessment of e-commerce adoption is done. This involves three stages; firstly, the product catalogue, company profile, and contact us are created; secondly, order forms and order tracking; and thirdly, online payments and customer services. This is similar with Daniel, Wilson et al., (2002) paper, where online ordering and payment services are considered as being the most advanced level of website adoption. According to Ngai and Wat (2002), from a business process perspective, e-commerce is the application of technology towards the automation of business transactions and workflow. This includes payment & delivery systems, innovation, e-catalogues, search engines, shopping carts, communications, marketing, and advertising.

(a) Payment and Delivery Methods: In agreement with Daniel, et al., (2002), Sharma & Wickramasinghe (2004), Kartiwi (2006), Lomerson, et al., (2004), online ordering and delivery is the most advanced stage in development and implementation of e-commerce. It is important if the business wants to use their website for more than just marketing purposes. This includes the method or system that is used to exchange payments between sellers and buyers (Al-Fayoumi, Aboud, Al-Fayoumi, & Jedda, 2010; YingHua Zhang & Wang, 2014). This exchange of payment in e-commerce is done using a digital financial instrument, such as a credit/debit card, e-checks, e-cash, etc. (Ngai & Wat, 2002; Chen, 2014).

The electronic shopping cart is order-processing software that acts as a shopping cart in physical world (i.e., where customers accumulate items while shopping). This shopping cart allows users to select various items, review item, make changes, finalize their list, and click the buy button to actually purchase the products.

(b) Ease of Use: There are three types of ease of use, namely ease of understanding, ease of finding, and information focusing. Ease of use can be based on the simplification of the work process, by making use of e-commerce that help companies to accept it faster. Ease of use can be based on the ease of taking an order, payment, and information search (Abbasi, et al., 2010; Woodside, Vicente, & Duque, 2011; Sambhanthan & Good, 2013).

(c) Customer Services (Service Quality): The researcher observed that strong customer support and relationships with clients helped business clients to facilitate the adoption and implementation of an e-commerce system (Laosethakul & Boulton, 2007). Service quality is defined by the overall support and service delivered by the e-commerce service provider (Molla & Licker, 2001). Service quality influences the customer's intention to use a system, which may equally apply to their intention to continue using a system. Service quality has positive effects on user satisfaction with an e-commerce system (Brown & Jayakody, 2009).

(d) Usefulness in term of Number of Hits: Perceived usefulness has a positive effect on continuance intention for an e-commerce system (Brown & Jayakody, 2009). Perceived usefulness is considered as being a key determinant for influencing customer's attention to continue using an e-commerce system. The use of e-commerce systems is a widely used criterion for accessing success. Use level, as captured through hits and visits, is often used to indicate market share and reach of e-commerce peacemakers, like Amazon and Yahoo (Molla & Licker, 2001; Sambhanthan & Good, 2013).

(e) Content Quality (Detailed Product specification): Web comments should be completed, personalized, relevant, easy to understand, and secure (DeLone & McLean, 2003). The quality of the content and the extent to which that content

meets the needs and expectations of customers, might affect the success of an organization and determine whether they stay on a site or move to the next site; which is only one click away (Molla & Licker, 2001; Hande, et al., 2015).

(f) Customization: Customization mean personalization of company products and services according to customer need (Schmitt & Bergmann, 1999). Internet to build interaction that not only attract but also engage and retain website visitor, learn (i.e. capture visitors profile) and relate (i.e., personalizing information) to their individual preference (Kierzkowrski, 1996; Le & Koh, 2002; Goi, 2012). Product customization can dismiss customers risk in e-commerce transaction by dismissing the scope of the customer test on delivered products and lowering the possibility of finding unexpected features after delivery (Cho, 2006; Jahanshahi, et al., 2013).

(g) Hardware and Software Stability: Hardware and software stability is part of system quality (Molla & Licker, 2001). Hardware and software should be stable for consumer at all time to build their trust on company services.

(h) Page Loading Speed: On internet where competitor are only few click away, it is necessary to have good page loading otherwise consumer will move to another site to make their purchases.

(i) Visual Appearance: According to Fogg et al. (2002), Cyr (2008) and Kim & Zhang (2014) average consumer paid far more attention to superficial aspects of the website such as visual cues, than to its contents and the appeal of overall visual design was the largest among respondents.

(j) System Architecture: System architecture should be good that is easy to use and maintained by not only consumer but also business personnel.

(k) System 24 hour availability & accessibility: system should be available for 24/7 to build stability and allow consumer to make purchases regardless of time, distance concerns (Dickinger & Stangl, 2011; Goi, 2012).

(l) System Accessibility (System quality): E-commerce system quality can be determined via 24 hour availability, stability of software and hardware, page loading speed, system architecture, visual appearance, and accessibility as part of the e-commerce system quality (Molla & Licker, 2001; Woodside, et al., 2011).

(m) Marketing/Advertising: Electronic marketing can be viewed as a new modern practice of buying and selling goods, services, knowledge, and ideas via the Internet or other electronic means.

As with business and commerce, companies need to promote their e-business and e-commerce. Companies can make use of conventional media or Internet media. There is a need for company customers to know that the website exists, and therefore, there is a need for marketing to bring people to their website. There are several ways to accomplish Internet marketing. These include display advertising, such as a banner, where advertisers pay to display the banner of their website for certain amount of the time, which is used to promote company products and services. E-mail marketing, including the sending of e-mails to customers, in order to advertise their services online. Affiliate marketing; where a company hires another company or website (known as affiliates) to promote their products and services. The affiliate receives a commission or reward for every visitor, subscriber, sale or customer that they bring to the company.

(n) User Satisfaction: User satisfaction is a means of measuring customer opinion of e-commerce systems and covers the entire cycle of the customer's experience; from information retrieval through to purchase, payment, receipt, and services (DeLone & McLean, 2003).

(o) Products and Services: All companies believe that their product offerings have a positive impact on the success of their e-business. Trials of such products identified by companies include information rich (56%), customizable (32%), tangible (28%), unique (24%), web-based (20%), and digitally based (20%) products (Golden, Hughes, & Ruane, 2004).

According to Zwass (1996), products also include and need proper online marketing. These enabling services include e-catalogues, e-money, digital libraries, copyright protection, and digital authentication services (Zwass, 1996). Electronic catalogues are used to promote products and services. For customers, they are used to search for information on products and services. E-catalogue consists of a product database, directory, and a presentation function. E-catalogues can be used in combination with search engines (a search engine is a computer program that can access an Internet repository for specific information/keywords, retrieve it, and report the results).

(p) Variety, Quality, and Cost of Products & Services: The Internet enables consumers to compare prices, products, and services, across suppliers. Price comparisons between different websites can lead to increased price competition and lower prices for products and services. An expansion into related product lines and increasing quality is also a good strategy. By making use of the internet, companies collect information on their target audience, identify target consumers, and better introduce products and services to targeted consumers (Shin, 2001).

2.5.4 Organizational Factors

Organizational factors, also known as firm internal factors, are generally represented by size, quality of IS system, management support, and enterprise resources (Rashid & Al-Qirim, 2001; Yang, et al., 2012).

(a) Enterprise Resources: Enterprise resources, also known as firm resources, include financial and technical resources that are principal facilitators during the implementation of e-commerce in any firm (Rashid & Al-Qirim, 2001; Huy & Filiatrault, 2006).

(b) Firm Size: The size of the firm also has a major impact on the manager's decision to adopt e-commerce (Tetteh, 1999; Dholakia & Kshetri, 2004; Huy & Filiatrault, 2006).

2.5.5 Management Factors

Management support is one of the most important factors towards the adoption of e-commerce in companies (Saif-Ur-Rehman, 2016). Poon and Swatman (1999) emphasised the importance of the CEO/management role on EC adoption and diffusion. CEO innovativeness, IT knowledge and attitude, together with the perception of the manager (Grandon & Pearson, 2004; Abdul Hameed & Counsell, 2012; Seyal, et al., 2012), has a positive effective on e-commerce adoption.

(a) Resources Commitment: These cases show a broad range of international web use demonstrated at different levels of resources commitment, functional sophistication involving information interaction, transaction, web-enabled business, and cultural adaption, such as language (Tiessen, Wright, & Turner, 2001).

(b) Good Project Management Team: The project management team should be efficient enough to develop the e-commerce site according to the business and client's needs and requirements (Moloney, 2015).

2.5.6 Environmental Factors

The external environment plays an important role in the adoption of technology. These environmental factors consist of competitive pressure, supplier/buyer pressure, public policy, and the government's role (Rashid & Al-Qirim, 2001; Vaithianathan, 2010).

(a) Government Policy and Regulations: According to Jennex, Amorose et al., (2004) the regulatory environment attribute involves legal representative/support, cost advantage exists, intellectual property protection, tax law encouraging B2B/e-commerce, banking/wire transfer law supporting overseas/electronic payments, customs laws supporting global e-commerce, exchange rules/rates favourable, and telecom regulation favour business. There should be proper government support towards the implementation of e-commerce, where the respective government supports and encourages small businesses towards the adoption of e-commerce (AlGhamdi, Nguyen, & Jones, 2013; Zhang & Okoroafo, 2013; Neely, 2014; Zhang & Okoroafo, 2014). In the UK, the government has set rules and regulations that include intellectual property rights linked to e-commerce, including trademarks, domain name registration, copyrights, and patents (Jennex, et al., 2004; Turban, et al., 2004; AlGhamdi, et al., 2011).

(b) Industry: According to Ling (2001), every adoption and diffusion of e-commerce varies from industry to industry, as industry considers that external factors compromise much wider aspects, including competitive pressure, pressure from suppliers, and critical mass.

(c) National: National can compromise factors such as the level of government support, national infrastructure, and cultural differences (Chong & Bauer, 2001). According to Efendioglu & Yip (2004), Kang & Corbitt (2002), Laosethakul & Boulton (2007), Pavlou & Chai (2002), and Thatcher, Foster, & Zhu (2006),

findings from cultural factor research are beneficial for IS developers for catering domestic customer base, as well as the international market, with a specific understanding of culture and human behaviour that it produces.

(d) Competitive Pressure: Competitive pressure is a major influence in the adoption of e-commerce (Dholakia & Kshetri, 2004; Huy & Filiatrault, 2006; Chiou, Lin, & Perng, 2010). One of the major benefits of e-commerce is its competitive advantage (Kuzic, Fisher, & Scollary, 2002). According to research by Dholakia and Kshetri (2004), in order to move websites further towards internet usage, they should focus on the firm who holds other related technologies and has a particular belief regarding competitive behaviour. The number of firms using websites for customer services and market research will impact the perception of competitive pressure and further accelerate SMEs towards the adoption of e-commerce (Dholakia & Kshetri, 2004).

2.6 E-commerce Security Factors

Section 2.5 has identified factors that are necessary for the successful adoption of e-commerce in SMEs. This section identifies the e-commerce security factors for secure e-commerce implementation in SMEs. Online sales offering from e-commerce firms can change the way in which consumers purchase goods and services, although the potential has not been fulfilled due, in part, to consumer perception of the risks involved in conducting business online (Turner, et al., 2001; Katsikas, Lopez, & Pernul, 2005).

The current state of e-commerce is a good example that the supporting technology has not yet reached its full potential. During the late 90s there were many predictions regarding how e-commerce would develop in the near future (Turner, et al., 2001). For example, in 1990, Forrester Research (1999) predicted a volume of US$ 184 billion of US online retail sales in 2004 whereas the actual value is only US$ 69 billion,

representing big gap. The potential of e-commerce has not been fulfilled due, in part, to consumers' perception of the risk involved with conducting business online (Katsikas, et al., 2005). Customers on an e-commerce site are mostly comfortable with providing general information to websites such as preferences, but are less comfortable when it comes to sensitive information such as a credit card number (Suh & Han, 2003). This is not because of a lack of e-commerce security, but it rather more to do with the fact that they do not trust these services (Turner, et al., 2001). For e-vendors, it is therefore critical to promote trust in order to transform a potential consumer from curious observer to one who is willing to transact over the site. It is crucial to understand the nature and antecedents of consumer trust in the web vendors, with a set of manageable, strategic levers to build such trust, which will in turn promote acceptance of B2C e-commerce (Mcknight, 2002).

According to Forrester Research, young consumers (59%) are primary reasons for not conducting business on-line whilst the remaining participants (approximately 43%) cite a concern for the on-line privacy of that data on the website (McQuivey, 2000). In order for e-commerce to reach, and exceed its full potential, there is a need for companies to provide an increase level of trust and confidence between the business and its customers. Indeed, the creation of technologies is essential in order to protect individual privacy and security in online business transactions.

Özkan, Bindusara, & Hackney (2010) study the critical factors (security, advantage, web assurance seals) which are necessary through customer intention to adopt e-commerce system. The perception of good security and trust will ultimately increase the use of e-commerce. In fact, customers' perception of the security of e-commerce systems has become major factor in the evolution of e-commerce in markets (Zhang & Wang, 2014).

Websites should adopt a privacy policy which allows a customer to trust the website with regard to sharing personal information (Mcknight, et al., 2002). Interacting with online customers makes it possible to convey that the vendor is competent, honest, benevolent and predictable, thereby strengthening the customer's trusting belief (Kim, Ferrin, & Rao, 2008). The vendor should advertise its good reputation in order to induce buying behaviour. Linking to other trusted sites allows for assurance building, thus enabling purchasing and Internet behaviour. Third party seals and guarantees from the sites such as BBB, AICPA's Webtrust or SysTrust increases the integrity of the vendor and allows a customer to trust the site (McKnight, et al., 2002).

When dealing with B2C clients, there is a great deal of responsibility imparted on the person or group of people which maintain the website. It is very important both in the context of ethical and legal business-to-consumer that what is written or portrayed about the company are factual. In addition, if proper business to business ethical behaviour is not being followed there is a possibility that trade secrets and/or intellectual property can be exposed.

The security factor is shown in Table 2.2. These factors are identified from the last twenty years of research conducted in the field of the e-commerce security factors. These factors are then categorised into six main headings: Ethical & Legal issues, Security, Privacy, Intellectual property rights, Trust and Loyalty. These security factors are identified to develop a conceptual model of integrated e-commerce factors shown in section 2.10.

Table 2.2: E-commerce Security Factors

Factors	Ter Kah (1999)	Hoeren (2000)	McKnight, Chervany (2001)	Udo (2001)	Turner, Zavod, Yurcik	Belanger, Hiller, Smith (2002)	Pavlou (2003)	Harris, Coles, Davies (2003)	Suh, Han (2003)	Slyke, Belanger, Comunale (2004)	Ladson, Fraunholz	Liu et al (2005)	Katsikas, Lopez, Pernul (2005)	Schl¨ager, Nowey, Montenegro (2006)	Teo, Liu (2007)	Kim, Ferrin, Rao	Chang, Chen (2009)	Zhang, Deng, Wei, Deng (2012)	Kim, Tao at el (2010)	Lu, Chang & Yu (2013)	Ziaullah, Feng, & Akhter, (2014)	Elbeltagi & Agag, (2016)
Trust		X				X	X		X	X	X	X	X	X	X				X		X	X
Legal issues/Website recovery system	X					X								X				X	X		X	X
Warranty messages						X			`q									X				X
Data integrity & Reliability	X		X			X			X	X	X		X		X	X			X	X	X	X
Competence	X		X							X					X							
Predictability	X		X	X						X					X	X	X					
Benevolence, caring			X	X											X		X			X	X	
Website continuity program						X									X			X		X	X	
Security				X	X	X		X	X			X		X		X	X	X	X	X	X	X
Authorization	X	X		X	X	X				X	X		X	X	X			X	X	X		X
Authentication	X	X		X	X	X		X	X	X	X		X	X				X	X	X		X
Transaction Security	X			X	X	X	X	X		X	X		X			X		X	X	X		
Customer Screening			X			X					X							X				
Data security policy		X		X		X		X			X	X							X	X		
Privacy				X	X	X		X	X			X		X		X			X	X		X
Privacy Policy			X	X		X		X			X	X				X		X	X	X		
Third-party privacy seals	X		X		X	X		X			X	X	X			X			X			
Cookies Control consent						X		X			X	X										
Employees privacy				X				X										X				X
Ethical & Legal issues								X					X					X				X
Control Spam				X						X	X											
Electronic Contracts	X	X									X							X				X
Links to other sites			X					X														
Guarantees or other seals	X		X		X	X												X		X		X
Intellectual property rights		X		X				X					X									X
Trademarks													X									
Domain Name registration		X											X									
Patents		X						X														
Copyrights		X						X														X
Loyalty												X			X		X			X	X	X
Trust on services and Security	X				X	X	X			X		X			X	X	X			X	X	X
Reputation building			X		X		X								X	X	X			X	X	X
Satisfaction with past services							X			X					X	X	X			X	X	X
Frequency					X		X			X					X	X	X		X	X	X	X

To cleary show the independent factors and dependents factors identified in Table 2.2, a diagram is presented in Figure 2.2. The elements of the model are discussed in the following section.

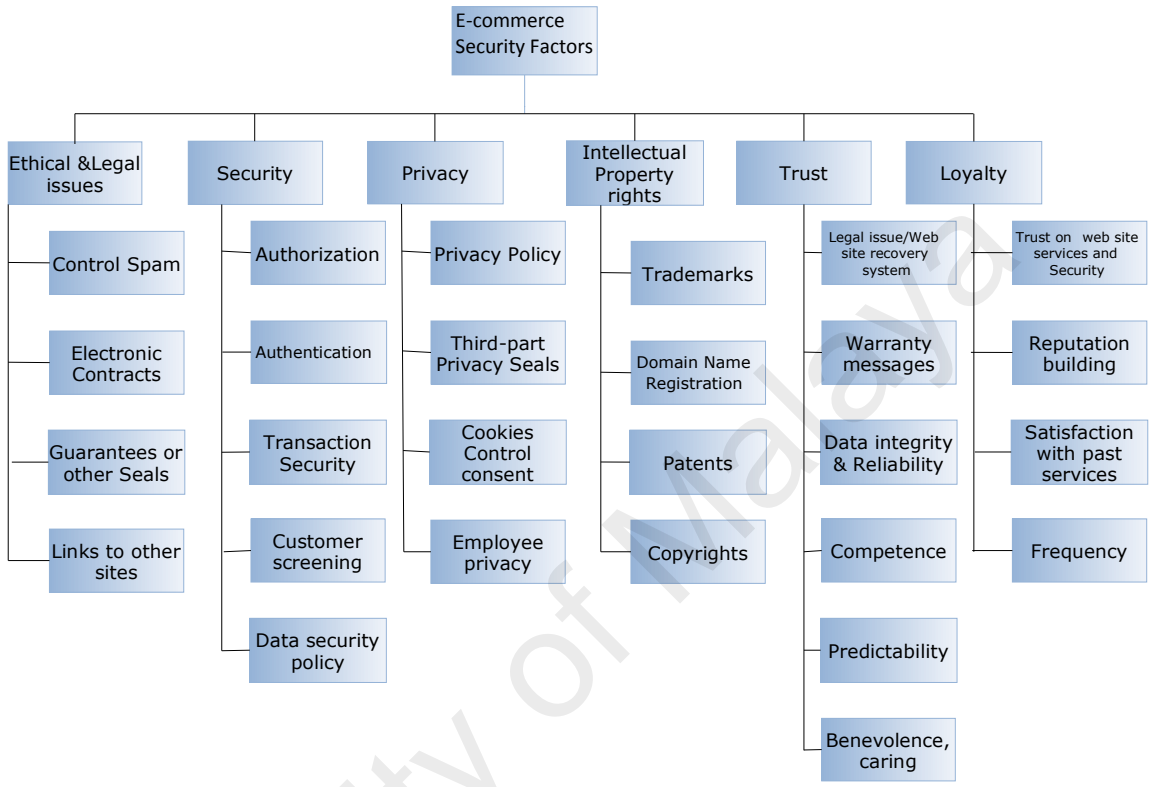

Figure 2.2: Factors for E-commerce Security

2.6.1 Trust Factors

There are three characteristics to represent the perceived trustworthiness of the trustee, namely ability, benevolence integrity, competence and predictability (Kim, et al., 2008; Sari & Rofiq, 2013). Indeed, should the trustee possess these qualities then trust will develop (an intention to accept vulnerability) toward the trustee (Kim, et al.,2008; Zhang & Okoroafo, 2013).

(a) Warranty Messages: Site provides adequate and clear statement on warranty messages (Gervasi, 2016). Aspects like malfunctioning and misinforming must

be clearly covered to improve the trust between buyer and seller (Soiraya, Mingkhwan, & Haruechaiyasak, 2015).

(b) Data Integrity and Reliability: This means that one believes that the other party makes good faith agreements, tells the truth, acts ethically and fulfils promises (Bromiley & Cummings, 1995) to secure data against alteration and interception whilst also ensuring that the electronic record is not altered; electronic signature is used (Leng, 1999; Ismaili, 2015).

(c) Competence: In the case of an Internet relationship, the consumer would believe that the vendor can provide the goods and services in a proper and convenient way (Bao, et al., 2016).

(d) Predictability: Predictability is considered important in a trusting relationship as a consumer can predict the vendor's action (Luo & Chea, 2017). For example, in the case of Amazon, customers can predict that they will receive a book within seven days, even if they receive no confirmation e-mail. This helps to build a trusting relationship between vendor and consumer (McKnight & Chervany, 2001).

(e) Benevolence (caring): Trusting belief-benevolence means that one party believes that the other party care about ones and is motivated to act in one's interest (McKnight & Chervany, 2001; Kumar, Anand & Mutha, 2016; Safa & Solms, 2016).

2.6.2 Security Factors

According to Kalakota & Whinston (1996), Shahibi & Fakeh (2011), Zhang & Okoroafo (2014), a security threat is defined as a circumstance, condition, event with the potential to cause economic hardship to data or network resources in the form of destruction, disclosure, modification of data, denial of service, and/or fraud, waste and abuse. Security thus pertains to protection against these threats; security in e-commerce

is reflected in the technologies used to protect and secure customer data (Belanger, Hiller, & Smith, 2002; Daud, et al.,2011).

(a) Authorisation (Protection of a site from unauthorised outsiders): Access Rights should be granted on a need-to-know basis; security patches should be applied as soon as possible; sensitive or confidential data should be encrypted; web servers, network equipment, and other infrastructure components should be physically protected (Hansel & Vianna, 2016). Security best practices should be implemented as recommended by organisations such as the network security should be audited regularly by someone who specialises in intrusion detection and prevention (Awa, Ojiabo, & Emecheta, 2015).

(b) Authentication: Authentication ensures that the trading parties in an electronic transaction or communication are in fact who they claim to be (Suh & Han, 2003; Manzano, et al.,2009; Polasik & Wisniewski, 2009). The authentication can be implemented by some of the technology such as identity certificates, Public-Key Infrastructure (PKI), Privilege Management System (PMI) (Katsikas, et al., 2005; H. Liu, Luo, & Wang, 2008).

(c) Transaction Security: Transaction security depends on the confidentiality of information between seller and buyer and non-repudiation that becomes even more important during the execution phase where secure payment is ensured as well as the secure delivery of the good (Shahibi & Fakeh, 2011). Therefore, according to Katsikas & Lopez et al. (2005) and Moloney (2015) e-commerce security requirement depends on confidentiality, the integrity and availability of information and system, the authenticity of communication parties and the non-repudiation sources.

(d) Customer Screening: This is essential in order to protect a system from unauthorised access and can be done using a firewall and terminal, database, server, application, and operating system security measures (Suh & Han, 2003).

(e) Data Security Policy: The first step in securing entity, electronic data and the system involves a design security policy. Security policies are important because they define what is being protected and what type of restriction should be put on those controls (Smith, 2004).

2.6.3 Privacy Factors

Privacy is "the condition of not having undocumented personal knowledge about one possessed by others" (Parent, 1983; Ohlhausen & Okuliar, 2015). Privacy related to issues of concern for both current and prospective e-commerce customers (Lanier, 2008; Shah, et al., 2013). There are a number of ways in which individual information can be found on the Internet, such as reading individual entries on a newsgroup posting; looking at individual names and identities in the Internet directory; by reading emails, conducting surveillance on employees, wiretapping wireless and listening to employees; asking an individual to complete website registration, and gathering information on individuals while they access the website by making use of cookies (Turban, et al., 2004; Karakaya & Stark, 2013; Chen & Liu, 2015).

According to Harrison, et al., (2002) and Đkudienë, et al., (Đkudienë, et al., 2015), e-commerce allows for the maintenance of trust and development of relations with online clients such as privacy policy and third-part privacy seals, interacting with customers, reputation building, links to other sites and guarantees or other seals.

(a) Privacy Policy: An online privacy policy or OOP is often used by a website to provide a comprehensive description of their information practices (Antón & Earp, 2001). It informs users that their privacy rights are being considered and

that the website understands the privacy concern faced by users (Alicia & Bardo, 2005). The information practices reflected in the firm's privacy policy should be open and honest, thus giving users the opportunity to evaluate the practices and make informed decisions regarding whether or not to disclose their personal information (Culnan & Bies, 2003). A website with a privacy policy will reassure consumers that the vendor is ethical, thus meaning that these consumers will be more willing to share information (McKnight & Chervany, 2001; Shah, et al., 2013). This will lead to an increase in repeat visits and more purchases (Liu, et al., 2005).

(b) Cookies: Cookies and tracking software are used to follow consumers' online activities so as to gather information about their personal interests and preferences. This information is extremely valuable as it helps a company to sell customers the products and services tailored to their needs (Liu, et al., 2005). According to Privacy and Electronic Communication Regulation, businesses have to inform their customers that they use cookies, and provide a choice for user who do not want to accept it; this means providing users with a statement of privacy and cookies which tell them how they are being used and how they can be switched off by the users (Turban, et al., 2004).

(c) Third Party Privacy Seals: Third party seals are increasingly used by businesses to communicate their commitment to security (e.g. Verisign) (Belanger, et al., 2002). Groups like TRUSTe or BBBOnline, AICPA's Webtrust or SysTrust and Entertainment Software Board Real (ESRB) offer programs in which businesses can participate in order to show their commitment to privacy and security. Privacy seals offer a readily visible and easy way to reassure consumers that the online business respects individual privacy on the Internet (Chang. Liu, et al., 2005; Andreani, 2016).

(d) Employee's Privacy: In some cases technology has transformed arrangements, thus meaning that people can connect to company intranets from home. The growth of mobile Internet, whereby employees can access information on the move, has piled additional pressure on the security system (Lisa, Anne-Marie, & Richard, 2003). With this in mind, there should be a code of conduct for employees using a system that ensures privacy and security of consumer data. It is also not ethical for a company to access their employees' data and emails without their consent, and as such measures should be provided to protect individual employee privacy (Karakaya & Stark, 2013).

Organisations are educating their employees and provide necessary hardware and software that enhances user privacy. For example, if an organisation informs its employees of its policy and intention to monitor e-mails as well as the consequences of sending and/or receiving e-mails, considered inappropriate, then the employee may cut down on the number of such emails, and the organisation will have achieved their goals (Udo, 2001)

2.6.4 Ethical and Legal issues Factors

When dealing with 'Business to Consumer' clients, a great deal of responsibility lies with the person or group of people which maintains the website. It is very important in the context of an ethical and legal B2C perspective that what is written or portrayed about the company is factual. Furthermore, if proper business to business ethical behaviour is not being followed, there is the possibility that trade secrets and/or intellectual property may be exposed (Turban, et al., 2015b). As with any business's planning or publishing, website development involves a variety of legal issues and standards which should be followed (Turban, et al., 2015a). Such issues are considered

to protect both the consumers and the owner of the site. The following details some of the areas that should be considered.

(a) Control Spam: Unsolicited commercial email commonly known as spam. The opt-in consent procedures for commercial e-mails were introduced by the Privacy and Electronic Communication Regulation, thus meaning that a business is only allowed to contact those people who have agreed to be contacted (Blanzieri & Bryl, 2008). In order to save businesses from the aggravation of having to obtain consent from all customers, the rule only applies to new customers (Turban, et al., 2004). Businesses can continue selling their products to current customers, provided they can opt out of receiving future messages related to similar products and services.

The US CAN-Spam Act (Controlling the Assault of Non-solicited Pornography and Marketing Act) of 2003 allows spam with new instructions, e.g. it demands that the advertiser's email address be included, that an opt-out link is present, that there is a legitimate return email address, and that messages are clearly marked as advertisement (Blanzieri & Bryl, 2008).

(b) Electronic Contracts: An electronic contract such as a digital signature is a mathematical scheme used to demonstrate the authenticity of a digital message or document. A digital signature provides a secure vehicle for the prevention of unauthorised alterations to the data and holds great potential for facilitating secure e-commerce transaction (Zhang, 2012).

(c) Guarantees or Other Seals: Guarantees or other seals such as BBB, AICPA's Web Trust or SysTrust state that the reliability of a website would help to raise trusting belief in the integrity of the vendor, thereby endangering willingness to depend on that vendor. The trusting belief depends on the nature of the seal (McKnight & Chervany, 2001).

(d) Links to Other Sites: Linking to other trusted sites allows for assurance building, thus enabling purchasing and Internet behaviour (Stewart, 1999). The implication of the outside link is that one has a good company because that is good company. Indeed, this has an impact on the trusting beliefs relating to the site vendor (McKnight & Chervany, 2001).

2.6.5 Intellectual Property Rights Factors

As privacy is a major concern for customers, intellectual property is a major concern for those who own intellectual property. According to the World Intellectual Property organisation, intellectual property refers to the creation of mind: invention, literary and artistic works and symbols, names and design used in commerce. There are four main types of intellectual property rights which link to e-commerce, including trademarks, domain name registration, copyrights and patents (Saha, 2000). There are differences when it comes to the way in which these rights operate. The patent holds for twenty years, whilst copyrights last until 70 years after the author's death, and trademarks can be continually renewed, meaning that they effectively last forever (Wilson, 2009).

(a) Trademarks: Trademarks are composed of symbols, letters, words, designs, numbers, shapes and combination of colours, etc. used by business to identify their goods and services. A trademark must be distinctive and original if it is to be registered and protected by the government (Turban, et al., 2004).

(b) Domain Name Registration: the domain represents the virtual identity of the provider, and his/her products. In light of this, it also features as part of the trade name on visiting cards, brochures and in advertising copy (Thomas, 2000). A domain name refers to the upper category of a URL address. A variation of trademark is Domain name. Indeed, in 2002, the Internet's governing body on Website names approved the following top-level names; .Biz, .info, .name, .pro,

.museum, .aero, .coop besides .com, .org and .gov which are already being used by the Internet community (Turban, et al., 2004).

(c) Patents: A patent is comprised of documents, which provide the exclusive right on invention for a fixed number of years, e.g. 10 years in the United States and 5 years in the UK. The application of patents must include following one or more claims that it must be new, useful, non-obvious and industry applicable (Turban, et al., 2004). The invention can be in the form of a physical device, method or a process of making a physical device.

(d) Copyrights: Copyright is an exclusive grant from the government that provides the exclusive rights to the creator of original work, including a right to copy, adopt and change the work. Copyright mostly exists in literary, musical, dramatic and artistic works; sound recording, film, broadcasting and cane program. In addition, copyright also protects images, photos, logos, text, HTML, java script and other material (Turban, et al., 2004).

2.6.6 Loyalty Factors

Modern day customers are in a very unique position, with many e-commerce businesses just a click away. This provides a huge advantage to buyers, as they can compare the quality and price of products between the world-wide sellers (Lu, Chang, & Yu, 2013). Therefore, in order for businesses to handle this type of competitive pressure, there is an ever growing interest in e-loyalty (Hansen & Jonsson, 2013). Customer loyalty increases sales of products and increases company profits over time (Chang & Chen, 2009; Kiran & Diljit, 2011). It also costs five to eight times more for a company to acquire new clients compared to keeping existing ones (Reichheld & Schefter, 2000).

(a) Trust in Website Services and Security: McKnight & Chervany (2001) present an interdisciplinary topology of trust which is related to e-commerce consumer

actions. The typology consists of four concepts: disposition to trust, institution-based trust, trusting belief, and trusting intention (McKnight & Chervany, 2001). Trust is defined as a type of belief superior to faith and inferior to confidence; the faith-trust-confidence continuum (Egger, 2001; Toufaily, 2016). Trust in an e-commerce site helps to build loyalty in consumer behaviour (Cyr, 2008; Eid, 2011).

(b) Reputation Building: A web retailer's reputation is an important antecedent of trust, perceived risk and purchase intention (Pavlou, 2003). A positive reputation is considered a key factor for reducing risk and creating trust because it provides information which indicate that the selling party has honoured or met its obligation toward other consumers in the past (Kim, et al.,2008) .

(c) Satisfaction with Past Services: Marketers are constantly attempting to discover the major factors leading to customer loyalty, satisfaction with services obviously representing one of the most important (Flavián, Guinalíu, & Gurrea, 2006; Chang & Chen, 2009). The best indication of customer satisfaction and business service quality is repeat visits to a website, a recommendation of the website to others, positive remarks or comments about the website and repeat purchases (Zeithaml, Berry, & Parasuraman, 1996).

(d) Frequency: A peer may increase its trust value by increasing its transaction volume and numbers of transactions is an important scope factor in measuring satisfaction in different peers (Xiong & Liu, 2003). In addition, frequent shoppers are more likely to conduct a transaction (Pavlou, 2003).

2.7 Information System Success Models

Molla & Licker (2001) present an extension of Delone & Mclean's (1992) model of IS success to e-commerce success. DeLone & McLean (1992) present the integrated view of the information system success concept with the variable, including system quality, information quality, user satisfaction, individual impact and organisational impact. However, Molla & Licker (2001) add two additional elements, namely trust and services. The other difference is that customer e-commerce satisfaction is proposed as a dependent variable to e-commerce success and its relationship with the e-commerce system's quality, content quality, use, trust and support is defined and discussed.

Molla & Licker (2005) also study e-commerce adoption in developing countries, with their paper discussing the holistic and theoretically constructed model which identifies relevant contextual and organisational factors potentially affecting e-commerce adoption in developing countries. Molla and Licker (2001) model is used in this study as it appear more widely cited and accepted model for e-commerce success in comparison with Molla & Licker (2005) model (Luarn & Lin, 2003).

Table 2.3 shows exactly how the Molla & Licker (2001) factors are used in the conceptual model.

Table 2.3: Molla & Licker (2001) Factors

Molla & Licker (2001)	Success/Security Factors	Factors usage in Model
E-commerce System Quality	Success Factors	**Implementation Factors** System architecture Good page loading Hardware software stability 24 hours availability & accessibility System accessibility Ease of use Visual Appearance **Management Factor** International web use **Trust Factors** Data integrity & Reliability
Content Quality	Success Factors	**Implementation Factors** Detailed product specification high quality Product & Services
Use	Success Factors	**Implementation Factors** Usefulness
Trust	Security Factor	**Trust Factors** Legal issues/Website recovery system Warranty messages Data integrity & Reliability Competence Predictability Benevolence, caring Website continuity program **Security Factors** Authorization Authentication Transaction Security Customer Screening Data security policy **Privacy Factors** Privacy Policy Third-party privacy seals Cookies Control consent Employees privacy **Loyalty Factors** Trust on website services and Security
Support	Success Factors Security	**Loyalty** Trust on website services and Security Satisfaction with past services Reputation building Frequency **Implementation Factors** Customer Service

Based on the factors shown in Table 2.3, in Molla and Licker (2001) model have added the newly found factors as shown in Figure 2.3. The factors such as intellectual property rights and ethics are added under the Trust factor in Figure 2.3. This is because in Molla and Licker (2001) paper have included security, privacy and loyalty variables under trust factor. Therefore, instead of extending and changing the Molla and Licker model in this research have added new security factors under Trust. The newly added factors

along with present factors in model are tested in section 5.4.3, Chapter 5 and verified model is provided.

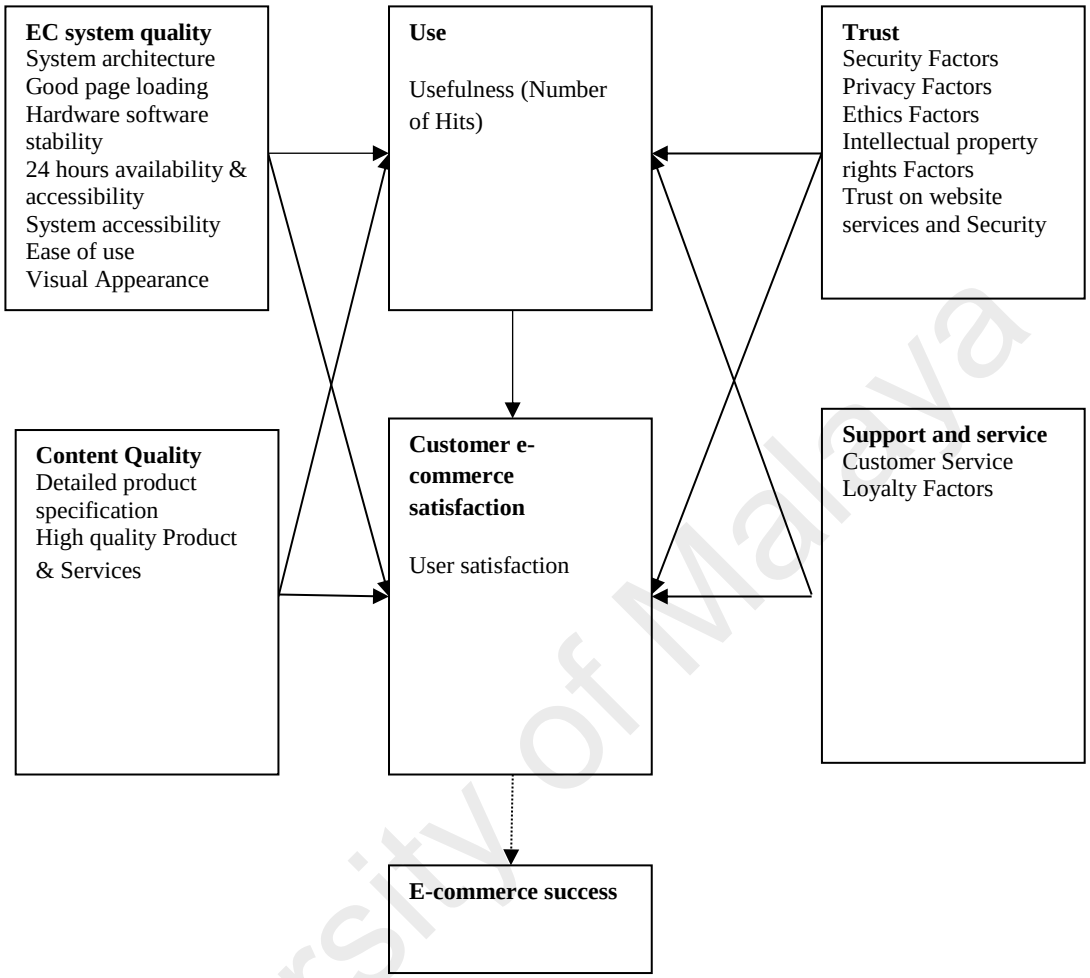

Figure 2.3: Molla and Licker (2001) Proposed Model

The work of DeLone & McLean (1992) is based on studies by Shannon & Weaver (1959) who examine the mathematical theory of communication, and Mason (1978), who looks to draw upon communication theory in order to measure the output of an information system. Delone & Mclean (2003) update their 1992 model by proposing a new IS success model. The new components added to the model include service quality and net benefits.

The Technology Acceptance Model (TAM) developed by Davis (1986) is widely referred to as the IS success model. TAM helps to understand and explain user behaviour in IS implementation. The model suggests two factors that influence the use and success of the system and address the issue of why users accept and reject the information system:

a) Perceived usefulness – this is the degree to which a person believes that a particular system will enhance his/her performance.
b) Perceived ease of use – this is the degree to which a person believes that a particular system would be free from the effort.

The Davis (1986) model is an adaption of the well-known model of social psychology domain – the TRA model by Fishbein & Ajzen (1975). This model explains that a person's actions are a function of that person's behavioural intention. The theory of planned of behaviour (TPB) is also the extension of the TRA. It posits that behavioural intention is jointly determined by attitude and subjective norms, similar to TRA, but with the extension of perceived behavioural control. TAM by Davis & Bagozzi et al. (1989) posits that perceived ease of use and perceived usefulness are major determinants of information system success. Many studies of user acceptance validate this model (Fishbein & Ajzen, 1975; Adams, Nelson, & Todd, 1992; Hendrickson, Massey, & Cronan, 1993; Subramanian, 1994; Grandon & Pearson, 2003; Palvia, 2009; Liao, et al., 2011; Godoe & Johansen, 2012).

Further studies are also conducted which influence these two beliefs with external variables (Liao, et al., 2011), including constructs such as management support (Igbaria & Tan, 1997); subjective norms (S. Taylor & Todd, 1995; Karahanna, 1999); technological factors (Wu, Chen, & Lin, 2007) and cultural across countries environment (Straub, 1994). Since online customers are very concerned about their

privacy and security, these concepts have been included in recent studies (Belanger, et al., 2002; Pikkarainen, et al., 2004). They include usefulness, ease of use, privacy, security, trust, content quality, and Internet connection. This study indicates that said factors affect their e-commerce acceptance, and as such there is a need for security and privacy studies.

The TAM has been continuously studied and expanded. The two major upgrades are TAM2 (Venkatesh, 2000; Venkatesh & Davis, 2000) and the unified Theory if Acceptance and Use of Technology (UTAUT) (Venkatesh, 2003). In TAM 2, perceived usefulness is dependent on other factors including the user's experience, voluntariness, social influence (called "subjective norm"), image, output quality in relation to the job and result demonstrability. Perceived ease of use correlates with control (computer self-efficacy and facilitating conditions), with the intrinsic motivation of the use and with his/her emotion (Venkatesh, 2000; Venkatesh & Davis, 2000).

The UTAUT aims to explain a user intention to use IS and subsequent usage behaviour. The theory holds that the first three key constructs: 1) performance expectancy, 2) effort expectancy, 3) social influence 4) facilitating conditions. The first there are determinants of usage intention and behaviours and fourth is a direct determinant of use, behaviour, gender, age, experience and voluntariness of use are posited to moderate the impact of the four key constructs on usage intentions and behaviour. A TAM 3 (Venkatesh & Bala, 2008) has been proposed in context of e-commerce with an inclusion of the effects of trust and perceived risk on system use. In table 2.4, provide the comparison of Molla and Licker (2001) model with TAM1, TAM 2, TAM3 and UTAUT and why Molla and Licker (2001) is chosen as basis for this research.

Table 2.4: Comparison of Molla & Licker (2001) with IS theories

Holistic Model	Molla & Licker (2001)	TAM	TAM2	TAM3	UTAUT
Information System	Yes	Yes	Yes	Yes	Yes
E-commerce	Yes	No	No	Yes	No
Success factors	Yes	Not Extensively	Not Extensively	Not Extensively	Not Extensively
Security	Yes	No	No	No	No
Privacy	Yes	No	No	No	No
Trust	Yes	No	No	Yes	No
Loyalty	Yes	No	No	No	No

The Molla and Licker (2001) is chosen as basis for this research as it elements cover the research and conceptual model extensively and provide a basis for this research. Molla and Licker model is developed for e-commerce success and also look into security factors such as trust, security and trust factors. Other model/theories such as TAM, TAM1 and UTAUT do not look into these factors. Although TAM3 look into e-commerce and trust but left other factors that is covered only by Molla and Licker. The TAM theories although are also popular in IS studies, but the Molla and Licker (2001) model is consider as more suitable model for this study.

2.8 Integrated Models in E-commerce

This section briefly discusses the integrated models for secure e-commerce. There are various researchers who make use of TAM during their studies. Indeed, according to Thong (1999) in order to develop the integrated model of IS adoption in SMEs four contextual variables are crucial, including primary determinants of IS adoptions which are CEO, IS, organisational characteristics and environmental characteristics. A research model is built by Grandon & Pearson (2004) by combining two independent

research streams in their paper entitled e-commerce adoption: an empirical study of SMEs. Three factors are found to be influential in previous research regarding the perception of strategic value of other IT: operation support, managerial productivity and strategic decision aid. Inspired by TAM, they identify four factors for E-commerce adoption: organisational readiness, external pressure, perceived ease of use and perceived usefulness. There is a causal link between the perceived strategic value of e-commerce and e-commerce adoption.

In the another study by Riemenschneider & Harrison et al. (2003), they investigate the factor which influences website adoption by SMEs. They propose a combined model using theory of planned behaviour and TAM. They test the individual model and fully integrated model by using structural equation modeling. They find that the combined model provides a better fit (Grandon & Pearson, 2004).

Contemporary researchers have built integrative models of trust that include institution-based trust and common trust types such as trusting intention, trusting beliefs and disposition toward trust. McKnight & Choudhury et al. (2002) introduce the framework for the theory of reasoned action in which belief leads to attitude, which in turn leads to intention and thus to actual behaviour. Three factors are proposed in order to build customer trust in the vendor: structural assurance (that is, consumer perception of the safety of the web environment), perceived web vendor reputation, and perceived website quality. According to Keen & Ballance et al. (1999), the perception of structural characteristics of the web, especially security and safety, can influence trusting beliefs and trusting intention towards online merchants.

More recent studies by Roca & García et al. (2009), has introduce the integrated model with aim to investigate the influence of perceived trust, security and privacy jointly with TAM constructs. The result of the study indicates that trust, usefulness and ease of use

are important issues in online trading systems. The finding also suggests that there is a need to increase online security and trust so that customers can easily conduct online transactions with businesses. Palvia (2009) makes use of TAM and other factors of trust, including value, loyalty, satisfaction, privacy and security etc., to build an integrated model which is later tested using CFA. The results show that trust, as well as its components such as satisfaction, value, loyalty and word of mouth play a major part in the model. As consumers use the vendor's website, it leads to satisfaction and perceived value, both of which are important in developing loyalty, willingness to continue the relationship, and recommending the site to potential new consumers (Palvia, 2009).

Awa, Ojiabo, & Emecheta (2015) has introduced integrated model of Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), and Technology-Organizational-Environment (T-O-E) model. This paper reviewed and synthesized the constructs of these models and proposed an improved TAM through TOE to expand their characteristic constructs for e-commerce adoption by SMEs. The integrated constructs include company mission, individual difference factors, perceived trust and perceived service quality improve existing knowledge on e-commerce acceptance and provide bases for information decision(s). Guzzo, Ferri, & Grifoni (2016), analyse TAM models of literature, the paper proposes and empirically validates a new model for e-commerce adoption. The paper investigates about actual transaction behaviour, and not just the intention to shop online. Results showed that social influence, usability and perceived usefulness are predictors of the frequency of use and then, of e-commerce adoption.

2.9 Criticism on Models

TAM has been criticised, despite its frequent use, leading the original purposes to attempt to redefine it several times. (Chuttur, 2009). TAM focuses of perceived usefulness with bringing additional factors to explain how a user perceived usefulness but TAM does not look into the social processes of IS development, implementation and social consequences of its use. TAM also does not essentially look into other issues such as cost and structural imperatives that force users into adopting technology (Bagozzi, 2007).

E-commerce security models by Grandon & Pearson (2004), Roca, García et al. (2009) and Palvia (2009) (explained in section 2.8) provide valuable tools for the information system designer. However, criticism can be levelled at the models. Whilst these models discuss a few of the security factors such as trust, security and privacy, they fail to discuss other factors such as ethics (Das, et al., 2013), intellectual property rights (Cheung, 2016) and loyalty factors (Berger, Geimer, & Hess, 2017) (Refer to section 2.6.4, 2.6.4 and 2.6.6 for more detail on these factors). These factors although not discussed in these models, play an important role for successful implementation of e-commerce in SMEs. Ethics is important in e-commerce for consumer trust and commitment building in online business. On other hand trust and commitment enhance consumer satisfaction. Thus, online retailer should foster practices which can reliability reveal the honesty of product and services to online shoppers to promote favourable customer attitude of online retailers, which in turn will increase customer satisfaction and loyalty (Arnott, Wilson, Mukherjee, & Nath, 2007; Das, et al., 2013). Intellectual property rights are important for SMEs because things of value that are traded on the internet must be protected, using technological security systems and IP laws, or else that can be stolen or pirated and whole business can be destroyed (WIPO, 2016a).

These models are considered as integrated models, as they also discuss the success factors which are considered important during the implementation of e-commerce. These success factors are also not sufficiently thorough or detailed, with many factors still missing; factors which are vital for the successful implementation of any e-commerce system in an organisation.

This study aims to produce an e-commerce integrated model that takes into consideration he success factors presented in Table 2.1 (page 21) as well as the security factors identified in Table 2.2 (page 37). Furthermore, the study intends to produce a guideline for IS developers to develop an e-commerce website. Figure 2.4 presents a diagram describing how the factors are distributed under the conceptual model and arrow describe they are still integrated factors.

This study find the factors that influence e-commerce adoption in SMEs, these factors include both security factors and success factors of e-commerce. These factors although in Figure 2.5 are described under the different heading, are basically integrated within each another as shown in Figure 2.4. According Molla and Licker (2001) and DeLone and McLean (2004) describe security, privacy and trust are part of e-commerce success.

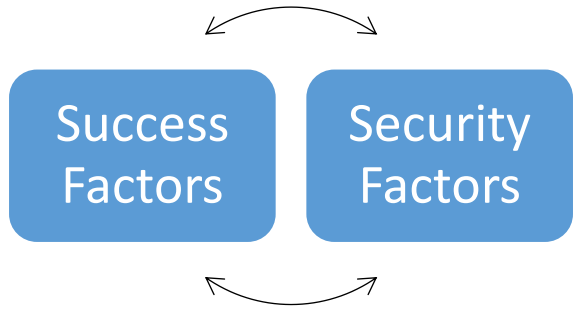

Figure 2.4: Factors Distribution

2.10 Conceptual Model

The model shown in Figure 2.5 is developed from the factors shown in Tables 2.1 (page 21) and 2.2 (page 37), whilst these factors are explained in detail in Sections 2.5 and 2.6. These factors are gathered from a detailed literature review conducted on the topic of success factors and security factors. The review covers the last 25 years of research from 1991 to 2016 as shown in Table 2.1 and 2.2. These factors when integrated as shown in Figure 2.5 will develop holistic model for e-commerce. The conceptual model of integrate factors for e-commerce success is then tested using CFA in Chapter 5.

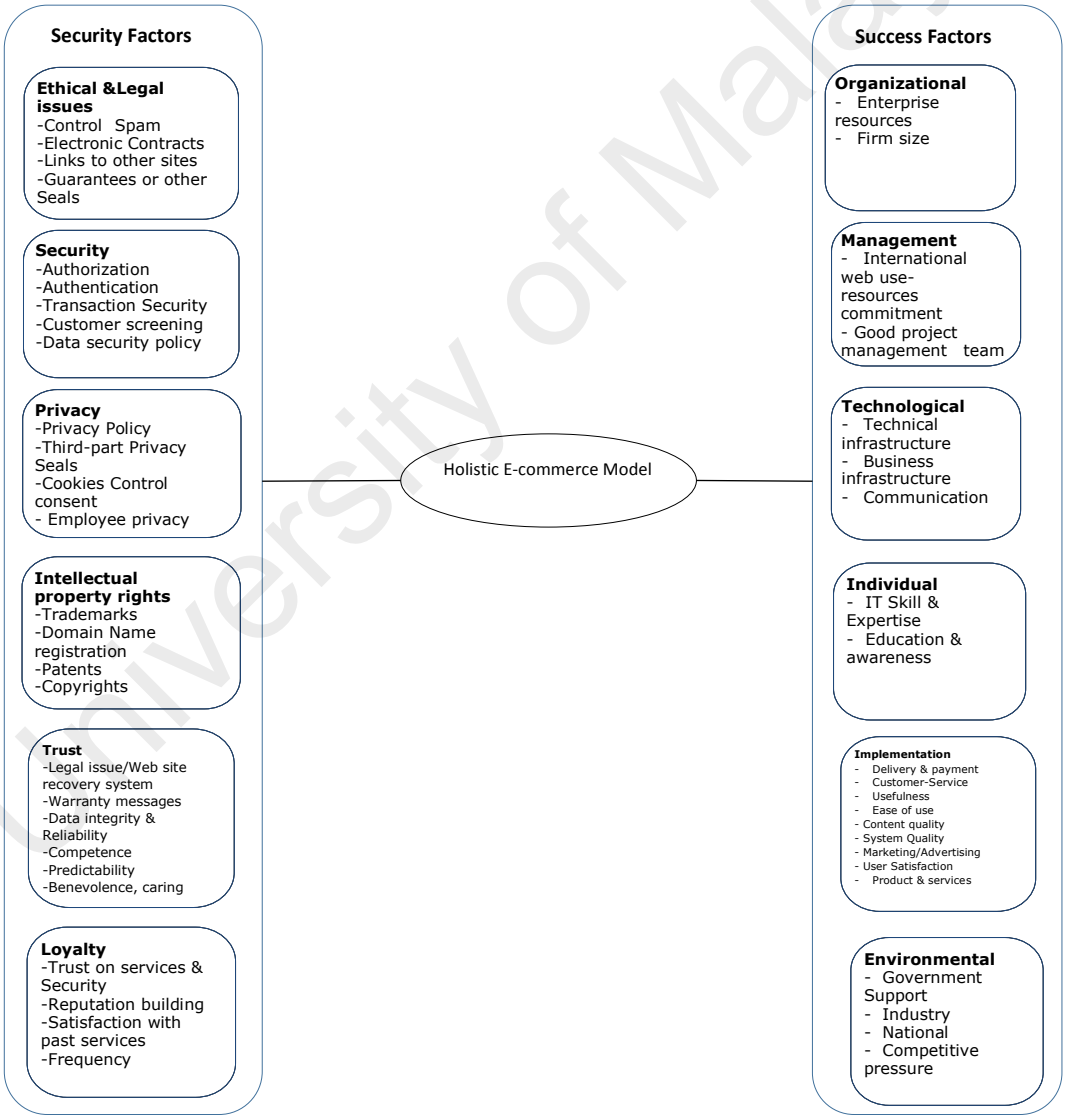

Figure 2.5: Conceptual Model for Integrated E-commerce Factors

The model is shown in Figure 2.5 is not capturing every possible factor in successful and secure e-commerce adoption. It is focussed on capturing the most significant set of success factors and security factors derived from previous research. It then seeks to present these factors as an integrated model that can provide direction for empirical testing. Other variables that may affect the model (e.g. number of employees, SMEs industry) can be controlled in empirical tests.

2.11 Summary

In conclusion, this chapter discusses the background of e-commerce, its evolution throughout the years and its role in developing SMEs. A review of the literature allows for the unveiling of factors (success factors and security factors) influencing e-commerce adoption in SMEs that, in turn, enables the formulation of a conceptual framework. The framework and factors are used to answer the research questions in relation to the objectives identified for this research. The next chapter presents the research design and provides details regarding how data is collected, presented and analysed in this research.

CHAPTER 3: RESEARCH DESIGN

3.1 Introduction

This chapter is divided into parts, part A discusses data collection and part B explains the system development. In the first part of this chapter explains the research design and the research methodology used in this study. The chapter defines the research method, approaches and style that are used to collect primary data and provide a justification of specific choices being used throughout this thesis. The next section, section 3.2, explains the research methodology following which section 3.4 detail the research strategy, and section 3.5 summarises the data collection method. This is followed by section on data analysis before a final presentation of the software used for data analysis. The second part of the chapter is related to the development of the system that discusses the prototyping and requirement for system development.

A) Data collection

3.2 Research Methodology

A mixed research approach is applied with a combination of quantitative and qualitative research methods. Mixed-method is the general term used for when both quantitative and qualitative data collection techniques and analysis procedures are used in a research design. Mixed-method is subdivided into two types. Indeed, this method either uses quantitative and qualitative data collection techniques and analysis procedures simultaneously (in parallel) or one after the other (sequential), but does not combine the two. This means that although mixed method research uses both, quantitative data is analysed quantitatively and qualitative data is analysed qualitatively (Saunders, et al.,

2007). According to Creswell (2005), there are four types of mixed method, as explained below:

i) Triangulation design – Equal priority is given in collecting both quantitative and qualitative data. It analyses both set of data separately before comparing them to assess whether both results support or contradict each other. To simultaneously collect both quantitative and qualitative data, merge the data and use the results to understand a research problem (Hanson, et al., 2005); Creswell, 2005).

ii) Embedded Design - Priority is given to the major form of data collection, whilst others are used as secondary data to argue for or support additional sources of information not provided by a primary method. Data is analysed separately but collected simultaneously.

iii) Explanatory Design – Data is collected sequentially in two phases. Priority is given to quantitative data following which qualitative data is used to refine or verify the results.

iv) Exploratory Design – Data is collected sequentially in two phases. Priority is initially placed on qualitative data to explore a phenomenon followed by quantitative data to explain the relationship found in the qualitative data.

This study employs explanatory design for mixed-method approach. The study is conducted sequentially in two phases. First is the quantitative phase, whereby data is collected using questionnaire to determine the factors influencing e-commerce adoption from different SMEs in Klang Valley, Malaysia. The second phase is qualitative, whereby data is collected using interviews and observation. Interviews and observation are conducted with managers of SMEs in order to verify the validity of data collected during the survey. Figure 3.1 describes the research method used for this study.

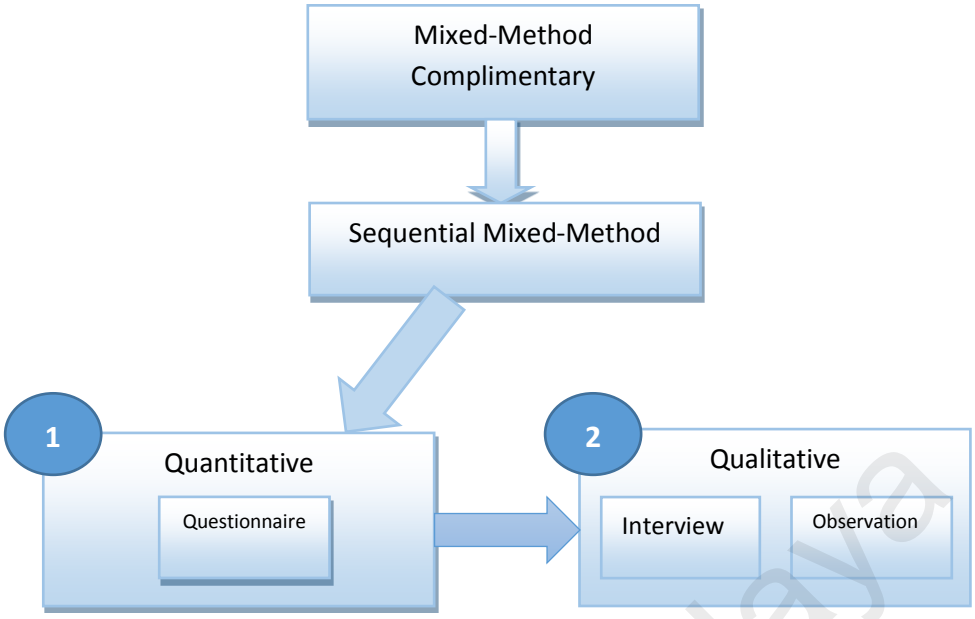

Figure 3.1: Explanatory Design for Research

According to Greene, Caracelli, & Graham (1989), there are five purpose of mixed-method evaluation design which are i) triangulation, ii) complimentary, iii) development, iv) initiation and v) expansion, each of which have different purposes to help researcher in addressing the research questions and objectives. Triangulation seeks convergence, corroboration, correspondence of results from the different methods. Complementary seek elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method. Development approach is conducted to use the results from one method to help develop or inform the other method. Initiation approach is conducted for the discovery of paradox and contradiction, new perspectives of framework, the recasting of questions or results from one method with questions or results from the other method. The expansion approach is used to extend the breadth and range of inquiry by using different methods for different inquiry components (Greene, et al., 1989).

Hence from the discussion of above approaches the researcher has chosen complimentary approach as it is more relevant to this research. In a complementarity mixed-method study, qualitative and quantitative methods are used to measure overlapping but also different facets of phenomenon, yielding an enriched, elaborated understanding of that phenomenon.

Mixed methods research can leverage on the complementary strengths and non-overlapping weakness of qualitative and quantitative methods, and offer greater insights on the phenomenon that each of these methods individually are not able to offer (Johnson & Turner, 2003). For example, interview, observation, a qualitative data collection approach, can provide depth in a research inquiry by allowing researches to gain deep insights from rich narratives, and surveys, a quantitative data collection approach, can bring breadth to study by helping researchers gather data about different aspects of phenomena from many participants. Together, these two data collection approaches can help IS researcher to make better and more accurate inferences – that is, meta-interferences. Meta-inferences represent an integrative mixed method research, and are considered essential components mixed facilitating high quality meta-inferences (Venkatesh, Brown, & Bala, 2013). In this study chosen complimentary approach considered to be as closest research method that can help to answer the research questions and objectives.

3.3 Procedural Issues in the Mixed-Methods Sequential Explanatory Design

In any mixed-methods design, there is a need to deal with issues of priority, implementation, and integration of quantitative and qualitative approaches. This is done to know which approach, quantitative or qualitative (or both), had more emphasis in this study design; establish the sequence of quantitative and qualitative data collection and

analysis; and decided where mixing or integration of the quantitative and qualitative approaches occurred in the study (Ivankova, Creswell, Stick 2006; Creswell & Clark, 2007; Greene et al., 1989).

3.3.1 Priority

Priority refers to which approach, quantitative or qualitative (or both), researcher give more attention or weight throughout the data collection and analysis process of the study (Morgan 1998; Creswell 2003). In this research priority is given to quantitative, the decision is based on the purpose of the study focused primarily on identifying and investigating selected factors (Morgan 1998). The qualitative phase was conducted to explore and interpret the statistical results obtained in the first, quantitative, phase (Yin, 2003).

3.3.2 Implementation

Implementation refers to whether the quantitative and qualitative data collection and analysis come in sequence, one following another more concurrently (Green et al. 1989; Morgan 1998; Creswell et al. 2003). In this study, sequential explanatory design is conducted, the data are collected over the period of time two consecutive phases. First quantitative data is collected and analyse. As a result of quantitative analysis, will able to answer the research questions 1 and 2. Qualitative data is collected in second phase and are related to outcome of first quantitative phase.

3.3.3 Integration

Integration refers to the stage or stages in the research process where the mixing or integration of the quantitative and qualitative methods occurs (Green, Caracelli, and Graham 1989; Tashakkori and Teddlie 1998; Creswell et al. 2003). The integration

happens during the intermediate stage, during data collection process, data interpretation and discussion. Here, the researcher connects two approaches using the participants' selections. The researcher will conduct qualitative follow-up, based on the results gathered after the quantitative phase (Creswell & Clark, 2007). As a result of analysis integration, it helps to achieve the research objective 3 and research question 3 and 4. Therefore it is important to use mix-method as it will help to achieve the research objectives.

3.4 Research Strategy

A research strategy is a plan that clarifies to the reader how one has gone about answering the research questions. Each strategy can be used for exploratory, descriptive and explanatory research (Yin, 2003b; Kumar, 2010). No strategy is inherently inferior or superior to a particular strategy. The choice of the research strategy is guided by a research question and objectives. It is also dependent on the extent of existing knowledge, the amount of time and other resources available as well as philosophical understanding (Saunders, et al.,2007).

According to Creswell (1997), there are five research designs under qualitative research: Case Study, History, Archival Analysis, Survey and Experiment. After examining the purpose of each research design, the researcher finds that a case study methodology is most suitable to proposed research questions of this study. The case study, though dominantly a qualitative study design, is also prevalent in quantitative research. It is useful in case where one desires a holistic understanding of the situation, site group or community, and help in extensively exploring and understanding the focus of the study (Kumar, 2010).

There are different types of cases that must be considered, depending on the research at hand. Yin (2003b) explains two case study strategies based upon two discreet dimensions: single versus multiple cases. The difference between a single case and multiple case is that a single case represents the critical case and allows one to analyse the phenomenon which few have previously considered. In contrast, multiple case focuses on whether a finding from one case occurs in other cases and needs to generalise from these findings (Saunders, et al.,2007). The case study also has considerable ability to generate answers to the questions of 'why?' as well 'what?' and 'how?' as shown in Table 3.1. The case strategy is the most often used in explanatory and exploratory research.

Table 3.1: Research Strategy

Strategy	**Form of research question**	**Requires control of behavioural events**	**Focuses on contemporary events**
Experiment	How/Why?	Yes	Yes
Survey	Who, What, Where, How many, How much	No	Yes
Archival Analysis	How, Why?	No	Yes/ No
History	How, Why?	No	No
Case Study	How, What, Why?	No	Yes

The data in Table 3.1 shows when each research strategy is suitable. Since this research study is focussed on 'What' questions, the case studies and surveys are recommended. Moreover, since control over behaviours is limited and this research focuses on the contemporary events, case study research is chosen.

3.4.1 Case Study Research

Robson (2002) defines the case study as a research strategy which involves an empirical investigation of a particular contemporary phenomenon with its real life context using multiple sources. Yin (2003a) also highlights the importance of context, adding that,

within a case study, the boundaries between the phenomenon being studied and the context within which it is being studied are not clearly evident. This differs from an experimental strategy where research is undertaken in context. Indeed, the ability to explore and understand this context is limited by the number of variables for which data can be collected. A case study is suitable if one wishes to gain a rich understanding of the context of the research and the processes being enacted (Morris & Wood, 1991).

This study makes use of case study method in order to study and analyse different industries in Malaysia, their IT advancement and challenges encountered over the past decade. In this study each SME industry will be treated as a case which is studied intensively through holistic in-depth exploration and explanation of the unveiled aspects.

Reporting of case study as shown in chapter 4 is done using secondary data, secondary data is useful in designing subsequent primary research and, as well, can provide a baseline with which to compare the primary data collection (Novak, 1996). Secondary data sources will include the government document, official statistics, technical reports, scholarly journals, trade journal, review articles, reference books, universities libraries, search engines computerized databases, the world wide web (Shell, 1997).

The case study is presented with the use of text, tables and quotations to provide a comprehensive description of each SMEs industry. The different Malaysian SME's industries are explained, as are their usage of IT and challenges faced by them, with several government agency publications supporting the argument.

3.5 Data Collection Method

In case study research, data collection techniques are likely to be used in combination. They may include interview, observation, documentary analysis and questionnaires (Yin, 2010). Consequently, if a case study strategy is being employed, it is more likely that multiple sources of data will be used (Saunders, et al., 2007). The case study allows for the collection of data from different SME industries in Malaysia.

The case study used in this research uses three main instruments to collect data from SME industries in Malaysia. These include questionnaire, interview and observation, as shown in Figure 3.2. Permission is obtained from each SME involved in this study. Anonymity of the questionnaires, interviews and observations is maintained by excluding respondents' names and their company names. The information about SME industries and type of business is included in this study as it is necessary to answer the research questions.

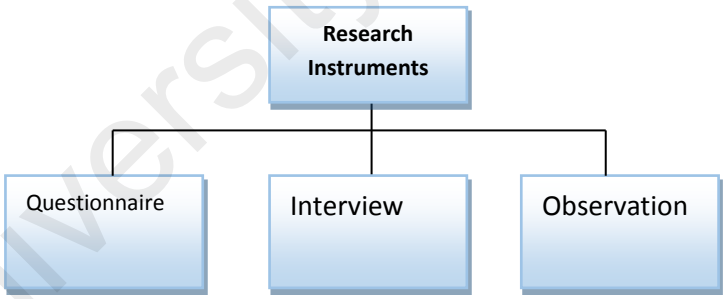

Figure 3.2: Research Instrument for Data Collection

The data for this study is collected during a period spanning 6 to 7 months, starting from January to July 2012. Data is collected from the CEOs, owners or managers of the companies. Questionnaires are first conducted to collect the data relating to the relevant factors. The questionnaire is the primary source of data collection, as it will aid in unveiling the factor for e-commerce success and security. This is followed by interviews and observation to verify the data collected by questionnaire. Interviews and

observations will validate the model using CFA and AMOS, as shown in Section 5.5 in Chapter 5.

3.6 Respondents of this Study

The research embarks on purposive sampling that is non-probability sampling technique. In this type of sampling researcher relies on his/her own judgement when selecting the units e.g. people, cases or organizations that are studied. The sample size studied is quite small, especially when compared to probability sampling techniques (Devers & Frankel, 1999; Polkinghorne, 2005).

The respondents of this study include the management of SMEs located in Klang valley, Malaysia. The SMEs are purposively selected from different industries such as Manufacturing (including. Agro Based), Manufacturing Related Services, Mining and Quarrying, Services, Construction, Primary agriculture, etc. and have 1-250 staff members. The companies selected use the Internet as a sales channel or supportive channel for their brick and mortar business.

The sample includes both private and public SMEs as shown in Figure 3.3. Two organisations are selected for data collection, with one belonging to the government e.g. SME Corporation (SMEcorp) and the other a private organization, WENA (refer to Appendix B for approval letters from respective organizations). Besides this, approximately 1,440 e-mails are sent to various SMEs asking them to participate in the survey as shown in Table 3.2. The e-mails are sent as to ensure all the sectors/industries of SMEs in Klang Valley, Malaysia are covered.

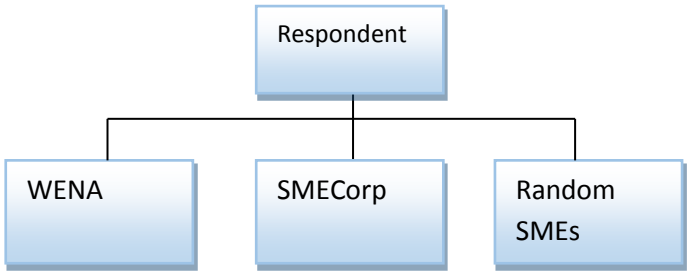

Figure 3.3: Respondent for Research

Table 3.2: Organisations used in this Research

Organisation	**Explanation**
SME Corporation (SMEcorp.)	In 2007, the National SME Development Council (NSDC) decided to appoint a single dedicated agency to formulate overall policies and strategies for SMEs and to coordinate programs across all related Ministries and Agencies. SMIDEC was tasked with assuming the role and the official transformation into Small and Medium Enterprise Corporation Malaysia (SMECorp. Malaysia) commenced on 2 October 2009. SME corp. is a central point of reference for information and advisory services for all SMEs in Malaysia.
Association of Bumiputra Women Entrepreneurial Network Malaysia (WENA)	The association of WENA is a non-profit organisation, established in 2003; its members are comprised of experienced and new women entrepreneurs and professional who have united under the auspicious banner of WENA to create synergy and apply strategies which will facilitate the continued successful development of their business and thus promote a culture of business excellence among women entrepreneurs in Malaysia.
E-mails to SMEs	Approximately 1,440 e-mails are sent to various SMEs around Klang Valley, Malaysia. The e-mail addresses for these SMEs are taken from on-line directories such as SMEcorp. Website, SME directory, SME on-line directory, etc.

The respondents selected for this research are comprised of top management, directors, chief information officers and those who hold strategic positions in their companies. The reason behind the selection criteria is that these people are the ones involved in the strategic decision regarding their companies, and as such it is believed that they are able to provide the detailed information necessary for this study. The interviews with respondent companies are conducted using English, with the duration of interviews not

exceeding one hour. Respondents are encouraged to highlight vital issues that are deemed important for this research.

3.7 Quantitative Research Investigation

Quantitative is used to refer to data collection technique (such as questionnaire) or data analysis procedures (such as graph or statistics) which use or generate numerical data (Saunders, et al., 2007). Quantitative research falls under the category of empirical studies, according to some, or statistical studies, according to others (Newman, 1998).

This research first embarks on quantitative method research investigation. The quantitative research will find the practices of Malaysian SMEs in adopting e-commerce. The quantitative research is also conducted to find factors that influence e-commerce adoption in SMEs. The quantitative research is used to develop the holistic model of e-commerce using CFA that is determine based on conceptual model in chapter 3. The quantitative analysis will address first and second research objectives and answers the first and second research question. Table 3.3 discuss the quantitative research investigation and its purpose.

Table 3.3: Quantitative Research Investigation

Research	**Quantitative Investigation**
Objectives	Research Objectives 1 and 2
Questions	Research Questions 1 and 2
Method	Questionnaires are sent to respective respondents using purposive sampling.
Respondents	CEO, owners and managers of SMEs in Malaysia that are using e-commerce in their business.
Scope	SMEs in Malaysia that are currently doing business on e-commerce system.
Data Access	Two organizations are used: WENA, SME corporation Email sent to SMEs, emails address taken from online directory
Population	Refer to section 3.7.1 shown below.
Sample size	Refer to section 3.7.1 shown below.
Analysis	Cronbach Alpha, Descriptive Analysis and Confirmatory Factor Analysis (CFA)
Data Analysis Software	SPSS and AMOS

3.7.1 Quantitative Research Population and Sampling

Based on the Malaysian Bureau of statistics (2012), 645,136 SMEs are active in three main economic sectors, namely services, agriculture, and manufacturing, which are mostly distributed across Klang Valley (Selangor and Federal Territory: 35.7% share of all SMEs) and followed by Johor (10.3%) and Perak (8%). Therefore the SMEs were purposively selected from industrial and commercial areas in the Klang Valley, Malaysia from all sectors/industry. The SMEs contact information is taken from SMEcorp., (SME corporation Malaysia) website. The companies selected use the internet as a sales channel or supportive channel for their brick and mortar business. The sample consisted of both private and public SMEs.

As describe above 35.7% share of all SMEs, that are 230,000 SMEs in Klang Valley, Krejcie & Morgan (1970) recommended that the sample size for this study 384. The respondents selected for this research comprised of top management, directors, chief information officers and those who were holding strategic positions in their companies, which resulted in total sample size of 1,449 respondents, where questionnaire were sent to them via emails. Out of 1,449 respondents 184 SMEs had responded to questionnaire. In current research 108 questionnaires are used, and others were excluded because of incomplete answers. The response rate is considered to be satisfactory since assessing managers is usually difficult due to lack of their availability and accessibility (Ale Ebrahim, Ahmed, & Taha, 2010).

3.7.2 Questionnaire

The online questionnaire method is considered to be the most efficient technique for the present study. It allows for the collection of data from the different SMEs in Malaysia without any distance, and time constraints. The Google survey is used for its ease,

popularity, and user friendly layout. The focus is placed on companies that have actual e-commerce presence and are connected to their customer and supplier over the site. The e-mails are intended for managers/CEOs of SMEs in order to elicit their responses regarding successful and secure e-commerce adoption.

The actual sampling process is conducted by means of an online form, although the paper copies are also used. The e-mails are sent to potential participants with necessary ethically responsible instructions; these instructions assure employees regarding their anonymity and ask for their assistance. If the participants agree, they click on the link and are directed to the survey site. A total of 3 to 4 months is given during which participants should complete the entire questionnaire process, including delivery and collection.

3.7.3 Designing Questionnaire

a) Research Instrument Development

A questionnaire was used in quantitative research instrument (refer to questionnaire in Appendix D). The questionnaire was construct based on literature analysis in chapter 2 and the designing of questionnaire was based the conceptual model from Section 2.10, Chapter 2 that discuss the factors influencing e-commerce adoption in SMEs. A sample of variables used in questionnaire under each factor is shown in Appendix C. The questionnaire is pre-tested by experts and pilot study is conducted shown in section 3.7.4.

The first part of the questionnaire (Question 1, 2, 3 and 4) consists of the demographic information of respondents. The respondents are asked to respond to the questions such as which SME industry they belong to; how many employees are in their companies; for how many years have they been using e-commerce and

how did they conduct business prior to this. These four questions are used to answer the first research question (Section 1.4 Chapter 1). The second part of the questionnaire consists of factors that influence e-commerce adoption in SMEs. Section two of questionnaire consists of twelve questions: Technological, Individual, Implementation, Organisational, Management, Environmental, Trust, Security, Privacy, Ethical and legal, Intellectual property rights, and Loyalty. The two sections are designed to encompass relevant indicators discussing each topic mention.

b) Measure of Elements

In order to measure the factors influencing e-commerce adoption, the Likert scale is used, with each factor measured on a scale of 1 to 5. Respondents are asked to rate the perception of importance for each factor identified through the literature. The questions require respondents to choose their responses from the provided options: very important, important, neutral, unimportant and very unimportant. An example of the questionnaire is provided below. They are given an option to identify the factors that they feel are important for e-commerce success and security besides those already stated. A sample of the questionnaire sent to the managers is shown in Appendix D. An example of the question is provided in the following section:

Rate the following Technological factors needed by an organisation when adopting e-commerce.

Technological Factors

We have good technological infrastructure to support the e-commerce process.

Very Important		Important		Neutral		Unimportant		Very Unimportant
1		2		3		4		5

3.7.4 Quantitative Pre-Test

There are two type of pre-test conducted in questionnaire: Expert-based pre-tests (Validation from Experts) and Respondent based pre-tests (Pilot Study).

a) Expert-Based Pre-Tests

Researchers sometimes call upon experts in a given field to identify problems with questions or response options in survey (Presser & Blair, 1994). Experts are important for cross checking the substantive aspects of the survey and to improve overall style of the survey. Experts can look at relevance, length (too long or short), flow of the questions and layout of the questionnaire (Olson, 2010). All experts are chosen from the field of e-commerce as they understand the issues related to it. There are two e-commerce practical experts, one academician and one reviewer are involve in experts pre-tests. List of experts and reviewer is given in Table 3.4.

Table 3.4: List of Experts and Reviewers

No.	Expert/Reviewer	Profession	Background
1	Expert	Professional Practitioner	A graduate and owner of small business. Currently using e-commerce site for his business.
2	Expert	Professional Practitioner	An owner of online retail shop with many years of experience in running business.
3	Expert	Academician	A senior lecturer that specializes in e-commerce.
4	Reviewer	Professional Reviewer	A professional reviewer who specializes in reviewing PhD work.

The test of questionnaire was conducted with experts using both face-to-face and via emails. However with reviewer only emails are used to interact. The first meeting with experts was conducted face-to-face where objectives of research

and expected outcome are explained. The reviewer then evaluated the questionnaire and provides their feedback. The questionnaire was then corrected and emailed back to experts with review script to be reviewed and provide their comments. The idea is not collect the experts' opinion and beliefs but to get their judgement of how well each questionnaire item truly reflects the construct the research attend it to measure (Jansen & Hak, 2005). The whole process of expert evaluation took two months. The revised copy based on expert's revision is made available to all experts' one week before pilot study is conducted.

b) Respondent Based Pre-tests (Pilot Study)

The pilot test for this study is conducted using SMEcorp database provided on their website (www.smecorp.com). The test is conducted using twelve CEO, management of SMEs that are selected from SMEcorp online database. This test is conducted to identify issues and problem related to instrument design. The objectives of pilot test were to select the appropriateness of questionnaire instrument within its context. Total of six questionnaires were received back from twelve selected SMEs. No issues or problems are identified with the instrumental structure and design, only major problem is related to willingness of participant to reply. The reminder e-mails are send, first with the distance of one week and then after two week. Analysis was strictly based on the content of the questions, style and level of question apprehension. There were no statistical analyses that can be conducted as response rate is low.

3.7.5 Questionnaire Response Analysis

The time-line for this study spans from January to April 2012. The analyses of data are completed in June 2012. Approximately 1,449, emails are sent to different SMEs in Malaysia. The SMEs contact information is taken from SMEcorp., (SME corporation

Malaysia) website. In addition to this, two SME organisations are contacted in order to help facilitate this survey. The first organisation is from a government sector named 'SME Corporation' (SMEcorp), whilst another is a private organisation, 'Women Entrepreneur Network of Malaysia' (WENA) (refer to Appendix B for approval letters from respective organizations). The link for the online questionnaire is sent to these organisations before being further distributed among their members. The reminder e-mail is sent after one month and later every two weeks to respondents, so as to remind them in case they have not filled in the survey. One hundred and eight combined responses are received from the total e-mails sent to the SMEs. The response rate is considered to be satisfactory since assessing managers is usually difficult (Ale Ebrahim, et al., 2010)

3.7.6 Quantitative Data Presentation and Analysis

Once data is collected from questionnaire it is transferred to a Microsoft Excel file. The excel file is then transferred to SPSS to perform statistical operations. Observation is used to confirm that all questions have been answered and to assess whether or not there are any entries missing from the questionnaire. There is also a classification check on the data to ensure that it has been filled in by a suitable/valid person else it must be discarded. The data is analysed using SPSS to answer the research questions. The knowledge derived from a literature review, helps to examine the data carefully.

a) Descriptive Statistics

Descriptive statistics are used to present a quantitative description in a manageable form. Descriptive studies may measure a large number of people on any measure or can make it possible to present a large amount of data in a sensible and presentable form so that readers can understand and analyse it. Descriptive statistics are useful for understanding the demographics of the

population, with frequencies and percentages typically seen as the most useful measures along with standard measures of central tendency (mean, median, mode and distribution) (Hill 2008). In this study we explained data in form of Mean and Standard deviation.

Mean: This is the arithmetic mean across the observation. It is the most widely used measure of central tendency. It is commonly called the average (IDRE, 2015).

Standard deviation: Standard deviation or StDev is the square root of the variance. It measures the spread of a set of observations. The larger the standard deviation is, the more spread out the observation are (IDRE, 2015).

b) Confirmatory Factor Analysis

There are two main types of analyses based on the common factor model: Exploratory Factor Analysis and Confirmatory Factor Analysis (Jöreskog, 1969, 1971). EFA and CFA both aim to reproduce the observed relationship among a group of indicators with smaller set of latent variables. However, EFA and CFA differ fundamentally by the number and nature of a prior specifications and restrictions made on the latent variable measurement model.

In CFA, the specification of correlated errors may be justifies on the basis of method effects that reflect additional indicators covariation that resulted from common assessment methods (e.g. observer ratings, questionnaires), reserved or similarly worded test item, or differential susceptibility to other influences such as response set, demand characteristics, acquiescence, reading difficulty, or social desirability. The inability to specify correlated error is a significant limitation of EFA because the source of covariance among indicators that is not due to the substantive latent variables may be manifested in the EFA solutions as

additional factors (Hoyle, 2000; Byrd & Brown, 2003). In addition, CFA offer a very strong analytic framework for evaluating the equivalence of measurement models across distinct groups (e.g., demographic group such as genders, races, or cultures) (Hoyle, 1995).

CFA is chosen for this study as will be developing and verifying the holistic model for e-commerce. Confirmatory factors analysis (CFA) is to test whether the data fit a hypothesised measurement model. The hypothesized model is based on theory and/or previous research (Preedy & Watson, 2010). CFA is s statistical technique used to verify the factor structure of a set of observed variable and their underlying latent constructs exists. The researcher's uses knowledge of the theory, empirical research, or both, postulates the relationship pattern a priori and then tests the hypotheses statistically (Barbara, 2001; Suhr, 2006). The hypothesised model can then be statistically tested in simultaneous analyses of the entire system of variables to determine the extent to which it is consistent with the data. If goodness of fit is adequate, the model argues for the plausibility of a postulated relation among variables; if it is adequate, the tenability of such a relation is rejected (Barbara, 2001) (Refer to Section 5.4.1 Chapter 5).

3.7.7 Software used for Quantitative Data Analysis

There are two types of software that are used by the researcher to analyse quantitative data for this study, namely SPSS and AMOS as discussed thoroughly in following section.

a) SPSS

SPSS is statistical package software that is used for data management and analysis; it provides a wide range of statistical analysis tools in order to obtain the most accurate response from different types of data (Nie, Bent, & Hull, 1975; Norušis & Inc, 1994; Hinton, McMurray, & Brownlow, 2014). This study makes use of SPSS version 20.0, which is the latest version of the statistical package on the market. The SPSS is used to analyse the data by making use of cronbach alpha and descriptive analysis to find an answer to the research question.

b) AMOS

This study uses the SEM technique to analyse its data. The AMOS-LISREL model were adopted because of PLS and regression were consistently less accurate than AMOS-LISREL (Goodhue, Lewis, & Thompson, 2012). The AMOS-LISREL estimation requires a set of assumption to be fulfilled, including multivariate normality of data, minimum sample size, and so forth (Hair, Ringle, & Sarstedt, 2011; Diamantopoulos & Siguaw, 2013). In comparison to AMOS, PLS like regression analysis apparently does not compensate for measurement error. PLS-PA require substantially larger sample size, there is a need of even a larger sample size in hypothesis test for system of regression approaches (Westland, 2014). This is a reason AMOS software is used in this study.

AMOS is short for **A**nalysis of **Mo**ment **S**tructures. Its implements the general approach to data analysis known as Structural Equation Modelling (SEM), but also known as analysis of covariance structures or casual modelling. This approach includes, as special cases, many well-known conventional techniques, including a general linear model and common factor analysis (Arbuckle, 2009).

> Thirty years ago, LISREL was the only program available for SEM. Now there are many other choices, for example, AMOS, CALIS, EQS, Mplus, Mx Gaph, RAMONA and SEPATH. AMOS was originally designed as a tool for teaching SEM, which is a powerful and fundamentally simple method. For this reason, every effort was made to ensure that it is easy to use. AMOS integrates an easy to use graphical interface with an advanced computing engine for SEM. The publication quality path diagrams of AMOS provide a clear representation of models, whilst the numeric methods implemented in AMOS are among the most effective and reliable available (Arbuckle, 1995).

3.8 Qualitative Research Investigation

Qualitative data permit an evaluator to study selected issues, cases or events in depth and in detail; the fact that data collection is not constrained by predetermined categories of analysis contributes to the depth and detail of qualitative data (Patton, 1987; Packer, 2011). This is done when there is a need for depth and detail through direct quotation and careful description of program situation, events, people, interaction and observed behaviour (Patton, 1987; Merriam, 2009a). In this second investigation, the researcher investigated the opinion and beliefs of e-commerce factors of SMEs owners who have implemented the successful e-commerce system in their business using standardised open-ended questions and observation.

The interviews are conducted with ten SMEs owner/CEO or management that previously participated in questionnaire to further understand the factors influencing e-commerce adoption in their respective SMEs. In the second phase of investigation, the observation is conducted in SMEs using e-commerce as a way of conducting the business. The observation is conducted to get deeper understanding of what factors are SMEs using that making their business successful. The qualitative analysis will address

third research objectives and answer the third research question. Table 3.5 discuss the qualitative research investigation and its purpose.

Table 3.5: Qualitative Research Investigation

Research	**Qualitative Investigation**
Objectives	Research Objectives 3
Questions	Research Questions 3
Method	Non-standardised Interview Participant Observation
Respondents	CEO, owners and managers od SMEs in Malaysia that are using e-commerce in their business.
Scope	SMEs in Malaysia that are currently doing business on e-commerce system.
Data Access	Interviews: Two organization is used: WENA, SME corporation Observation: One company using e-commerce site for selling cars.
Population	Based on quantitative input
Sample size	Interview: Ten companies Observation: One company
Analysis	Each interview is treated as a case and themes are identified from each case

Small participant research is the expected norm in qualitative research. Such small studies enable the researcher to gain a deeper understanding of participant experience and to develop a thick, rich description of the experience (Creswell, 2009; Merriam, 2009b). In this study interviews and observations conducted with individuals that are holder of knowledge in discipline of e-commerce for SMEs. The observation and interviews are conducted from SMEs managers, CEO until the researcher was confidents that no more additional data can be found and researcher seem to see in their data similar instances over and over again and that make that it empirically confident that data is saturated (Fusch & Ness, 2015). Once the data is saturated the researcher is allowed to stop sampling and to round off their analysis (Bowen, 2005; Baker, Edwards, & Doidge, 2012)

3.8.1 Interview

According to Yin (1994), interviews are considered to be the most important source of information. In this study non-standardised interviews are conducted via telephone.

Phone interviews may offer potential advantages associated with access, speed and lower cost (Saunders, et al., 2007), and are ideal for this study as SMEs used for interview are located in different cities of Klang valley. Face to face interviews are impartial because of the distance, prohibitive cost, and the time involved. The interviews are structured and are conducted across a time-span of 30-60 minutes. A total of ten interviews are conducted with different SME owners, CEOs or management. The interview questions are provided in Appendix E.

Selected CEOs for interviews represented different type of business from various industries of SMEs. Most CEOs agree to participate in the interview as their business has high involvement in e-commerce activities. The researcher was able to get permission from CEO through phone conversation, during the phone conversation the CEO also explained the scope of the current research and issues that will be discussed during the interview. Once CEOs was able to provide their confirmation, the email was sent to confirm the time and date suitable for interviewee. One day prior to interviews, reminder email was sent to interviewee. Through this exercise, one-to-one phone interviews were initiated.

3.8.1.1 Designing Interview Questions

In investigating the secure adoption of e-commerce in SMEs, we make use of the non-standardised open-ended questions that provide respondents with the freedom to express their opinion. The interviews are conducted to verify the facts collected by questionnaire. The respondents are the SMEs that have previously taken part in the questionnaire. The interview questions are divided into four main parts/themes such as General, Success factors, Security factors, Holistic Model as shown in Figure 3.4. Refer to Appendix I for interview theme. These themes are derived from literature review and the conceptual model based e-commerce adoption. In first part, that is General, the

respondents are asked about their companies, e-commerce usage and history, reason of e-commerce adoption and benefits they get from e-commerce. In second and third part of the interview, seeks to verify the data collected from questionnaire by trying to understand factors influencing e-commerce adoption in SMEs and beside that respondents are asked what factors they feel are necessary for e-commerce. In fourth part, respondents are asked about the security model they have used to develop their e-commerce system and what further enhancements they desire for that model.

The objective of these five key areas is to identify any possible and additional factors which could possibly lead to additional factors for e-commerce success and security.

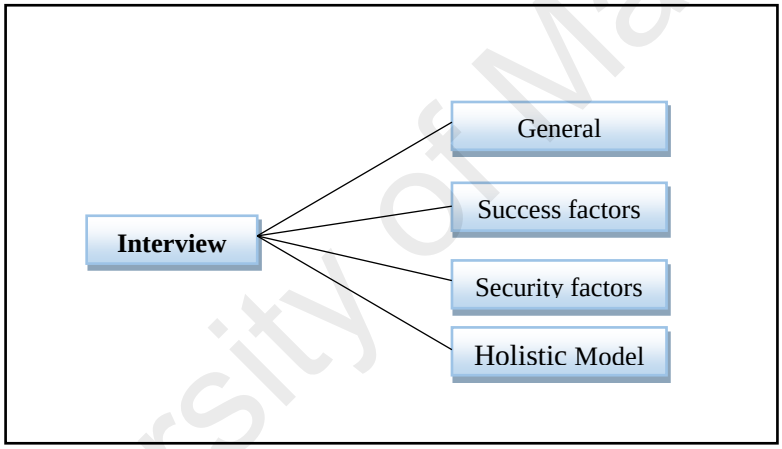

Figure 3.4: Interview Questions Structure

3.8.1.2 Pilot Study

The pilot study was carried out with three CEO's, using the interview protocol. The purpose of pilot test is to make sure that everyone in the sample can understand the questions and understand them in the same way that they were intended. The pilot study will also make sure that of there are any questions that make respondents fee uncomfortable and finally time period will respondents take to complete each interview. The pilot test objective is also to ensure that the intended data is indeed reflected by the data collected through the pilot test. By conducting pre-test, researcher will revise the interview protocol accordingly before final study conducted. There were no major

comments given by CEO/owners of SMEs but rather CEO were hesitant in giving few answer that because of their own business policies and procedures therefore variety of answers collected. Few respondents commented on the clarity of questions so questions were further simplified for better understanding. Timing of interview were kept around one hour however extra half an hour is given to interviewees who will want to share more insights for their questions.

3.8.2 Observation

The participant observation method is used in this research. With this type of method, a researcher reveals his/her identity as the researcher. Both researcher and participant are aware that it is a fieldwork relationship (Ackroyd & Hughes, 1981). The researcher is interested in winning over the attention of the group, and with his/her identity revealed questions can be asked of the subjects in order to enhance the understanding (Saunders, et al., 2007). The researcher is able to informally observe how business is actually conducted using an e-commerce site because she had access to company name Prestige Autos Export Pte. Ltd. Prestige Autos (Refer to Appendix B for approval letter) is an auto dealership company concerning with selling and purchasing of second hand vehicles using their e-commerce site. The Prestige Autos offices are located in Malaysia and Singapore with serving their clients all over the globe. Essentially, the act of studying human subjects has a number of effects on their behaviour irrespective of study (Kazdin & Weisz, 1998), these effects is generally refer to as Hawthrone type effects (Falk & Heckman, 2009). A Hawthrone effect is people changing their behaviour because they know that are being watched as part of a study (Franke & Kaul, 1978).

In observational studies this can be achieved by research/participant interaction, by through reduced contact and acclimatisation (Podsakoff, et al., 2003). Therefore researcher for this research limits her questions until the end of each observation session and also did not used any visible recording device that make them feel they are recorded and observed. The researcher also did not start taking field notes until she know that employee are comfortable with her presence and it's not effecting their daily work process. The date and time chosen for the observation sessions, were a busy time for business. Therefore, employees were mostly busy with their work and took less notice of researcher.

The company used in the observation is located in Klang Valley, Malaysia. The SMEs is chosen due to the ease with which its office can be accessed by the researcher; in addition, the company and its employees are ready to participate and help the researcher during the observation. The researcher makes several visits to the company within the month of April 2012; data is collected using random observations of how they conduct their business with through the e-commerce site, their interaction with clients, order processing and payment making, etc., all of which are recorded in field notes.

Recording the observation: Three main medium were used in recording the activities and conversation of the whole process: data logged in the researcher own field notes (observational notes), voice recording was done and apart were that direct question were asked to clarify observation. Beside that several question were asked to managing director to clarify and share few of aspects of business.

For collecting data three columns are developed, first column related to activity that take place within the observation (Refer to Appendix H). This is a very descriptive and factual account of what is taking place and is not used for interpreting what is going on.

Column two is where the researcher is allowed to add personal interpretation to the actions being observed and describe on column one. Finally the third column allows the researcher to draw conclusion about the action and interpretation based on her understanding and question asked during the observation (Patton, 1990).

3.8.3 Qualitative Analysis Strategy

In qualitative analysis strategy, for this research the thematic coding and pattern matching is done. As mentioned by Miles & Huberman (1994), qualitative analysis employs three important processes:

a) Data Reduction: data were selected, simplified and transformed into understandable information shown Table 3.6.
b) Data Display: summaries, table and diagrams are used to seek meaning of the data analysed.
c) Conclusion: compare and contrast data between each participant where patterns were identified to address research questions of the research.

These three processes of qualitative analysis help the researcher to categorize the data better and logically. In this research, the interview questions are arranged in tabulated form for easy understanding and review. Kumar & Feldman (2011) define content analysis as a means of analysing the interview content or observation fields notes in order to identify the main themes emerging from responses provided by respondents or observation notes made by the author.

Table 3.6: Data Reduction Process

Steps	Interview Code	Description
1.	Interview Record Example	There are many things to consider when having a website, if the website is good where customer can buy. It should have many things, for example people should know the features of the website. There should be a help menu to help your customers because sometimes customers are interested in company products but don't know how to use the website.
2.	Reduction from Original Interview	People should know the features of the website. There should be a help menu to help your customer because sometimes customers are interested in company products but do not know how to use the website.
3.	Issues	Sometimes customers are very interested in company products but unaware of how to use the company website to buy products.

After the gathering the data from interviews and observations, researcher then tries to find patterns in the issues gathered. Once the pattern was detected, the items are group together to become theme. There are total of five main theme are identified and data gathered from interviews and observations grouped under each theme (Refer to Appendix I). The full interview transcripts can be found in Appendix E. Each theme includes the quotes from the interviews, reference of interviewees and notes taken down during the observation in SMEs. Before data is quoted under the themes, a data cleaning is conducted to check on spelling and other associated errors. For the purpose of qualitative data analysis discussion, quotes which are used to address discussion in Chapter 5, section 5.5.

The real identity of respondents is not exposed rather than identification and numbers are developed and used for analysis purposes. Respondents were given title as 'Respondents 1', based on order interview have been conducted. Observation is mentioned as observation in analysis. Participating respondents and companies for interviews remain anonymous.

3.9 Validation and Reliability

To ensure the validity of the data, triangulation is used, meaning that multiple research methods are employed instead of relying on only one data collection method. Triangulation is a powerful way in which to demonstrate concurrent validity (Campbell & Fiske, 1959; Cohen, 2000; Yin, 2003a; Jupp & Sapsford, 2006). For example, data is collected from questionnaires, interviews and observations, thus allowing for the triangulation of findings, which also makes it possible to identify any results that may be 'off' in comparison to other findings. The data collected from the questionnaire is validated when the interview is conducted, which is further verified when observations are conducted. It is also important to address the specific reliability and validity concern with measurements. The conceptual model that is developed is based on factors, which are collected from previous studies conducted in this field.

A popular method for measuring the internal consistency reliability of a group of items is the Cronbach's alpha coefficient, often simply referred to as Cronbach's alpha or Cronbach's (Andrew, Pedersen, & McEvoy, 2010; Vinzi, Chin, Henseler, & Wang, 2010). In order to test the reliability and internal consistency of the questionnaire, Cronbach's alpha coefficient is used to evaluate the reliability of the scale for the statements, thus yielding the results (Refer to Section 5.2.3 Chapter 5).

B) System Development

Once the data analysis completed, the system is developed based on the holistic model that has been verified using CFA.

3.10 Prototyping Tools

There are several prototyping tools have been used in development of the system as shown in following section.

3.10.1 X-cart

X-cart is a PHP/MySQL based secure shopping cart software that uses a smart template engine for easy and unlimited design creation. X-cart is the only PCI SCC compliant software that can run on any server for the best and secure e-commerce websites. The x-cart provide business with the ease of design or change business logic of the store, simple PHP code and QYSIWYG user interface make x-cart a snap to customize. To develop the e-commerce system 2 X-cart software that provides best and secure e-commerce system (Refer to Section 6.2.1 Chapter 6 for more detail).

3.10.2 Shop Factory

Shop factory is shopping cart software, website builder and store manager. Shop factory provides complete solution to website development that includes securely accept payments and mange products, orders and customers. Shop factory is desktop software. It runs on computer that makes working fast even when the Internet slows down. To develop the e-commerce system 1 Shop factory 7.0 is used to enhance e-commerce experience for customer (Refer to Section 6.2.1 Chapter 6 for more detail).

3.10.3 Adobe Photoshop CS

The software is used to alter and draw photos to enhance the websites. For system development adobe Photoshop CS6 a newer version has been used.

3.10.4 Windows

An operating system is the main collection of programs that mange a computer system's operations. The primary function of an operating system is the management and control of CBIS resources. This involves the allocation of hardware, programs and data resources to CBIS users in the wisest manner possible. Windows 10, 8, 7, vista, XP, 2002 or NT 4.0 SP5 Workstation is highly recommended, due to ease of use and support.

3.11 Requirements

There are several functional, non-functional and usability requirements need to consider during development of system as shown in following section.

3.11.1 Functional Requirements

1. Customer is able to search, browse product catalogue in easy to use website.
2. Customers are able to securely enter payment details and conduct transaction over the website and should have multiple payment and delivery choices.
3. System able to store order, customer, payment and delivery details.
4. Secure access to records to be available to employee and customers through a portal
5. Allow for the entry, updating and deletion of any or all records from employees side based on proper authorization and authentication.
6. System able to keep customer update about their payment and delivery status

3.11.2 Non-Functional and Performance Requirements

1. Can able to support multiple users at a time.
2. Store records least from six to seven years.
3. System must be capable of processing all the data and providing the reports.
4. Proper security and privacy for is a key since performing transaction and dealing with confidential data

3.11.3 Usability

1. Be developed using normal windows formats and standard colours.
2. Fonts use in screen to be no smaller than 9 point and standardized at Ariel Narrow.
3. Assumed screen size to be 19".
4. Report to be printed as appropriate, but with fonts never less than 10 points.

5. Data entry load per screen to be as recommended in DEF 981.90.

3.12 Summary

The research focuses on both secondary and primary data. For the secondary data a thorough review is conducted whilst the primary data is collected by making use of surveys from SMEs. The survey is conducted in order to gauge which factors are deemed most important by SME management when it comes to their e-commerce, as well as their opinions on these factors. The interview and observation are then conducted to verify the findings from the survey and to elicit respondents' thoughts on the good e-commerce model. In second part of the chapter prototyping tools and requirement for system development, based on a holistic model is discussed.

The next chapter, Chapter 4, provides the case study on different Malaysian SME industries. The case study provides a detailed description of these Malaysian SME industries, their history, as well as current and past usage of information systems and e-commerce. Later, Chapter 5 deals with the analysis of data based on the SMEs and their industries.

CHAPTER 4: DESCRIPTION OF CASE STUDY

4.1 Introduction

The previous chapter has examined the research method, as well as data collection techniques and how the data is organised and reported. In this study each SMEs industry will considered to be case to study and explored. In Malaysia, SMEs are divided into five different industries which are explained throughout this chapter, e.g. Manufacturing (including agricultural based), Manufacturing-related Services, Mining and Quarrying, Services (including ICT), Construction and Primary Agriculture. Each case study looks into industry background on how they conduct their business in Malaysia, existing challenges and e-commerce implementation.

4.2 SMEs in Malaysia

SMEs have long been considered to represent the backbone of any economy by providing most of the employment and growth. Similarly, according to the SMEcorp website, in Malaysia SMEs account for 99% of total business establishments and contribute 31% of the nation's Gross Domestic Product (GDP) (Malaysia2015; Chee, Suhaimi, & Quan, 2016). SMEs in Malaysia share total employment of and exports of the country are 56% and 19% respectively. SMEs are expected to be a major driver in terms of the nation going forward to achieve their status of a developed nation and high-income country. According to Malaysian Tenth Economic Plan, bring emphasis on to unleash the untapped potential of SMEs and to transform these entities to be more competitive and resilient in the changing business environment.

According to statistics shown by Nielsen & Paypal Analysis (2011), there is a estimated of $5.76 billion online market size in Malaysia, looking at the increase of 82.1% from

previous year. It has been forecasted by ACCCIM (2012) SMEs Survey, that there is approximately 72% growth potential of SME to be involved in e-commerce. Approximately 28% out of one million SMEs in Malaysia has benefited from e-commerce (ECommerce Milo, 2014; Sin et al., 2016). Many advantages were leveraged by these e-commerce participants including global business connection and presence, plus free marketing medium to promote business (Brooks, 2014; White, Afolayan, & Plant, 2014).

The definition and type of SMEs are taken from the website of 'SMEinfo business directory'. The site divides Malaysian SME companies into six main sectors/industries and lists companies within each industry, namely manufacturing (including agricultural based), Manufacturing-related Services, Mining and Quarrying, Services (including ICT), Construction and Primary Agriculture. Table 4.1 shows the general definition of SME in the Malaysian and European Commission. Table 4.2 provides the definition of SME based on the industry/sector in which SMEs are generally distributed in this chapter. Table 4.3 have shown number of SMEs establishment per sector/industry. Table 4.4 shows the profile of an SME, as well as distribution by state and region in order to better understand SMEs in Malaysia. Table 4.5 shows SMEs' contribution to the nation's GDP, from 1991 to 2020.

Table 4.1: Distribution of SMEs Based on Regions (SMEcorp, 2013)

Country	Category of enterprises	Employee numbers	Turnover	Other measures
European commission	Small	10-50 employees	Less than euro 10 (13.5 USD) million turnover	Balance sheet total: less than euro 10 million balance sheet total
	Medium		Less than euro 50 (67.6 USD) million turnover	Balance sheet total: less than euro 43 million balance sheet total
Malaysia	Small	Between 5 -50 employees	Between RM 250,000 (750,000 USD) and less than RM 10 (3 USD) million and RM 25 (7.5 USD) million	
	Medium	Between 50 -150 employees or > 250		

Table 4.2: Summary of SMEs' Definition (Ndubisi, 2008)

Sector size	Primary Agriculture	Manufacturing (including agro based) & MRS	Services Sector (including ICT)
Micro	1. Less than 5 employees OR 2. Less than RM200,000 of annual sales turnover	Less than 5 employees OR Less than RM 250,000 of annual sales turnover	Less than 5 employees OR Less than RM200,000 of annual sales turnover
Small	1. Between 5 & 19 employees OR 2. Between RM200,000 & less than RM1 million of annual sales turnover	Between 5 & 50 employees OR Between RM250,000 & less than RM10 million of annual sales turnover	Between 5 & 19 employees OR Between RM200,00 & less than RM1 million of annual sales turnover
Medium	1. Between 20 & 50 employees OR 2. Between RM1 million & RM5 million of annual sales turnover	Between 51 & 150 employees OR Between RM 0 million & RM25 million of annual sales turnover	Between 20 & 50 employees OR Between RM1 million & RM5 million of annual sales turnover

Table 4.3: Number of Establishments by Sector (Economic/SMEs Census 2011 by Department of Statistic, 2011)

Sector	**Micro**	**Small**	**Medium**	**Total SMEs**	**Total SMEs**	**Large Firms**	**Total Establishments**
	Number of Establishments				**% Share**	**Number**	**Number**
Manufacturing	21,619	13,934	2,308	37,861	5.9	1,808	39,699
Services	462,420	106,061	12,504	580,985	90.1	10,898	591,883
Agriculture	3,775	1,941	992	6,708	1.0	2,121	8,829
Construction	8,587	6,725	3,971	17,,283	3.0	2,857	22,140
Mining and Quarrying	57	126	116	299	0.05	119	418
Total SMEs	496,458	128,787	19,891	645,136	100.0	17.803	662,939

Table 4.4: Profile of SME: Distribution by State and Region (Ndubisi, 2008)

Northern Region	Perlis 1%	Kedah 3%	Penang 11%	Perak 13%	Total 28%
Central Region	Kuala Lumpur 10%	Selengor 18%	N/Sembilan 18%	-	30%
Southern Region	Melaka 2%	Johor 18%	-	-	20%
Eastern Region	Pahang 3%	Kelantan 8%	Terengganu 6%	-	17%
East Malaysia	Sabah 3%	Sarawak 3%	Labuan Less than 5%	-	6%

In order to determine the relative importance of SMEs, it is essential to measure the economic output and services (GDP) of SMEs. Table 4.4 shows SMEs' contribution in 1991 and their expected contribution in the years spanning 2000 to 2020, as provided by the Ministry of International Trade and Industry (MITI) (Ismail & King, 2007). Despite a now more challenging external environment, the Malaysian economy continues to expand. The real Gross Domestic Product (GDP) records growth of 5.1% in 2011 (MIDA, 2012).

Table 4.5: SMEs' Contribution to GDP (Hashim, 2000)

Year	Percentage of Contribution to GDP
1991	20 (RM 4.3 billion)
2000	40
2020	50

Tables 4.6 & 4.7 show e-commerce usage by Malaysian SMEs based on year. As can be seen from Table 4.6, B2C e-commerce total spending among Malaysians is less compared to B2B e-commerce.

Table 4.6: Malaysian E-commerce Spending (Hashim, 2000)

Year	2004	2005 (est.)	2004-2005
Internet users	11.6	14.0	20.7%
Malaysian Population	25.50	26.0	2.0%
% of Internet Users/Total Population in Malaysia	45.5%	53.9%	

Table 4.7: Malaysian Internet Users versus Population, 2004 – 2005 (Million) (IDC, 2005)

Year	2004	2005 (est.)	2004-2005 growth
B2C e-commerce	1,345.8	1,946.3	44.6%
B2B e-commerce	4,099.7	7,698.0	87.8%
Total e-commerce Spending	5,445.5	9,644.3	

Manufacturing: In January 2005, the National Small and Medium Enterprise Development Counsel of Malaysia (National SMEDC) divided SMEs into two broad categories – the manufacturing and manufacturing-related services (shown in section 4.3 and 4.4), together with agro-based industries in the first category and services, primary agriculture and ICT in the second category (Bank Negara Malaysia, 2005). The categories have also been sub-divided according to number of employees and annual turnover of the SMEs (Bank Negara Malaysia, 2005). Table 4.8 shows the manufacturing activities perform by industry.

Table 4.8: Manufacturing Activities (MIDA, 2012)

	Manufacturing Activities:
1.	Agriculture production;
2.	Integrated agriculture;
3.	Processing of agriculture products;
4.	Forestry and forestry products;
5.	Supporting products/services;
6.	Manufacturing of rubber products;
7.	Manufacture of palm oil and palm kernel oil and coconut of products;
8.	Manufacture of chemicals, petrochemicals and pharmaceutical;
9.	Manufacturers of wood and wood products;
10.	Manufacture of pulp, paper and paperboard;
11.	Manufacture of textile and textile products;
12.	Manufacture of clay-based, sand-based and other non-metallic;
13.	Manufacture of plastic products;
14.	Manufacture of non-ferrous metals and their products;
15.	Manufacture of machinery and machinery components;
16.	Manufacture of motor vehicles, components and accessories;
17.	Manufacture of other transport equipment's;
18.	Manufacture of electrical and electronic products and components and parts thereof;
19.	Manufacture of professional, medical, scientific, measuring equipment and components and parts thereof;
20.	Manufacture of photographic, cinematographic, video and optical goods and components;
21.	Manufacture of iron and steel and their products;
22.	Miscellaneous of iron and steel and their products;
23.	Manufacture of leather and leather products;
24.	Manufacture of clocks, watches and components;
25.	Manufacture of kitchenware;
26.	Manufacture of souvenirs and handcrafts;
27.	Manufacture of educational objects;
28.	Manufacture of toys;
29.	Manufacture of footwear's;
30.	Manufacture of sports good s and equipment's;
31.	Manufacture of jewelry and related products;
32.	Manufacture of firefighting and detection systems and parts thereof;
33.	Manufacture of hand tools; and
34.	Other miscellaneous products and services.

In order for a manufacturing-related services company or an agriculture based company to be classified as an SME, it must not employ more than 150 full-time employees or, alternatively, its annual sales turnover must not exceed RM25 million. When a company's sales are less than RM25,000 or it employs fewer than five full-time employees, it is known as a micro-enterprise. If a company's sales turnover is between RM250,000 and RM10 million or it employs between 5 and 50 full time employees, it is known as a small enterprise. Finally, in the case where a company's sales turnover is between RM10 million and RM25 million or it employs between 20 to 150 full time

employees, it is known as a medium enterprise (Bank Negara Malaysia, 2005; SMECorp, 2012).

4.3 Manufacturing (including agro based)

The agro-based SMEs are commonly located between the modern and the traditional SMEs. In general, this group of small businesses is often found in semi-urban areas. They cluster around towns and populated areas. The agro-based small businesses utilise raw agriculture materials as major production inputs and may also depend on other outside markets for selling their products. These types of SMEs are also seen as having the potential to assist under-developed economies in the development process (Hashim, 2005b).

As of December 2005, a total of 600,000 SMEs were registered in Malaysia (SME bank). They account for 27.3% of total manufacturing, 25.8% of value-added production, own 27.6% of fixed assets, and employ 38.9% of the country's workforce (Alam & Ahsan, SMIDEC, 2002; 2007). In 2002, 27.2% (approximately 2,679.8) of total employment was generated by the manufacturing industry (Ministry of Finance of Malaysia, 2003). In fact, the manufacturing industry is also an important source of technology transfer and foreign exchange earnings for Malaysia and is expected to play a significant role in driving the Malaysian economy from an agriculture-based economy to an industry-based one to achieve a fully developed country by 2020, or what is also known as vision 2020. The main aim of vision 2020 is to fully develop Malaysia in terms of national unity and social cohesion, economy, social justice, political stability, system of government, quality of life, social and spiritual values, national pride and confidence (Alam & Ahsan, 2007). In short, one can say that the Malaysian

manufacturing industry plays an important role in the transformation and development of Malaysia.

4.4 Manufacturing related Services

In this business segment, SMEs are involved in the activities of converting of basic raw material into useful products such as bakeries, sawmills, toy factories, shoe factories, clothing manufacturing factories, furniture manufacturing plants, job printing shops, ironworks, ready-mixed concrete plants, fertiliser plants, rubber glove plants, plastic bags and paper box manufacturing plants, and more recently electrical and electronic appliances and components (Hashim, 2005b).

The growth in manufacturing sector-related SMEs is closely related to the swings of external demands. The manufacturing industry is an important engine of economic growth for the Malaysian economy. In 1987, it contributed 19.8% of gross domestic product (GDP). That contribution increased to 24.6% in 1990 and 44.8% in 2001. In 2011, its status as an important sector remained strong, as it contributed 27.5% of total GDP. The sale value of manufacturing sector in June 2016 grew 2.9% (RM1.5 billion) to record RM55.8 billion as compared to RM54.3 billion a year reported (D. o. Statistics, 2016) as shown in Table 4.9.

Table 4.9: GDP based on Year (SME Annual Report 2010/11, 2010)

Year	**GDP**
1987	19.8
1990	19.8
2001	44.8
2011	27.5
2013	3.2
2014	3.8
2016	2.9

It also contributes to Malaysian export, namely exports of manufactured goods, machinery and transport equipment and miscellaneous manufactured articles. Indeed, this equates to 39.9% of the total exports. The contribution of manufactures exports to total exports increased to 53.6% in 1990. In 2002, 73.5% of total exports were manufactured (Ministry of Finance, various issues). SMEs' share of the overall manufacturing value increased again as it was observed that the manufacturing sector outperformed the overall sector since 2005; indeed, SMEs' share of overall value added by the manufacturing industry rose from 29.3 in 2005 to 30.4 in 2009. The key growth driver in this industry is resource-based industries such as rubber products, plastic and chemical products as well as Food and Beverges (F&B) and supported by Electronic and Equipments (E&E) products, basic metal and fabricated metal products, neon-metallic mineral products (SME Annual Report 2009/10, 2009).

This figure stood at 69% in 1993, 74.3% in 1994, 75.2% in 1995, 82.1.4% in 2002, and 79.4% in 2003 (MITI, 2003). Since SMEs comprise more than 80% of the total manufacturing firms in Malaysia, they have indeed contributed to generating income through exportation. The figure indicates that at present SMEs account for approximately 26% of the country's total manufactured products. Manufactured exports accounted for 67.7% of Malaysia's total exports in 2011. This increased by 2% to RM470.3 billion in 2011 from RM461 billion in 2010. Table 4.10 represents the contribution of the manufacturing sector to the total Malaysian manufactured exports.

Table 4.10: Manufacturing Exports (SME Annual Report 2010/11, 2010)

Year	Contribution to Total Manufactured Exports (%)
1992	69.0
1993	74.3
1994	75.2
1995	75.4
2002	82.1
2003	79.4
2011	67.7

The SME sector is also a significant sector of employment in the economy as SMEs use relatively labour-intensive production techniques (Abdullah, 2000). Table 4.11 indicates SMEs' contribution to the total employment in the manufacturing sector in 1981, 1994 and 1995. Employment in the manufacturing sector was estimated at 3.5 million people or 28.7% of total employment in 2011 (MIDA, 2012).

Table 4.11: Employment in Manufacturing Sector (SME Annual Report 2010/11, 2010)

Year	Percentage of Total Employment in Manufacturing sector
1981	41.2
1994	18.5
1995	17.9
2011	28.7

4.4.1 ICT in Manufacturing Industry

New manufacturing technology often involves the adoption of new technologies as well as changes in organisational structures and practices, such as Just-In-Time (JIT) and Total Quality Management (TQM), which may result in radical changes in the way business is conducted. The AMT adoption encompasses the adoption of advanced

technologies and the integration of various computer applications in production planning and processes. The Advance Manufacturing Technology (AMT) application includes applications such as Computer Integrated Manufacturing (CIM), Computer-Aided Design (CAD), Computer-Aided Engineering (CAE), Flexible Manufacturing Systems (FMS), Material Requirement Planning (MRP I), Manufacturing Resources Planning (MRP II) and Enterprise Resources Planning (ERP) (Isa & Foong, 2005).

The CIM system automates manufacturing through integrating the manufacturing process by using ICT to allow for information flow between people and equipment. Activities, including product design, development, engineering, manufacturing, inventory control, marketing, sales, field support and services can be fully integrated and automated. The CIM can improve quality reliability and manufacturing flexibility whilst also providing other benefits such as reduced inventory cost, saving on floor space, lower throughput and lead times and acceleration of the learning phase (Kaplan, 1986; Beaumont, Schroder, & Sohal, 2002; Isa & Foong, 2005)

According to the prime minister of Malaysia in his opening remarks during the Ninth MSC International Advisory Panel Meeting on 8 September 2005; “I believe that ICT has the power to improve the economic condition of, and quality of life enjoyed by the people” (Nordin, 2011).

Figure 4.1 shows the Malaysian Transition over the years. During 1960, Malaysia's economy was primarily labour driven in primary commodities. That changed in the year 1970 where assembly type manufacturing took the place of primary commodities. In the 1980s it became investment driven for high-tech manufacturing and services while between 1990 and 1995 it was productivity driven. However, from 1996 onward it moved toward knowledge driven as Malaysia focussed on exporters for technology.

MSC (Malaysia Super Corridor) is changing Malaysians' way of life and trying to make Malaysia a knowledge driven economy by the year 2020. The mission is to realise Malaysia as a global hub and preferred location for ICT, Multimedia and services for innovation and operations. The ultimate goal is to become the next engine of growth in support of Malaysia's Vision 2020 as shown in Figure 4.2.

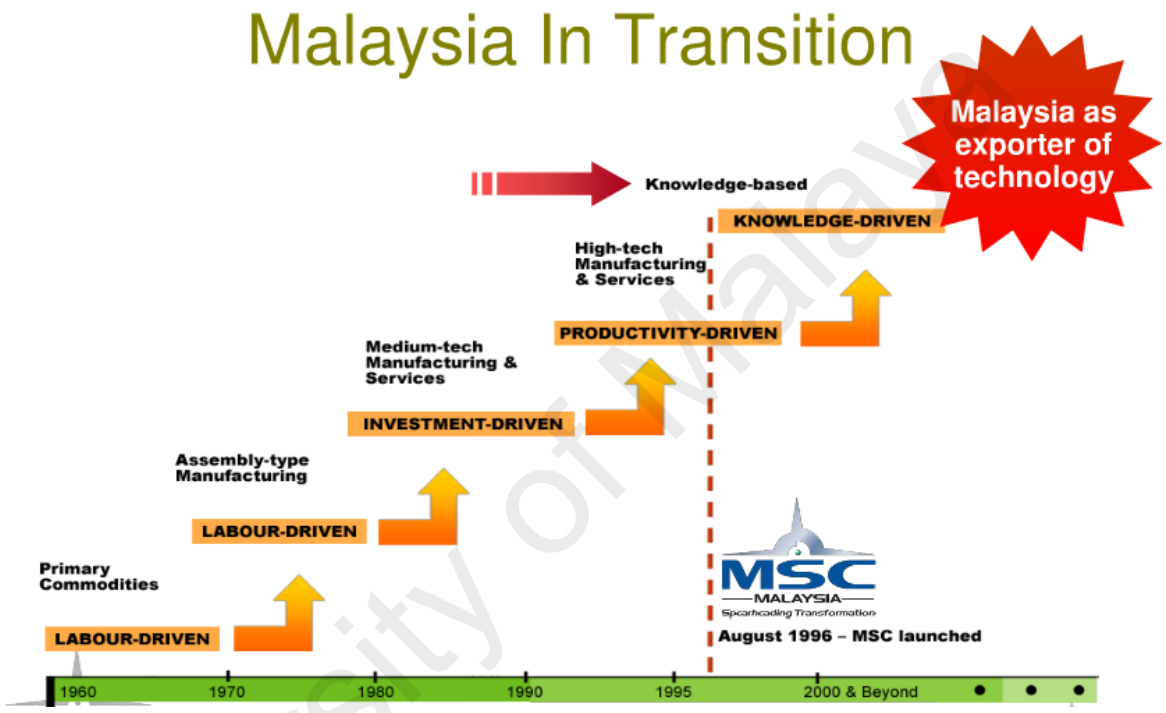

Figure 4.1: Malaysia in Transition (National Economic Action Council, 2012)

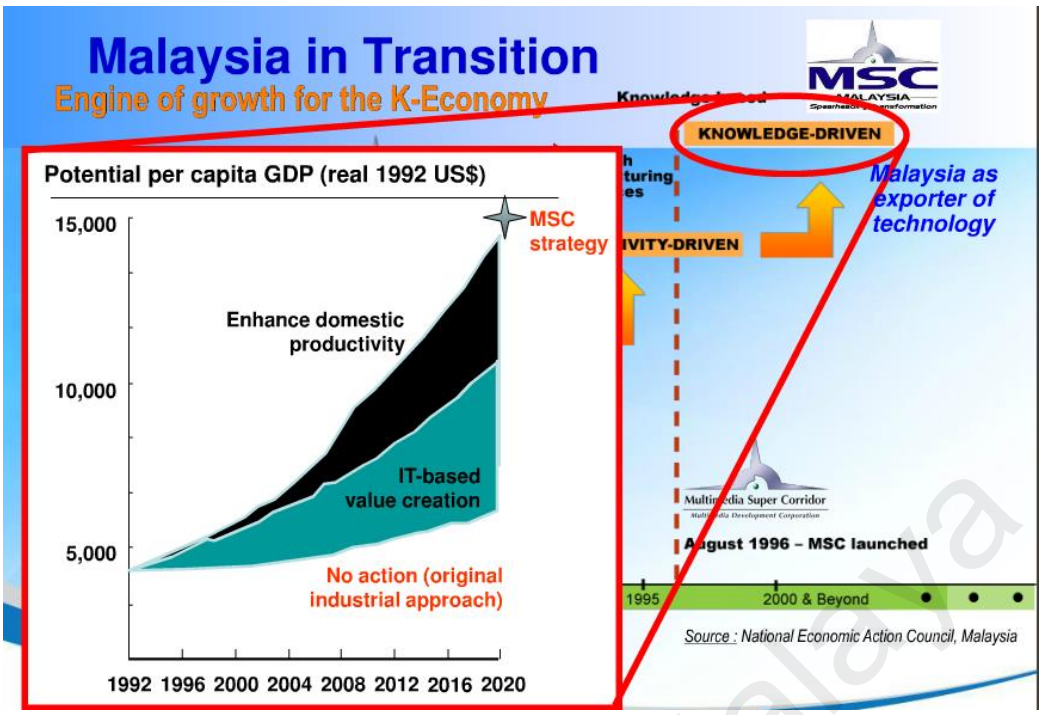

Figure 4.2: Malaysia in Transition: Engine of Growth of K-economy (National Economic Action Council, 2012)

The electronic industry in Malaysia has turned into a leading and major manufacturing sector, contributing the largest share to the total manufacturing output, export and employment. With the help of e-commerce, this sector can expand its market share in the global business arena. Benefits of e-commerce adoption include improved customer service, better inventory control, lower marketing and distribution cost, reduced cycle time, increased market reach and reduced operation cost. Other benefits include global connectivity, high accessibility, scalability, interoperability and interactivity (Alam, et al., 2005).

Although the manufacturing industries are reluctant to use this new technology, it has the greatest potential for growth when it comes to the world-scale Internet economy. (Alam, et al.,2005). Another study find that, in 2000, approximately 50% of the SMEs had websites for online advertising and 43% took orders on the Internet (Razak, 2002). This finding indicates that SMEs in Malaysia are beginning to take up Internet business.

In their study on e-commerce in Malaysia's manufacturing sector, Sulaiman & Jani (2000) find that e-commerce companies in Malaysia's relatively new manufacturing industry have begun processing sales orders, procurement and good tracking online.

4.4.2 Manufacturing Industry Challenges/Issues

(a) Lack of Managerial Expertise: An earlier study conducted by Chee (1986), indicates that 78.9% of SME owners do not have an upper secondary education. According to Chee (1986), if not for owning their business, these entrepreneurs may find it difficult to secure job positions in the market. Furthermore, the training and experience from operating their business provides them with various skills and knowledge (Chee, et al., 2016).

According to a study conducted by Hashim (1999), the survey conducted by the owners of SMEs indicates that 77 owners have secondary and higher level education. Of the thousand owners interviewed, forty owners indicate having secondary education; fourteen owners have college education (have earned a diploma), and twenty-three have university education (sixteen have earned a bachelor's degree; five have earned a master's degree and one PhD degree). One of the major internal issues related to the non-adoption of e-commerce, is a lack of staff expertise and commitment (Tan & Teo, 1998; Dholakia & Kshetri, 2004; Seyal, Rahman, & Abid, 2013). With this in mind, management commitment is crucial; where skills need to be redefined, and adequate training is needed (Cloete, et al., 2002; Seyal, et al., 2013).

In Malaysia, anecdotal evidence suggests that the failure rate among SMEs is quite alarming (Jamaludin & Hasun, 2007). Poor financial management is found to be one of the deciding factors when it comes to the survival of these firms, especially bumiputra SMEs (Jayasankaran, 1999). In the case of Malaysia, the

government has given their full support to the SMEs in terms of infrastructure, training, financing facilities and others (Hamzah & Ho, 1994), although the failure rate remains high and SMEs are unable to compete in the global market (Jamaludin & Hasun, 2007). Ability to compete in a global market is usually related to poorly educated entrepreneurs and their employees (Tan, 1996). This situation doubles as a result of insufficient training provided to SME owners as well as their staff (Tan, 1996; Westhead & Storey, 1996). Similar to other parts of the world, the failures of Malaysian SMEs among all are due to low literacy levels among the adults' low education attainment (Hamzah & Ho, 1994) and most SMEs have started a venture in a rural area (Ladzani & Vuuren, 2002).

(b) Shortage of Skilled Labour: SMEs are seriously affected by a shortage of skilled labour. SMEs compete with large industries for skilled workers. SMEs blame large companies for pinching the skilled workers for better wages and working conditions (Chee, 1986). In their study, Mohd & Nawawi et al. (1990) make reference to the manufacturing industries in Malaysia and report that labour intensive enterprises SMEs are unable to attract and retain skilled workers, and that one out of four SMEs has problems in attracting the right kind of workers. This is especially true for the manufacturing sector, where a majority of staff are blue-collar workers, and manufacturing workers need minimal education when compared to any of the sectors describe above. The illiteracy rate makes them more vulnerable to security risks in the organisation. This may be because they are not educated about security measures and/or have low ethical/moral ground.

(c) Low Productivity and Quality Output: Technology capabilities and the ability to meet specified manufacturing standards determines whether or not SMEs participate in the global supply chain. SMEs face the challenge of constantly upgrading their productivity through automation (increased efficiency and lower

product costs) in order to participate in the global supply chain (Saleh & Ndubisi, 2006b).

(d) High cost infrastructure: The majority of SMEs are still located on land and are not designated for industrial use. In addition, the dispersed pattern of SMEs has impeded the full realisation of synergies in the industry clusters. There are also difficulties when it comes to providing common user facilities, thus affecting the ability of SMEs to comply with requirements demanded by their customers (Saleh & Ndubisi, 2006b)

4.5 Mining and Quarrying

Compared to other sectors the mining sector is mainly dominated by large players due to the capital intensity of the oil and gas business. Therefore, SMEs' total share of the mining and quarrying industry in insignificant at 0.5 to 0.6%. The SME growth in this sector has performed better than the overall growth since 2001 and reached a peak of 9.5% in 2007 before consolidating in 2008. Despite the contraction in the overall mining sector in 2009 due to weaker external demand, SMEs' value added recorded a growth of 6.1%, possibly because of strong quarrying activity and continued activity in minor minerals. The mining and quarrying sector recorded a decline of 5.7% in 2011, and contributes 6.3% to GDP. Employment in this sector was estimated at 42,000 people in 2011 as shown in Table 4.12.

Table 4.12: GDP of Employment (SME Annual Report 2010/11, 2010)

Year	GDP%
2001	0.6
2007	9.5
2009	6.1
2011	6.3
2013	2.2
2014	3.1
2016	6.3

4.5.1 ICT in Mining and Quarrying

In the Malaysian context, studies on SMEs have not yet reached an in-depth analysis regarding the development of SMEs in many major areas, particularly concerning the issues of electronic endeavour. Despite a number of small-scale studies on the issue, the current level of adoption of Internet-based business among SMEs in Malaysia is not clear. According to the SMI Association of Malaysia, the ICT implementation in SMEs remains very basic. In light of this it is difficult to find any resources or research which addresses e-commerce adoption in the mining and quarrying sector in Malaysia. When examining limited online literature on this industry one can see that e-commerce penetration in Mining and Quarrying is very limited. This may be because most large companies are related to the mining and quarrying industry. However, for SMEs to increase their business, they must create an online presence in terms of e-commerce, which is the only effective way of competing with large companies and to be visible in the international market.

4.6 Services (including ICT)

Definition: There is no common classification of services. They can vary from a narrow to a broad range of services (Kanapathy, 2003). The narrow range includes all the activities other than agriculture, forestry, hunting and fishing, mining and quarrying, manufacturing, construction, utilities and public administration and defence, while the broadest range includes utilities, public administration and defence and construction (Ling, 2002).

SMEs enterprises which operate in this area of business comprise those involved with construction, wholesale and retail trade, transport and storage, business services (such as accounting firms, advertising agencies, private employment agencies, secretarial, tax and management consultants), personal services (such as barber and beauty shops, laundries, photographic studios, insurance agencies and travel agencies) automobile and repair and maintenance services (such as automobile and motor cycle repair, computers, electrical and electronics repair, upholstery and furniture repair, cleaning) entertainment and recreational services (bowling alleys, cinemas, amusement parks, cyber cafes) and services in hotels and restaurants (Hashim, 2005b).

There are 192,527 establishments in the services sectors, whilst 186,728 (or 96.7%) of these are comprised of SMEs in Malaysia (Department of Statistics). The service sector has expanded gradually over the years from 1975, with the exception of a marginal slide in the early 1980s, when it fell from approximately 49% in 1975 to approximately 45% in 1980 largely due to the slow growth in government services. The services sector share also fell in 1990, but this was primarily due to the large-scale privatisation of public services (Kanapathy, 2003). The services sector contributed approximately 57% to Malaysia's gross domestic product (GDP) in 2002, representing a 10% increase since 1990.

The service sector grew by 6.8% in 2004, driven by higher consumer spending and a record level of tourist arrivals. Growth emanated from strong expansion in all sub-factors with transport and communication in the lead at 8.4% followed by wholesale and retail trade, hotels and restaurants (7.1%) and finance, insurance, real estate and business services (6.5%). Together with new growth areas in information and communication technology (ICT), the service sector has been able to maintain its premier position in terms of its share of GDP at 57.4% (Yusoff, 2004). The service sector accounted for the largest share of Malaysia's GDP in 2011. The sector contributed 58.6% to the GSP, whilst the service sector recorded a growth of 6.8% in value added for the same period (MIDA, 2012). According to the Economic Report 2011/2012 (2011), the service sector for 2012 would be underpinned by the wholesale and retail trade, finance and insurance as well as communication sub-sector. The implementation of the Entry Point Project (EPP) is expected to give the sector a boost, whilst the contribution of the service sector is expected to increase to 58.9% of GDP as shown in Table 4.13.

Table 4.13: Service Industry GDP (SME Annual Report 2010/11, 2010)

Year	**GDP**
1975	49
1980	45
2002	57
2004	63.8
2011	58.6
2013	5.5
2014	5.7

According to the Department of Statistics (DOS), Malaysia's education sector and health service sector has the highest concentration of SMEs with a total of 98.6%, followed by a wholesale and retail trade provision, which accounts for 97.8%, and selected services (92.7%). The size of the firm (economy of scale) is a crucial factor in the telecommunication service sector, and thus the participation of SMEs in that industry is limited. The wholesale trade sector is the second largest in the service sector, with 8.5% of the total 192,157 enterprises, as shown in Table 4.14 and Table 4.15 (Saleh & Ndubisi, 2006a).

Table 4.14: Number of Companies based on the Industry Size

Size of companies	**Number of companies**	**Share (%)**
Micro	114,840	59.6
Small	53,612	27.8
Medium	17,976	9.3
Total SMEs	186,428	96.7
Large	6,099	3.2
Total	**192,527**	**100**

Table 4.15: Areas in Service Industry (Department of Statistics)

Segment	**Total Number of Participating Companies**	**Total Number of Participating SMEs**	**Percentage of Participating SMEs %**
Education and health	8,558	8,438	4.5
Professional services	5,548	4,840	2.6
Selected services *	4,146	3,844	2.1
Transportation and communication	3,908	3,473	1.9
Computer industry services	283	186	0.1
Wholesale and retail Trade	170,046	165,640	88.8
Telecommunication	38	7	0.0
Total	**186,462**	**186,428**	**100**

*Refers to hotels and other lodging places, travel agencies and tour operator's services, share, commodity and foreign exchange brokers, bureau de change, real estate agents, videotape rental services, advertising agencies and motion picture projection services.

4.6.1 ICT in Service Industry

According to research conducted by Alam (2007) on ICT adoption in Malaysian SMEs from the service sector, most SMEs never develop a website for their business and the embracing of ICT is considered low. This is because most of the SMEs in the service sector have a limited financial budget with a small business structure and even smaller number of employees. This may threaten SMEs with regard to investment of e-commerce, thus potentially meaning that they will lag behind Multi-National Companies (MNC) if sufficient resources are not allocated from e-commerce activities.

According to Lim (2006), most SMEs in Malaysia realise that ICT is critical to the productivity and performance of their companies. However, the implementation and maintenance of this ICT system are restricted due to inability to handle, owing to high staff turnover and lack of the ICT project's management enterprise. He also feels that many Malaysian family-based SMEs are continuing to operate their business in the conventional way. Consequently, SMEs which have invested in an ICT system fail to successfully implement and maintain these systems. This is due to a lack of guidelines and models presented to develop and maintain e-commerce for the management of e-commerce.

A other study by Suraya (2005) explores Internet diffusion and e-business opportunities among Malaysian travel agencies which are part of the service industry. The study reveals that Malaysian travel agencies are very positive towards e-commerce, despite the slow rate of adoption of e-commerce practices. According to the study, unveiling cultural issues is important when it comes to explaining the adoption rate of the Internet in Malaysian travel agencies. Culture issues relate to users' inability to trust online services in terms of payment and personal information

provided on the Internet, as customers remain unconvinced when it comes to the security and privacy of e-commerce.

One particular study is conducted by Alam & Noor et al. (2009) on ICT adoption in the Malaysian service sector, as shown in Table 4.16. Respondents agree that use of the Internet when conducting business will be important for the future progression of companies. Most of the respondents believe that doing business over the Internet will generate desired return in terms of profits.

Table 4.16: ICT in Service Industry (Alam & Ahsan, 2007)

Variables	**No. of respondents**	**%**	**Cumulative**
1. Develop formal ICT training plan			
Yes	47	16.11	26.11
No	133	73.89	100.0
2. Develop business website			
Yes	17	9.44	9.44
No	163	90.56	100.0
3. E-mail usage for business purpose			
Yes	143	79.44	79.44
No	37	10.56	100.0
4. E-business practices			
Yes	38	21.11	2.11

4.6.2 Service Sector Challenges/Issues

The challenges faced by the Service Sector include:

(a) Intensified global competition:

- Trade agreements (e.g. multilateral, bilateral, and regional) have made markets more readily accessible and have increased competition.
- Timely market intelligence and the ability to compete based on quality, cost and speedy delivery (OCD) will be critical factors (Saleh & Ndubisi, 2006a).

(b) Limited capability to meet the challenges of market liberalisation and globalisation:

- Most SMEs are dependent on small and protected domestic markets, thus deterring them from upgrading their technological and management capabilities, which also limits their ability to meet global standards.
- Without assistance, SMEs face significant barriers when it comes to penetrating the export's markets because of high transaction and information cost (Saleh & Ndubisi, 2006a).

(c) Limited capacity for technology management and knowledge acquisition:

- Technology and knowledge investment will ensure that SMEs are able to monitor and respond to new opportunities in a timely and effective manner
- Content provision is lacking in many areas and is costly for SMEs to acquire on their own (Saleh & Ndubisi, 2006b)

(d) Limited access to finance and capital, and the infancy of venture funds in or initial mezzanine financing:

- SMEs traditionally finance their operations through personal saving, loans from family members and friends, as well as supplier credits.
- New start-ups often face difficulties in securing credit, as they have built little collateral or track record (Saleh & Ndubisi, 2006b)

4.7 Construction

In 1997, construction contributed 10.6% to the national GDP, second only to the services sector (11.06%) with the manufacturing sector a close third (10.1%). However, this sector suffered contractions of 23.0% and 5.6% in 1998 and 1999, respectively.

Efforts to revive the sector helped it to turn around in 2000, contributing RM6,996 million (US$1,841 million) or 3.3% of the national GDP (Eight Malaysian Plan, 2001).

As Malaysia's economy continues to grow there is always a need to build/re-build or maintain the construction of roads, buildings, houses and apartments in the country. In 2008-2009 although the overall construction sector recorded a strong growth due to the government support to upgrade existing public infrastructure and buildings as well as construction of low and medium cost houses under the stimulus packages, SMEs in the construction sector could not reap the benefits as they were affected by materials and subdued demand for residential properties arising from uncertainty in the global economy (SMECorp, 2012). The construction sector is expected to grow at a stronger pace of 7% in 2012 as large infrastructure projects and housing construction activities pick up (Economic Report 2011/2012, 2011). The value if construction work dine grew by 11.7 percent year-on-year basis to record RM30.4 billion in the second quarter 2016 (D. o. Statistics, 2016). Table 4.17 shows the total GDP growth in the construction sector based on number of years.

Table 4.17: Construction Sector GDP Growth (SME Annual Report 2010/11)

Year	**GDP%**
1997	10.6
1998	23.0
1999	5.6
2000	3.3
2011	3.2
2013	10.6
2014	9.6
2015	11.7

4.7.1 ICT in Construction Industry

In line with the National IT Agenda, which was formulated in 1996, the Malaysian Government has been aggressively promoting IT and its application in every sector including the construction industry. The Mid-Term Review of The Seventh Malaysian Plan 1996-2000 reports an RM152 million (US$40 million) investment in IT from the construction sector in 1995, although there was a sharp decline in 1998 when investment in IT from the construction sector was at RM48 million (US$12.6 million). However, this decline was not due to a massive pullback on the usage of IT in construction, but more likely caused by the economic crises which affected the East Asia region.

The Construction Industry Development Board (CIDB), the national body set up to standardise and modernise the construction industry, is also exerting a great deal of effort to promote IT in line with the government policy. They have launched an e-construction portal exchange, which is an IT infrastructure so as allow for maximum and effective means of interaction between the industry players. In addition, various portals targeting the construction industry such as Icfox, Binaonline.com, Buildcom.net and Construction Asian have emerged in recent years. Whilst this bonds well for the construction industry, the question remains as to how well receive these portals actually are. Do the players in the industry actually utilise the Internet, or do they just implement e-mail?

According to Mui & Aziz et al. (2002) there appear to be no official statistics on the usage of the Internet in Malaysian Construction Company. No survey has addressed the industry as a whole except for a survey regarding the usage of ICT by quantity surveyors (Darmawan, 2000). Other research on the usage of the Internet in Malaysia focuses on communication (Goh, 1997) and education (Yeap, 1998).

According to Ng (2005), procurement through the Internet is low in the construction industry. Another study of interest is the study conducted by Mui & Aziz et al. (2002) regarding Internet usage in construction firms. In the survey most of the respondents indicate that they have access to the Internet and consider Internet as important for their firms. However, it has also been realised that the full potential of Internet /e-commerce in the construction industry is not utilised. The only function currently implemented is e-mails and in order to improve the intensive use of Internet in strategic operations and production, an improvement of the existing infrastructure is suggested, thus hopefully yielding more knowledgeable workers.

4.7.2 Construction Industry Challenges/Issues

Ting (2004) lists the following challenges: (i) human-resource constraints; (ii) lack of access to finance; (iii) inability to adopt technology; and (iv) lack of information on potential markets. He also argues that Malaysian SMEs are in a critical position, and risk being wiped out if they do not improve their competitiveness in the new world of globalisation.

More recently, Saleh & Ndusbisi (2006) identify some of the hindrances to the development of Malaysian SMEs in construction industry. They include the following:

(a) Red tape applied by government agencies in delivering incentives. This hinders the speed of new business development and efficiency in the operation of Malaysian SMEs.

(b) Difficulty in obtaining funds from financial institutions. Commercial banks consider SMEs as high-risk ventures and are often reluctant to lend to them without adequate collateral which many SMEs do not have. In addition,

Micro finance institutions are not well developed to meet the mounting financial needs of SMEs.

(c) Lack of human capital is one of the most significant challenges for Malaysian SMEs. It is often very expensive for Malaysian SMEs to employ professional and skilled people; when they do, they find it difficult to keep them with their poor career development plans. In fact, many SMEs still exploit their staff instead of treating them as capital (something of value to cherish).

(d) SMEs in Malaysia face a high level of international competition due to globalisation, AFTA and competition from MNCs as well as new competition (e.g. China, India).

(e) Poor access to new technologies and underutilisation of existing ones. Sichel Sichel (1999), Landauer (1995), Ndubisi & Jantan (2003) have linked the gross under-utilisation of a system to the productivity paradox.

4.8 Primary Agriculture

In the field of agriculture, SMEs are involved as agricultural producers and natural product producers of rubber, rice, palm oil, coconut, cocoa, pepper, tobacco, fish, prawn, oysters, clams, cockles, sea weed, fruits, tapioca, sweet potatoes, yam, sugar cane, flowers, herbs and vegetables. Other examples include chicken, duck, quail, ostrich and turkey hatcheries, bird nest, and small-scale cattle, deer, goat and sheep ranchers (Hashim, 2005b).

The main growth drivers for SMEs in the agriculture sector are palm oil, fruits, vegetables, paddy, fishing and rubber. SMEs' growth has outperformed the overall sector growth from 2004 to 2009, with SMEs' share of the agriculture sector's overall value added increasing from 29.8% in 2005 to 31.0% in 2009 (SMEcorp, 2012).

SMEs in the agriculture sector accounted for 99.2% of the 32,397 establishments enumerated. Approximately 93.3% (29,985) of SMEs are categorised in the micro category. The contribution of SMEs to the output of the agriculture sector accounted for 41.4% of output and 41.7% of value added. The largest share of output was contributed by the sub sectors, growing of crops, market gardening, horticulture and livestock farming, collectively accounting for 72.2%. Workers employed by SMEs numbered 31,130 or 57.5% of the total workers in the agriculture sector. Micro establishments were characterised by a high percentage of working proprietors and active business partners, specifically 97.5%. The concentration of SMEs in the state has a significant correlation close relationship with the dominant economic activity. In Kedah where agriculture is the main stay of the economy, the number of SMEs was the largest, at 8,803 (27.4%) followed by east coast states with 26.6% (Aris, 2007). Table 4.18 shows the primary agriculture contribution to GDP over the years

Table 4.18: Contribution to GDP (SME Annual Report 2010/11)

Year	**Plantation Sector (%)**	**Food Sector (%)**
1995	9.6	3.6
2003	5.2	3.3
2004	6.1	2.9
2011	7.3	

4.8.1 ICT in Primary Agriculture Industry

The key objectives of ICT are to allow for efficient dynamic computing and detailed analysis of strategic agriculture information for better planning and forecasting of agriculture produce; provide better access to market demand and agriculture know-how and best practices; bring farmers closer to retailers and international markets. These factors will assist in the objective of encouraging modern farming to increase income of

our farmers, and make Malaysia an exporter of quality agriculture produce, thus also increasing its sector contribution, national income and export earnings (Meyerson et al., 2002).

In 1997, the Inter Agency Task Force on E-commerce (IAFETC) was established, reporting to the National E-commerce Committee (NECC) with the aim of devising a national strategy for a competitive e-commerce/ICT environment in Malaysia (Meyerson, et al., 2002). Under the e-commerce, Strategic Direction II (SD2) for Malaysia, a study on the 5 identified sectors with low ICT uptake is undertaken in 2004 (Suhaimi, 2011). Based on the SD2 study, the agriculture sector focuses on the following; (i) creating and improving the supply-chain management (ii) creating a community development programme (iii) creating a registry of agriculture products with trace ability feature, and (iv) creating value-added services specifically tailored to modern farmers (Suhaimi, 2011). ICT is a tool with which to facilitate local and global surveillance such as better agriculture methods, faster contact with consumers and providers, up-to-date information, central registry, decision tools and food safety (Nordin, 2011).

Figure 4.3 shows ICT uptake in Agriculture. The agriculture sector has the lowest level of e-commerce whilst the highest level of e-enablement is demonstrated by the tourism sector.

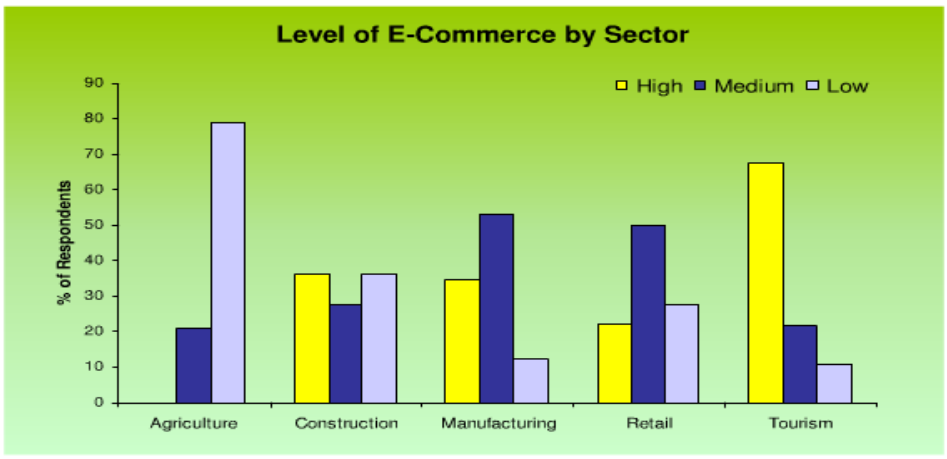

Figure 4.3: Level of E-commerce by Sector (Sullivan, 2003)

According to Sullivan (2003), the benefits of e-commerce in the agriculture sector include enhancing customer relations, increasing productivity and improved revenue. Indeed, these are the most important benefits experienced in the agriculture sector as a result of e-commerce usage.

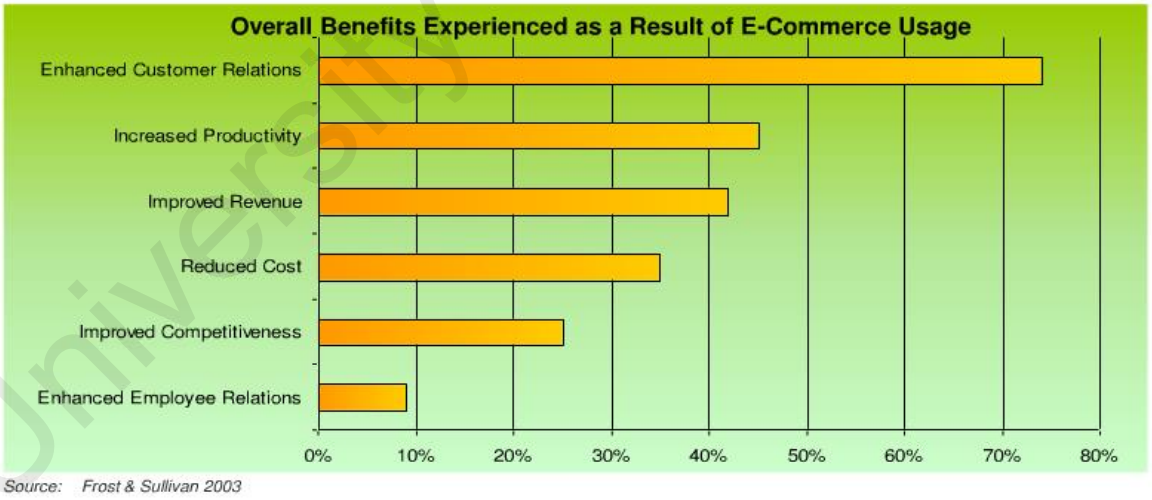

Figure 4.4: Overall Benefits Experience of E-commerce Usage (Sullivan, 2003)

4.8.2 Primary Agriculture Industry Challenges/Issues

The challenges faced by the primary agriculture industry include:

(a) The impact of globalisation on agriculture:

– Only the lowest-cost producers can make money from their products.

– Producers have to be sensitive to market demand and trends.

– Specialisation and value added is the key to profitability.

(b) Consumers are becoming very demanding:

– The safety of food products must be proven.

– Purchasers are looking for extra information.

(c) Shortage of skills for the new business environment:

The continuity dependence of SMEs on foreign labour delays investment in automation, skills upgrading and knowledge acquisition, which are critical to long term competitiveness. The supply of skilled labour remains scarce, resulting in high staff turnover at the enterprise level and impeding output expansion (Hashim, 2005a; Saleh & Ndubisi, 2006b). Table 4.19 shows the labour force employed in agriculture between the years 1992 and 2004.

Table 4.19: Labour Force in Agriculture (1992-2004) (A. s. i. Malaysia, 2009)

Industry	**1998**	**2000**	**2001**	**2002**	**2003**	**2001**
Pandi Planters	302,852	314,158	320,587	297,227	268,542	320,022
Farmers	311,979	301,035	284,637	239,517	245,976	248,260
Livestock Farmers	43,222	41,263	36,790	35,870	34,005	79,665
Fishermen	115,901	125,353	136,610	104,309	102,933	132,712
Agriculture	8,996	9,134	8,528	3,346	4,067	9,694
Small holdings	387,982	353,828	290,146	304,990	337,792	442,486
Total	**1,170,902**	**1,144,771**	**1,077,298**	**985,259**	**993,315**	**1,232,839**

4.9 Summary

This chapter has examined different SME sectors in Malaysia, including their ICT development and challenges. The Malaysian SMEs clearly play an important role in the nation's economic development. In order to accurately evaluate the SMEs and to define their development and challenges, it is necessary to look at SMEs from an industry perspective. Although there are many studies which have addressed Malaysian SME challenges and IT developments, none look into it based on their individual industrial development. This case study helps in the unveiling of new discoveries and gathering information about SMEs in Malaysia, which will help e-commerce adoption among them. A good understanding of SMEs and its industries are vital in order to formulate an accurate holistic e-commerce model for them.

There are many challenges faced by SMEs industries as can be seen from this chapter. There are noticeable similarities between most of the challenges between SMEs industries aside from dissimilarities. In order to better understand challenges faced by SMEs in Malaysia and how to overcome them and answer the research questions. In Figure 4.5 has shown the mapping of similar/dissimilar challenges faced by Malaysian SMEs industries. Understanding these challenges help to verify the factors to overcome these challenges and develop a model for successful and secure e-commerce implementation in SMEs.

Most of SMEs industry share the same type of challenges such as 'shortage of skills' challenges is faced by manufacturing, construction and mining industry, similarly 'technology management' challenges is shared by services and construction industry. Since, there are many similarities between the challenges faced by different SMEs industry. Therefore, for this research will provide holistic model to allow adoption of e-

commerce for all SMEs regardless of industry. The e-commerce factors will help to overcome these challenge and holistic e-commerce model will allow secure and successful adoption of e-commerce regardless of SMEs industries and their challenges.

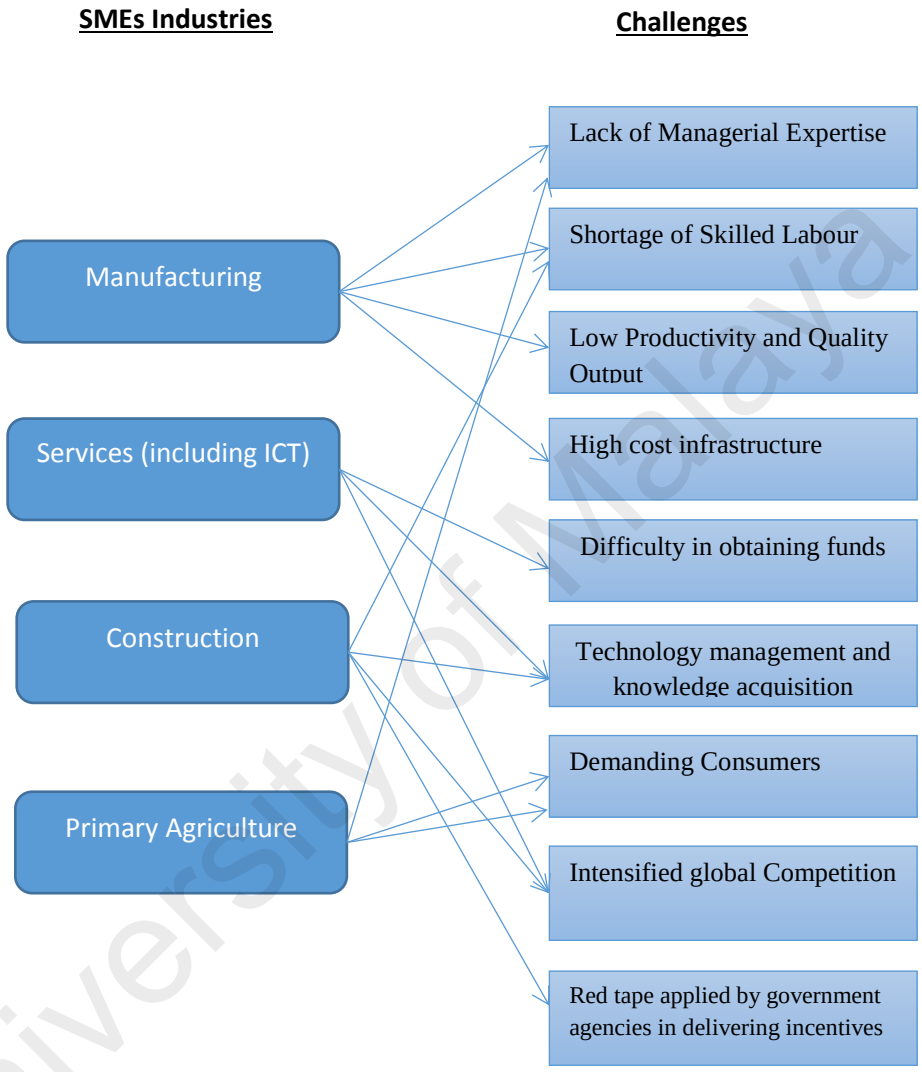

Figure 4.5: Mapping of Similar/Dissimilar Challenges Faced by SMEs Industries

The next chapter will present data collected through questionnaires, interviews and observations from different SME industries in Malaysia. This will provide an in-depth and broad range of information regarding the problem, as well as possible solutions for the research question.

CHAPTER 5: DATA ANALYSIS AND FINDINGS

5.1 Introduction

This chapter provides analysis for quantitative and qualitative data collected from the questionnaire, interview and observations for case study describe in chapter 4. The data is collected from management, CEO/managers or from the people who participate in the companies' IT/IS decisions as describe in Chapter 3. The study have make use of explanatory design for mixed method research. The study conducted sequentially in two phases. First quantitative phases, where data is collected using questionnaire to determine factors that influence the e-commerce adoption in SMEs. The second phase is qualitative where data is collected using interviews and observation. Total of 108 SMEs responded to questionnaire, there were ten interviews conducted from SMEs managers and one SME was involved in observation.

In this chapter, will analyse data collected, first section will provide analysis of quantitative data collected via questionnaires. First reliability test and demographic analysis will be done, followed by the factors that influence e-commerce success will identified and analysed. Later, CFA using AMOS is done to develop and confirm the model for e-commerce adoption. The final section evaluates and verifies the holistic model by making use of qualitative data collected from interviews and observations.

5.2 Sample Demographics and Reliability Test

The sample demographics and reliability test is conducted in this section.

5.2.1 Demographic Characteristics

The first page of the questionnaire (refer to Appendix D) is composed of four demographic information questions. Table 5.2 presents the characteristics of the SMEs from the first section of the 108 usable questionnaires.

5.2.1.1 Type of Organisation: The first level of analysis looks for the main organisation type to which SMEs usually belong and provides a point of comparison for further studies.

A total of 108 SMEs have contributed to this study, and are divided into the six main industries to which they belong. As can be seen from Table 5.1, most of the companies are linked to industries which provide services (including ICT) to their customers. This is followed by SMEs which are linked to Manufacturing services, and then Construction and Primary Agriculture, finally Mining and Quarrying. This is predictable as the survey is conducted in Klang Valley, which is a central location in Malaysia. Indeed, most of the companies in this area are linked with providing services rather than taking part in agriculture-related activities. The latter activities are more of concern for small villagers away from Klang Valley in Malaysia.

Table 5.1: Distribution of Sample by Industry type

SMEs Industry	Percentage	Frequency
Manufacturing (including Agro Based)	13.9	15
Manufacturing Related Services	15.7	17
Mining and Quarrying	.9	1
Services (including ICT)	42.6	46
Construction	6.5	7
Primary Agriculture	1.9	2
Others	15.7	20
Total	100.0	108

5.2.1.2 Number of Employees: Table 5.2 shows the distribution of SMEs based on the number of employees they employ in their businesses. In this study, international standards of SMEs are used for numbers of employee, that is, 1-250 (refer to Table 4.1 in Chapter 4). Based on Table 5.2, most of the SMEs participating in the survey have less than 5 employees, and are micro businesses with an e-commerce presence (refer to Table 4.2 in Chapter 4). Limited number of SMEs that participate in the survey has more than 150 employees. This is true as small companies are increasingly moving toward adoption of e-commerce sites to increase their customer base.

Table 5.2: Number of Employees

Number of Employees	**Percentage**	**Frequency**
Less than 5	37.0	40
5-19	31.5	34
20 - 50	22.2	24
50 - 150	7.4	8
150 - 250	1.9	2
Total	100.0	108

5.2.1.3 Years Spent on E-commerce Activity: According to the survey most SMEs have been running their e-commerce sites for 1-5 years. This means that most of the SMEs have had an e-commerce site for a few years, and are conducting business based on them. Only 4.6% of companies have had an e-commerce site for more than 10 years, with this percentage showing that usage of e-commerce has become more prominent over the past 1-5 years. This is quite encouraging as in the past year; more companies (25.9%) are beginning to make use of e-commerce sites for their business, as can be seen from Table 5.3.

Table 5.3: Number of Years

Years spent on E-commerce Activity	Percentage	Frequency
Less than 1 year	25.9	28
1-5	49.1	53
5-10	20.4	22
More than 10 years	4.6	5
Total	100.0	108

5.2.1.4 Before E-commerce: In this question respondents were allowed to select more than one option. Most of the SME business owners respond that before the e-commerce site, they made use of a website which is used for marketing purpose only. This is true as most of the small businesses have previously made use of small sites, social media sites, or blogs to advertise their business before moving to an e-commerce site. The ratio shows that most of the businesses make use of some sort of advertisement to make their business visible, whether offline or online advertisement. Only 26.0% respond that they did not make use of any form of advertising before e-commerce as shown in Table 5.4.

Table 5.4: Business conducted by SMEs before E-commerce

Before E-commerce How Business was Conducted	Percentage	Frequency
Website for marketing only	28.5	35
On-line advertisement/marketing only	22.0	27
Off-line advertisement (e.g. newspaper, TV etc.) only	23.6	29
No website and marketing efforts done	26.0	32
Total	100.0	108

5.2.2 Practice of Malaysian SMEs in adopting E-commerce

Further tests are conducted in order to obtain answers to the second research question, which attempts to find the "practice of Malaysian SMEs in adopting e-commerce" as shown in the following section:

> Research Question 1: What is the practice of Malaysian SMEs in adopting e-commerce?

This research question is answered through statistical analysis of the survey questions, analysis of interviewees' answers, including the managers of the companies, and researcher observation on the SME businesses, in terms of how they conduct their business.

As one can see from the Table 5.5, number of employees is high in the service industry, as a vast number of companies in this industry use e-commerce to conduct their business. This is followed by manufacturing industry. It is true that industries related to services, implement e-commerce sites as they mostly want their business to grow. Most of the industries, including manufacturing, are implementing e-commerce; these companies mainly employ 1-17 workers in their business as seen from Table 5.5. This type of business is also known as a small business. Therefore, one can say that in an attempt to gain more exposure, small businesses attempt to implement e-commerce sites. This can be compared to the mining industry where e-commerce usage is less but employee number is greater. Indeed, it could be said that larger SMEs or those with more employees occasionally ignore the advantages of the e-commerce sites for their businesses.

Table 5.5: Industry based on Employee Number

Employee Number	**Manufacturing (incl. Agro Based)**	**Manufacturing Related Services**	**Mining and Quarrying**	**Services (including ICT)**	**Construction**	**Primary Agriculture**	**Others**	**Total**
Less than 5	3	2	0	25	1	1	8	40
5-19	4	7	0	12	1	1	9	34
20 - 50	5	7	0	7	3	0	2	24
50 - 150	3	0	1	2	1	0	1	8
150 - 250	0	1	0	0	1	0	0	2
Total	**15**	**17**	**1**	**46**	**7**	**2**	**20**	**108**

Table 5.6 shows the services industry are making use of most e-commerce in their business and vast number of SMEs have been using e-commerce for 1-10 years. This is followed by manufacturing industry that making use of e-commerce, mainly SMEs

responded that they are making use of e-commerce for 1-5 years in their business. This is followed by construction then primary agriculture and finally mining and quarrying.

Table 5.6: Industry based on E-commerce Usage

E-commerce Usage	Manufacturing (incl. Agro Based)	Manufacturing Related Services	Mining and Quarrying	Services (including ICT)	Construction	Primary Agriculture	Others	Total
Less than 1 year	6	5	0	9	2	1	5	28
1-5	5	10	1	23	2	0	12	53
5-10	3	2	0	11	2	1	3	22
More than 10 years	1	0	0	3	1	0	0	5
Total	**15**	**17**	**1**	**46**	**7**	**2**	**20**	**108**

In Table 5.7 shows most SMEs industries such as manufacturing and services before making use of e-commerce have not been using any form of e-commerce. According to interviews, this is beacuse they have just started their e-commerce ventures as soon as they started their companies. Construction, services and manufacturing industry SMEs, there were greater number of respondents who mentioned they have use offline advertisement for their business.

Table 5.7: Industry based on Business conducted by SMEs before E-commerce

Before E-commerce	Manufacturing (incl. Agro Based)	Manufacturing Related Services	Mining and Quarrying	Services (including ICT)	Construction	Primary Agriculture	Others	Total
Website for marketing only	6	3	1	10	1	1	10	32
On-line advertisement/marketing only	1	1	0	11	0	0	6	19
Off-line advertisement (e.g. newspaper, TV etc) only	5	5	0	11	4	0	1	26
No website and marketing efforts done	3	8	0	14	2	1	3	31
Total	**15**	**17**	**1**	**46**	**7**	**2**	**20**	**108**

5.2.3 Reliability Test

Cronbach's alpha coefficient is used to evaluate the reliability of the scale for the statements. The alpha coefficient ranges in values from 0 to 1, and the higher the value, the more reliable the generated scale (Al-Sayyad, 2006). Zikmund (2007) also indicate that a value is considered to have very good reliability with between 0.80 and 0.95, good reliability (between 0.70 and 0.80), fair reliability (between 0.60 and 0.70), and poor reliability (below 0.60). For this study, reliability test is shown in Table 5.8. Cronbach's alpha value is more than 0.7 for all items, the results shows good reliability. The correlation coefficient between each statement and the whole scale is highly significant, thus supporting claims that the scale is valid. As Cronbach's alpha is significantly high, thus indicating that the questionnaire is reliable, it is possible to now proceed with the analysis of data collected using the questionnaire.

Table 5.8: Measure of Reliability and Internal Consistency

Factors	Composite Reliability	Cronbach Alpha
Technological Factors	0.833	0.832
Individual Factors	0.808	0.806
Implementation Factors	0.936	0.934
Organizational Factors	0.791	0.785
Management Factors	0.809	0.795
Environmental Factors	0.786	0.788
Trust Factors	0.907	0.906
Security Factors	0.863	0.860
Privacy Factors	0.875	0.872
Ethical and Legal Factors	0.864	0.866
Intellectual property rights Factors	0.927	0.927
Loyalty Factors	0.922	0.918

5.3 Measurement Development

In this section will look into measurement development by investigating on factors influencing e-commerce adoption in SMEs. This section will unveil the e-commerce success factors and security factors for SMEs. The factors are tested for internal consistency and reliability by making use of Cronbach alpha in Section 5.1. The

analysis is conducted in order to unveil e-commerce factors so as to answer research question 2, as shown in the following section.

> Research Question 2: What are the factors influencing adoption of e-commerce in SMEs?

The success factors and security factors are identified through analysis of the survey. Using a scale of 1 (very important) to 5 (very unimportant) the overall data gathered is summarised in various tables. If the value of mean is less than 3.0, the data is considered significant. The factors considered least important by the SMEs owners are removed, whilst the other factors are discussed according to their importance.

5.3.1 Success Factor

The e-commerce success factors for SMEs include:

5.3.1.1 Technological Factors

Technological factors are rated important among SMEs owners as only two respondents view it as unimportant. Most of the respondents consider these factors either important or very important. This shows that SME owners are aware of the importance of good technological infrastructure for their companies and therefore employ it in their company.

Table 5.9 shows that most respondents consider e-commerce infrastructure, with a mean of 1.78, as most important, followed by communication (1.90) and business infrastructure (1.94) with consequently little difference. This is because manager considers business infrastructure and communication as a part of technical infrastructure and do not see as separate factors.

Table 5.9: Technological Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total/N	Mean
E-commerce Infrastructure	38.0% 41	47.2% 51	13.9% 15	0.9% 1	0.0% 0	100.0 108	1.78
Business Infrastructure	31.5% 34	46.3% 50	19.4% 21	2.8% 3	0.0% 0	100.0	1.94
Communication	32.4% 35	48.1% 52	16.7% 18	2.8% 3	0.0% 0	100.0	1.90

5.3.1.2 Individual Factors

The question under discussion here asks respondents about the importance of individual factors for e-commerce activity. This includes necessary skills, education and awareness as well as previous IT experience. Most of the respondents mark education and skills either as very important or important, thus indicating that knowledge about e-commerce is necessary among the companies which are implementing e-commerce. Most of the respondents see previous IT experience as important, with only two stating that it is not important. This is because SMEs think that once they implement e-commerce in their organisation they will acquire necessary skills in the form of learning themselves or hiring new staff.

As shown in Table 5.10, education and awareness, with a mean of 1.73, are assigned the most importance compares to skills, with a mean of 1.75, and previous experience (1.94). This is because lack of skills and expertise is one of reason for non-adoption of e-commerce in SMEs, therefore education and awareness is important among employee in order for them to successfully embrace and adapt new technologies.

Table 5.10: Individual Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total/N	Mean
Necessary Skills	39.8% 43	45.4% 49	14.8% 16	0.0% 0	0.0% 0	100.0% 108	1.75
Education & Awareness	37.0% 40	52.8% 57	10.2% 11	0.0% 0	0.0% 0	100.0% 108	1.73
Previous IT Staff Experience	26.9% 29	54.6% 59	16.7% 18	1.9% 2	0.0% 0	100.0% 108	1.94

5.3.1.3 Implementation Factors

As shown in the Table 5.11, the factors payment (52.8%), delivery (54.6%), easy to use (63.9%), customer service (59.3%), usefulness in terms of hits it received (54.6%) and Website provides detailed product specification (58.3%) are mostly rated Very Important among the SMEs, with few considering them to be important factors. This is because these factors are considered as a main part of e-commerce website implementation; a notion with which most business owners agree. Most respondents feel that a website's ease of use feature is very important as they know that the e-commerce system must be easy to use, with the right font, graphics, and text to attract potential customers. Its importance can be seen from the visual appearance factor which SMEs rate as very important (49.1%) and important (46.3%) for their e-commerce sites. The user satisfaction factor is also rated very important by SMEs owners. Other factors such as hardware/software stability, good page loading time, 24 hour availability and accessibility factors are considered important, with no respondents viewing them as not important for an e-commerce site.

The factor of customisation is considered important by 42.6%, very important by 41.7% and neutral by 14.8%, whilst 0.9% refer to this factor as unimportant. This is because most companies implement customisation according to their company and product

needs. However, as can be seen from the percentages, most respondents still consider it important. Marketing and advertisement is considered very important (51.9%) and important (40.7%) by respondents as they realise it is vital to advertises their business so as to attract more customers. Product and services provided by the company is considered a major factor as this is why customers visit the e-commerce site. This factor is considered to be very important among SMEs respondents as they realise the importance of providing high quality, low cost and a variety of products to their niche market so that customers continue to return regardless of the competition.

As seen from Table 5.11, the factor ease of use is considered the most important factor, with a mean of 1.38 respondents mention that a website should be easy to use with good customer service (mean = 1.44). This will allow businesses to serve their customers better and they will come back to make more purchases from the company. All implementation factors are considered to be significant as they are less than the mean of 3.00.

Table 5.11: Implementation Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Payment	52.8% 57	37.0% 40	8.3% 9	1.9% 2	0.0% 0	100.0% 108	1.59
Delivery	54.6% 59	39.8% 43	4.6% 5	.9% 1	0.0% 0	100.0% 108	1.52
Ease of Use	63.9% 69	34.3% 37	1.9% 2	0.0% 0	0.0% 0	100.0% 108	1.38
Customer Service	59.3% 64	38.0% 41	2.8% 3	0.0% 0	0.0% 0	100.0% 108	1.44
Number of Hits	54.6% 59	36.1% 39	9.3% 10	0.0% 0	0.0% 0	100.0% 108	1.55
Detailed product specification	58.3% 63	35.2% 38	6.5% 7	0.0% 0	0.0% 0	100.0% 108	1.48
Customisation on product & services	41.7% 45	42.6% 46	14.8% 16	.9% 1	0.0% 0	100.0% 108	1.75
Hardware/software stability	37.0% 40	50.9% 55	11.1% 12	.9% 1	0.0% 0	100.0% 108	1.76
Good page loading time	46.3% 50	48.1% 52	5.6% 6	0.0% 0	0.0% 0	100.0% 108	1.59
Visual appearance	49.1% 52	46.3% 50	4.6% 5	0.0% 0	0.0% 0	100.0% 108	1.56
System architecture	41.7% 45	49.1% 53	9.3% 10	0.0% 0	0.0% 0	100.0% 108	1.68
E-commerce site 24 hour availability and accessibility	55.6% 60	55.6% 45	2.8% 3	0.0% 0	0.0% 0	100.0% 108	1.47
Accessibility as a part of e-commerce site availability	55.6% 51	55.6% 52	2.8% 5	0.0% 0	0.0% 0	100.0% 108	1.57
User satisfaction with system	59.3% 64	36.1% 39	4.6% 5	0.0% 0	0.0% 0	100.0% 108	1.45
Marketing/advertisement	51.9% 56	40.7% 44	7.4% 8	0.0% 0	0.0% 0	100.0% 108	1.56
Product and Services Variety	46.3% 50	46.3% 50	7.4% 8	0.0% 0	0.0% 0	100.0% 108	1.61
Provide high quality product and services	52.8% 57	40.7% 44	6.5% 7	0.0% 0	0.0% 0	100.0% 108	1.54

5.3.1.4 Organisational Factors

The organisation factors are mostly known as firm internal factors. The responses for organisation factors are very different, with respondents mainly choosing between very important, important and neutral shown in Table 5.12. Few respondents also choose unimportant. Most of the respondents state that firm size, with 10.2%, is unimportant. This could be true as most respondents feel that firm size should not affect their

decision regarding the adoption of e-commerce. In contrast, 48.1% see this as important, 24.1% very important, and 17.6% are neutral. This depends on the owners of the organisation. Some respondents feel that firm size is important when implementing e-commerce and that it affects their success, while others think differently. The other factors financial resources and number of employees, the responses are dispersed but most of the respondents consider the factors as important.

Financial resources invested in web-based activity is considered to be most important (mean = 1.96%) compared to number of employees (2.16%) and Firm size (2.14%). This is because, as within the organisation, the management are more concerned with the financial resources which must be invested efficiently in order to build and maintain a good e-commerce site. This is often the reason behind SMEs' resistance when it comes to the adoption of e-commerce due to fear of cost it will incur.

Table 5.12: Organisational Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Firm Size	24.1% 26	48.1% 52	17.6% 19	10.2% 11	0.0% 0	100.0% 108	2.14
Financial Resources	30.6% 33	47.2% 51	47.2% 19	4.6% 5	0.0% 0	100.0% 108	1.96
Number of Employees	18.5% 20	53.7% 58	21.3% 23	6.5% 7	0.0% 0	100.0% 108	2.16

5.3.1.5 Management Factors

Management factors consist of factors related to CEO/management of SMEs. Starting with the factor CEO support on adoption of e-commerce in the company, more than half of respondents (54.6%) see it as a very important factor whilst the rest (41.7%) mainly regard it as an important factor. This verifies the notion that CEO/owner/management support is very important in the adoption of e-commerce, especially in SMEs. A good

management team is either considered important or very important (47.2%) by respondents. Similarly, resources commitment by management on e-commerce activity is considered very important (47.2%), followed by important (44.4%). All three variables are considered important and no respondents rate them as unimportant, although a few respondents are neutral in their responses. International web use considers being important followed by very important.

The Table 5.13 shows that CEO support for the adoption of e-commerce is considered the most important among all variables. This is true as in SMEs, owners/CEOs are the ones who make major decisions regarding the infusion or diffusion of new technology for businesses.

Table 5.13: Management Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Manager/ CEO Support	54.6% 59	41.7% 45	3.7% 4	0.0% 0	0.0% 0	100.0% 108	1.65
Good project Management team	47.2% 51	47.2% 51	5.6% 6	0.0% 0	0.0% 0	100.0% 108	1.68
Management Resources Commitment	47.2% 51	44.4% 48	8.3% 9	0.0% 0	0.0% 0	100.0% 108	1.85
International Web use such as language	39.8% 43	42.6% 46	18.7% 17	1.9% 2	0.0% 0	100.0% 108	1.76

5.3.1.6 Environmental Factors

Environmental factors are also known as external factors. Most respondents consider government support factor to be important (46.3) followed by very important and neutral. However, none of the participants categorise it as unimportant. This indicates just how important SMEs consider government support for their businesses. Similarly, with regard to industry competitive, most respondents consider this to be either

important (52.8%) or very important (39.8%) whilst a few are neutral (7.4%). However, few of the SMEs consider national support or competitive pressure as unimportant while a greater number SMEs still consider it as an important factor.

Government support is considered to be the most important environmental/external factor by respondents of the study. This is particularly true given the fact that SMEs want more government support in order to enhance their business, especially in the area of ICT. Indeed, most SMEs realise that without government support they will not be able to progress, especially in developing country like Malaysia.

Table 5.14: Environmental Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Government support	44.4% 48	46.3% 50	9.3% 10	0.0% 0	0.0% 0	100.0% 108	1.65
Industry Competitive	39.8% 43	52.8% 57	7.4% 8	0.0% 0	0.0% 0	100.0% 108	1.68
National support	33.3% 36	50.9% 55	13.0% 14	2.8% 3	0.0% 0	100.0% 108	1.85
Competitive pressure	35.2% 38	55.6% 60	7.4% 8	1.9% 2	0.0% 0	100.0% 108	1.76

5.3.2 Security Factors

The e-commerce security factors for SMEs are given in following sections:

5.3.2.1 Trust Factors

When it comes to maintaining the trust between customers and an e-commerce site, the following factors must be taken into consideration, as shown in Table 5.15. According to SMEs, owners' data integrity and reliability is the most important factor, with a mean of 1.58. Indeed, it is deemed to be a vital trait in maintaining trust through data integrity and reliability. Put simply, whatever that company publishes on their website should be

truthful and reliable. With this, customers are more able to trust the company's products and services. In terms of importance, this factor is followed by website recovery system, with a mean of 1.69. The website should have some form of backup system to protect customers in case of a system crash. Most respondents consider all trust factors as important for e-commerce adoption, with only 0.9% saying that the warranty message is not needed.

Table 5.15: Trust Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Website Continuity Program	30.6% 33	61.1% 66	8.3% 9	0.0% 0	0.0% 0	100.0% 108	1.78
Warranty Messages	26.9% 29	58.3% 62	13.9% 15	.9% 1	0.0% 0	100.0% 108	1.89
Website Recovery System	40.7% 44	50.0% 54	9.3% 10	0.0% 0	0.0% 0	100.0% 108	1.69
Data Integrity and Reliability	45.4% 49	50.9% 55	3.7% 4	0.0% 0	0.0% 0	100.0% 108	1.58
Competence	37.0% 40	52.8% 57	10.2% 11	0.0% 0	0.0% 0	100.0% 108	1.73
Predictability	34.3% 37	50.9% 55	14.8% 16	0.0% 0	0.0% 0	100.0% 108	1.81
Benevolence (caring)	33.3% 36	51.9% 56	14.8% 16	0.0% 0	0.0% 0	100.0% 108	1.81

5.3.2.2 Security Factors

Table 5.16 shows security factors; considered mainly important and neutral among all respondents. This can verify the fact that security is one of the most important features for e-commerce in an organisation. The descriptive analysis compares the mean of all factors under security. This verifies the fact that, among the organisations, protection from unauthorised access is considered most important, with a mean of 1.33 followed by transaction security with a mean of 1.30. The transaction security provides security for transaction of credit cards and debit cards by e-commerce sites, whilst most SMEs feel it is very important to consider this security.

Table 5.16: Security Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Protection from unauthorised access	67.6% 73	31.5% 34	.9% 1	0.0% 0	0.0% 0	100.0% 108	1.33
Authentication	63.0% 68	32.4% 35	4.6% 5	0.0% 0	0.0% 0	100.0% 108	1.42
Transaction Security	74.1% 80	24.1% 26	.9% 1	.9% 1	0.0% 0	100.0% 108	1.30
Data Security Policy	63.0% 68	34.3% 37	2.8% 3	0.0% 0	0.0% 0	100.0% 108	1.40
Customer Screening	57.4% 62	36.1% 39	5.6% 6	.9% 1	0.0% 0	100.0% 108	1.50

5.3.2.3 Privacy Factors

Table 5.17 shows the privacy factors as rated by the SMEs owners. As can be seen, the factor privacy policy, with a mean of 1.54 is considered the most important. This is followed by third party privacy seals with a mean of 1.62. These factors are highly rated as most companies consider them when implementing their e-commerce. The least important factor is considered to be cookies control consent, with a mean of 1.70. This is because most organisations implement cookies without their consumers consent as cookies allow companies to gather individual information while they make use of website.

Table 5.17: Privacy Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Privacy Policy	47.2% 51	51.9% 56	.9% 1	0.0% 0	0.0% 0	100.0% 108	1.54
Third Party Privacy Seals	45.4% 49	48.1% 52	5.6% 6	.9% 1	0.0% 0	100.0% 108	1.62
Cookies Control Consent	35.2% 38	58.3% 63	6.5% 7	0.0% 0	0.0% 0	100.0% 108	1.71
Employee Privacy	38.0% 41	54.6% 59	6.5% 7	.9% 1	0.0% 0	100.0% 108	1.70

5.3.2.4 Ethical and Legal Factors

Table 5.18 discusses the frequency of response for ethical factors in e-commerce. Most respondents feel that these factors are important, followed by the response of very important. Only few respondents remain neutral, and view these factors as neither very important nor unimportant. Thus, overall respondents consider the factors as important rather than being critically important as they consider privacy and security factors. This can be because lack of awareness about ethics factors among SMEs compared to security and privacy factors as most of the respondents consider ethics as part of security and privacy concerns (Roman, 2007).

Table 5.18: Ethical and Legal Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Control Spam	41.7% 45	51.9% 56	6.5% 7	0.0% 0	0.0% 0	100.0% 108	1.65
Electronic Contracts	30.6% 33	59.3% 64	9.3% 10	.9% 1	0.0% 0	100.0% 108	1.81
Secure or Approved Links or other seals	32.4% 35	55.6% 60	11.1% 12	.9% 1	0.0% 0	100.0% 108	1.81
Guarantees/ Disclaimer or other seals	33.3% 36	53.7% 58	12.0% 13	.9% 1	0.0% 0	100.0% 108	1.81

5.3.2.5 Intellectual Property Rights Factors

Intellectual property rights are important in order to protect companies from competitors. SMEs can use Intellectual property rights, in the form of trade secrets, patents, copyrights and trademarks, to attract investors, increase their market value, and protect their innovation from use by business competitors (Sabett, 2016). As shown in Table 5.19, with a mean of 1.53 domain name registration is considered the most important among all intellectual property rights followed by copy right protection, with

a mean of 1.64. Trademark usage, with a mean of 1.65 and patent protection, with a mean of 1.69, are considered the least important. This may be because most of SMEs consider patents are for big cooperation's and high technology. Secondly, they have lack of information regarding applying for patents in their respective countries (Bharati & Chaudhury, 2015; WIPO, 2016b).

Table 5.19: Intellectual Property Rights Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Trademark Usage and Protection	40.7% 44	53.7% 58	5.6% 6	0.0% 0	0.0% 0	100.0% 108	1.65
Domain Name Registration	48.1% 52	49.1% 53	1.9% 2	99.1% 0	.9% 0	100.0% 108	1.53
Patents Protection	41.7% 45	48.1% 52	9.3% 10	.9% 1	0.0% 0	100.0% 108	1.69
Copyright Protection	44.4% 48	47.2% 51	8.3% 9	0.0% 0	0.0% 0	100.0% 108	1.64

5.3.2.6 Loyalty Factors

Reputation building is considered most important among SMEs with a mean of 1.56 followed by the customer satisfaction variable, with a mean of 1.58 as shown Table 5.20. This is true as SMEs know that their reputation is considered to be their most valuable asset as this reinforce that customers will keep coming back for more services and products. In this context, customer satisfaction with the service plays an important role. Customer trust and frequency of purchase, both with a mean of 1.61, are considered to be essential factors as it help to increase sales and revenue for businesses (Awa, et al., 2015).

Table 5.20: Loyalty Factors

Variables	Very Important	Important	Neutral	Unimportant	Very Unimportant	Total	Mean
Customer Trust on site product and services	45.4% 49	48.1% 52	6.5% 7	0.0% 0	0.0% 0	100.0% 108	1.61
Reputation Building	49.1% 53	46.3% 50	4.6% 5	0.0% 0	0.0% 0	100.0% 108	1.56
Customer Satisfaction with past Services	46.3% 50	49.1% 53	4.6% 5	0.0% 0	0.0% 0	100.0% 108	1.58
Frequency of Purchase	50.0% 54	38.9% 42	11.1% 12	0.0% 0	0.0% 0	100.0% 108	1.6111

5.4 Model Testing

Further analysis is conducted so as to find a holistic model for e-commerce by making use of AMOS to answer research question 3, as shown in Section 5.4.1 and Section 5.4.2.

> Research Question 3: What are the components of holistic e-commerce model for SMEs?

5.4.1 Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) is used to establish a suitable model for e-commerce security. This is done by making use of AMOS software to perform structural equation modelling. The steps in the following sections are used to verify the holistic model for e-commerce.

First Order Model 1: A Model Estimation of twelve Factors

Figure 5.1 shows the first attempt to account for the elements of security while featuring twelve latent variables. The latent variables, which are also known as unobserved variables, are variables which are not directly observed but are rather inferred through a

mathematical model from other observed variables. The 12 factor is called the latent variable because they are removed from the direct questionnaire to which SMEs respond. The model brings a total of 62 factors and 12 latent variables (Refer to Appendix F for abbrevation of factor usage in CFA model).

The overall fit of the model is measured using Chi-square = 3427.280, Degrees of freedom = 1763, and Probability level = .000. As one of the research objectives is to find the model with a close fit between observed factors and the hypothesised model, a finding of significant difference is a sign that the goal has not yet been met. However, the Chi-square divided by degree of freedom 1.944, yields the range of acceptability. The ratio of the Chi-square to the degrees of freedom is 1.944, with a figure lower than 3 indicating a good model fit (Schumacker & Lomax, 2004). The Comparative-Fit Index (CFI) = 0.693, Tucker-Lewis Index (TLI) = 0.671 and Relative Fit Index (RFI) = 0.498 do not fall within the confidence level 0.8 to 0.9 (Lee, Kang & Kim, 2007) and as such are considered low. This means that the model is not a good fit and the Root Mean Squared Error of Approximation (RMSEA) is 0.88, namely less than 0.1, which is high.

The loading between most of the factors and latent variables is good, with the exception of a few factors where loading is below average >50 and marketing and payment where factor loading is approximately 0.40 (Refer to Appendix G for loading of each factors).

Model 1 then provides an insight into the inter-correlation of the individual item and the inter-correlation between the main security factor. Although it does not demonstrate goodness of fit to be truly useful, it does offer the pointer which helps to reach a better fitting model.

Chi-Square = 3427.280

Cmindf = 1.944
P = 0.000
CFI = .693
TLI = 0.671
RMSEA = 0.88

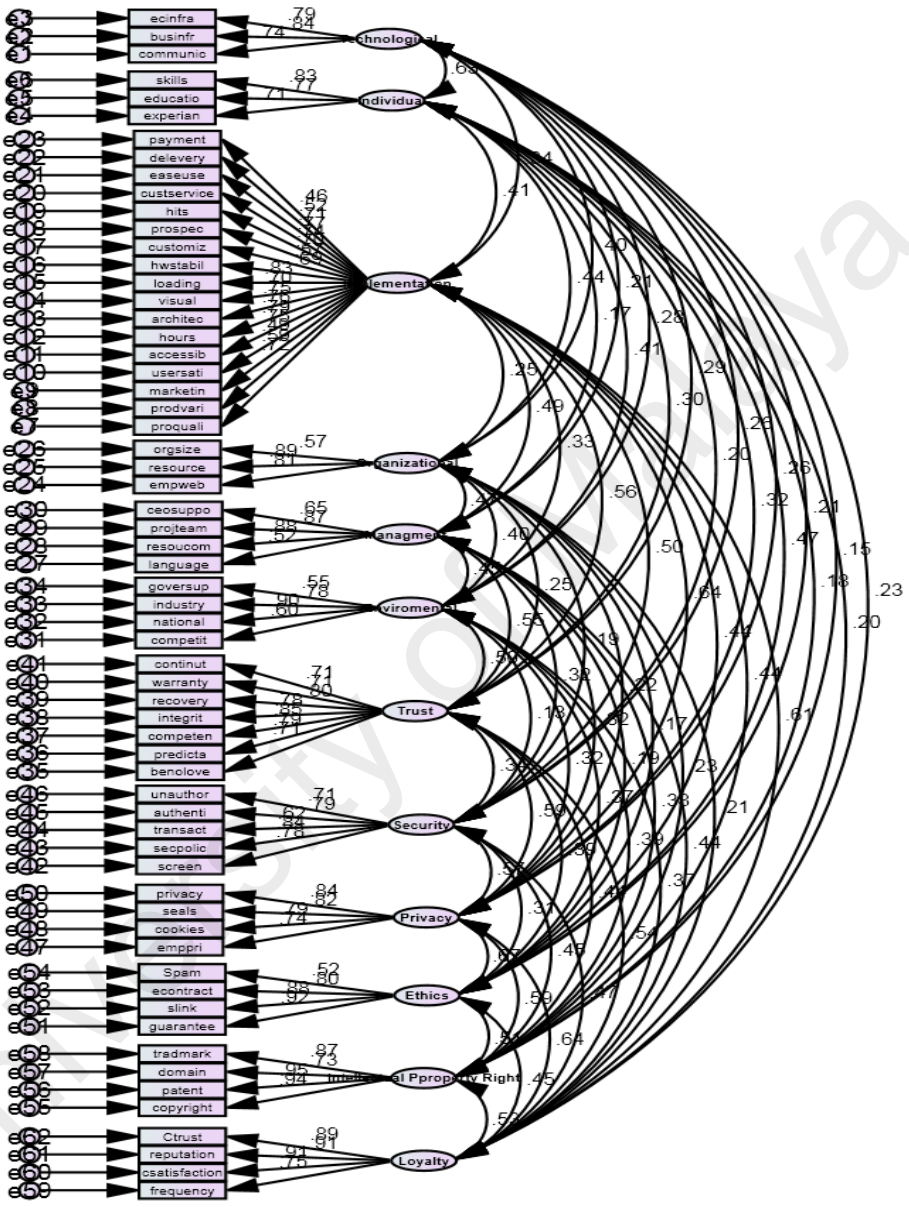

Figure 5.1: Model 1: 12 Latent Variable Loading 62 items
(Refer to Appendix F for abbrevation of factor usage in CFA model)

First Order Model 2: Revised Model of 12 Factors

As shown above section, model 1 is considered to be un-satisfactory. A revised model, as shown in Figure 5.2, is proposed by expanding the degree of correlation between each variable. Eight correlations are made between the variable to increase the acceptability of the model. The Chi-square test ($X2 = 3197.644$, $df = 1756$, $p = .000$) is considered to be significant, although the model is still not a good fit. Although CMIN = 1.821 is acceptable, CFI = 0.734 and TLI 0.714 values are increased. However, it remains no closer to the 0.90. The value should be more than the 0.90 which is needed for an acceptable fit of model. Refer to Appendix G for loading of each factors.

Chi-Square = 3197.644
Cmindf = 1.821
P = 0.000
CFI = 0.734
TLI = 0.714
RMSEA = .088

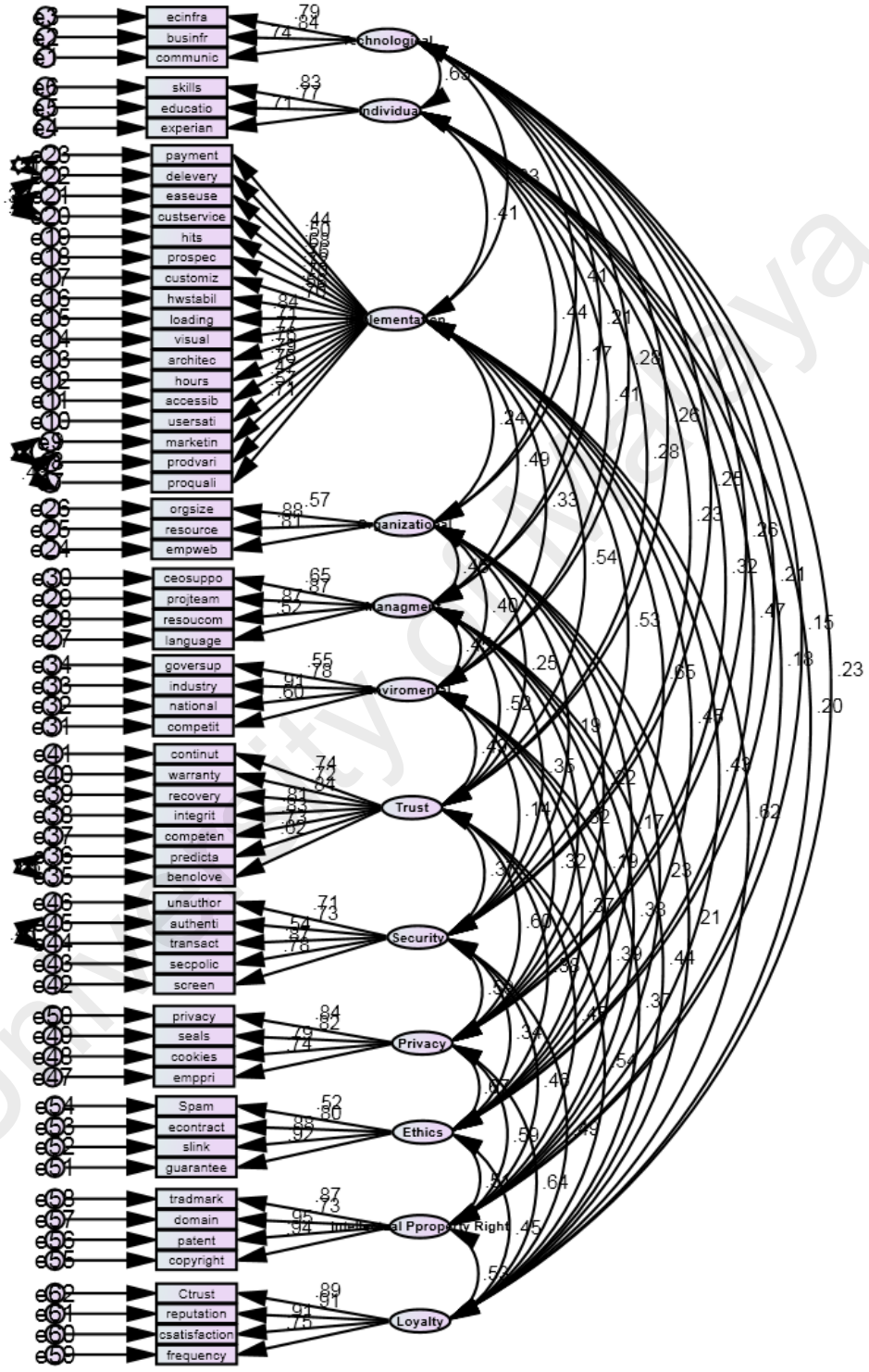

Figure 5.2: Model 2: 12 Factors Loading on 62 Items and 7 Error Correlations

(Refer to Appendix F for abbrevation of factor usage in CFA model)

First Order Model 3: Revised model

Whilst Model 5.2 is an improvement of Model 5.1, it remains unsatisfactory in terms of model fit. Model 5.3, shown in Figure 5.3, use a different approach toward achieving the overall model fit. The model is modified by eliminating the factor by indication of Standardised Residual Covariance to increase model acceptability. The CMIN/DF = 1.481, which is considered good as it within an acceptable level, not exceeding the 2.0 point. The TLI = 0.906 and CFI = 0.918, both of which are above the 0.90 threshold and are thus considered to be acceptable. RMSEA value is .067, which is acceptable as the as RMSEA in the range of 0.05 to 0.10 was considered an indication of fair fit and values above 0.10 indicated poor fit (MacCallum, Browne, & Sugawara, 1996). RMSEA of between 0.08 to 0.10 provides a mediocre fit and below 0.08 show a good fit (MacCallum, et al., 1996). The loading between all of the factors and latents variables is good, with the exception of a few factors where loading is below average >50 and delivery and education where factor laoding is around 0.40. Therefore, the overall model is considered to be acceptable. Refer to Appendix G for loading of each factors.

Figure 5.3 shows a higher order Confirmatory Factor Analysis model for e-commerce secure adoption. This model is developed for secure e-commerce adoption in SMEs.

Chi-Square = 663.263
Cmindf = 1.481
P = 0.000
CFI = 0.918
TLI = 0.906
RMSEA = .067

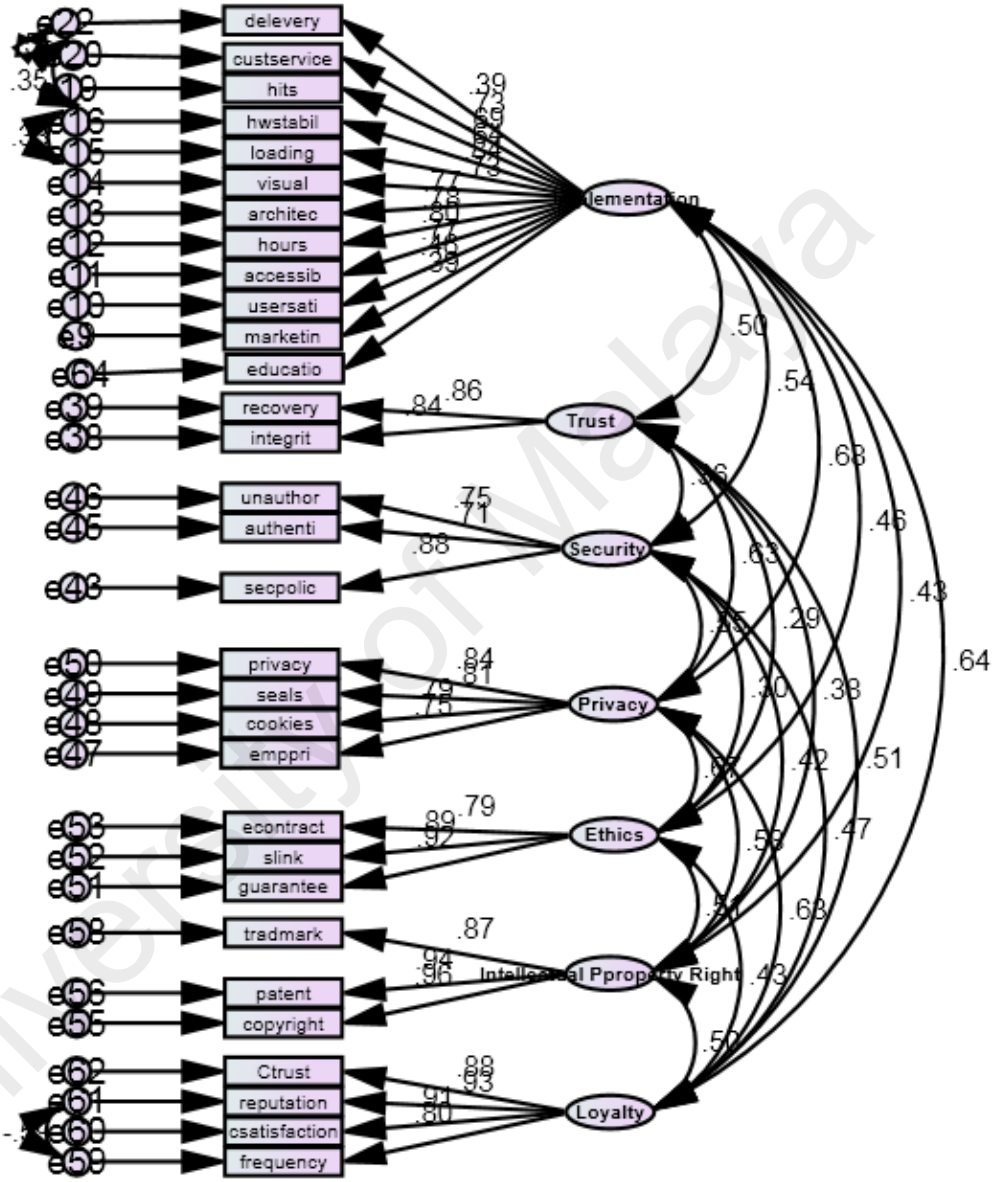

Figure 5.3: Model 3: 7 Factors Loading on 32 Items and 4 Error Correlations

(Refer to Appendix F for abbrevation of factor usage in CFA model)

5.4.2 Discussion on E-commerce Holistic Model

The factors verified in the e-commerce holistic model in Figure 5.3, are shown in Table 5.21. As expected the implementation factors is verified in holistic model are the success factor that is consider necessary in successful implementation of e-commerce site in SMEs. The implementation of e-commerce requires proper planning and a policy to promote the use of e-commerce among customers of website. Adequate and proper planning usually results in success. The other point that is clear from the research the factor such as ethical, intellectual property rights and loyalty for SMEs is as important as trust security and privacy factors. These are the factors that needed to be considered when final implementation of e-commerce system. Intellectual property right that was mild surprise, but this is an indicator that there is more global awareness with respect to the issues of software privacy and knowledge capital. Loyalty factors such as reputation and customer satisfaction have very high loading followed by guarantees under ethics have high loading. This means for businesses, customer's satisfaction and their reputation are important factors when conducting online transaction.

The usage of e-commerce requires security and privacy factors to maintain loyalty and trust between customers and company. Adequate e-commerce implementation and security in SMEs results in success. Therefore SMEs wishing to implement e-commerce need to have extended infrastructure, with good working website and strength their security system. In next section, there is a discussion on all the factors verified by holistic model followed by new version of Molla and Licker (2001) model with verified factors from CFA.

Table 5.21: Factors from the Holistic Model

Factor	Variables
Implementation	Good Delivery system Website provide good customer service Website is useful/success in term of hits its received on daily basis Hardware/software stability Good page loading time Visual appearance System architecture Accessibility as part of the e-commerce system quality E-commerce site 24 hour availability and accessibility User satisfaction with system Appropriate site marketing/advertising
Trust	Website recovery system Data Integrity or Reliability
Security	Protection of site from unauthorized access/outsiders Provide Authentication - secure access to website Data Security policy
Privacy	Privacy policy Third part privacy seals assuring the trustworthiness of Internet vendors Cookies control consent Privacy of employees in using website
Ethical and Legal	Availability of Electronic contracts Secure and approved links to other seals Guarantees/disclaimer or other seals
Intellectual property rights	Trademark usage and protection Patents protection Copyright protection
Loyalty	Customer trust in site services in term security policy Reputation building Customer satisfaction with past services Frequency of purchase

a) **Implementation Factors:** Implementation factors are the variables that are needed for successful implementation of the e-commerce system in business. Availability of implementation factors is needed to make the e-commerce system as a good functioning website for clients and business owners. The implementation of e-commerce requires good planning and a policy to promote the use of e-commerce among customers of the website. Adequate and proper planning usually results in success.

As seen from the Table 5.21, the factors such as website appearance together with customer service is considered the most important factor, respondents mention that a website should be easy to use with good architecture and

customer's service. These factors adopted by SMEs will allow companies to serve their customers better, and they will come back to make more purchases from the company.

b) Trust Factors: Trust has been identified an important factor for e-commerce transaction. Trust and security are two of the most important issues in any online transaction. They are cited as being the most significant barrier to e-commerce (Gutowska & Bechkoum, 2007). It is suggested that the level of trust that consumers are willing to place on an online transaction is considered a key factor for the continued growth of e-commerce (Houston, 2001). An increased degree of trust in an e-commerce site will increase people's intentions to inquire and purchase the products on that vendor's website (Gefen & Straub, 2000).

When it comes to maintaining the trust between customers and an e-commerce site, the following factors must be taken into consideration, as shown in Table 5.21. According to SMEs, owners' data integrity and reliability and website recovery system are the most important factor. Data integrity and reliability is needed by company in order for customer to maintain trust on company products and services. The business e-commerce system needs to have a good recovery system to protect customer data in case of the system crash.

c) Security Factors: Security concerns in e-commerce are related to data and the system security. To improve the data security in e-commerce can make use of public and private keys, digital signatures & certificates, secure socket layers, and secure electronic transactions. This will allow to SMEs to secure online data and information related to personnels and their payments. To protect e-commerce networks against internal and external attacks and intrusions,

firewalls, VPNs, and intrusion-detection systems can be used. Biometrics systems can be used to protect the system and its data (Ngai & Wat, 2002).

The security factors verified in the model are able to provide protection from unauthorised access, transaction security and data security policy. This verifies that SMEs managers know that authentication and authorization is consider being important for both their customers and employees. Data security policy is needed for e-commerce system to ensure customers of e-security and confidential of their personal and sensitive information and establish administrative, technical and physical safeguards to protect against unauthorised access or use of information.

d) **Privacy Factors:** Privacy is a necessary concern in e-commerce. It is difficult to complete a transaction without revealing some personal information, such as shipping, billing, or product preferences. Users will be unwilling to provide this information if they believe their privacy is invaded or threatened (Ackerman, Cranor, & Reagle, ,1999). The privacy issue of data gathering should inform the consumer what information they are collecting and what they intend to do with it, as people are concerned that their personal information will be reused without authorization (Ngai & Wat, 2002). Privacy factors are needed by company to maintain their customer's privacy by providing appropriate measures.

e) **Ethical and Legal Factors:** When dealing with B2C clients, there is major amount of responsibility imparted on the person or group of people that maintain the website. It is very important in the context of ethical and legal B2C perspective that what is written or portrayed about the company is factual. Furthermore, if proper business to business ethical behavior is not

being followed there is potential of trade secrets and/or intellectual property can be exposed. As with any business planning or publishing, website development involves a variety of legal issues and standards to be followed. Such issues are considered to protect both the consumers and the owner of the site. Ethics factors such as availability of e-contracts, secure links and guarantees are verified in the model. The secure link and guarantees are needed on product and service to build customer trust and loyalty.

f) **Intellectual property rights Factors:** Intellectual property rights are important in order to protect companies from competitors. The factors such as trademark, patents and copyright are being verified by SMEs. There are several reasons why intellectual property is important to e-commerce for SMEs. E-commerce, more than any business system involves selling of products and services that are based on intellectual property and its licensing. Music, pictures, photos, software designs, training modules, system, etc., can all be traded through e-commerce, in which case, intellectual property is the main components of value in the transaction. Intellectual property is important because the things of value that are traded on Internet must be protected, using technological security systems or intellectual property laws, or else they can be stolen or pirated and whole business can be damage. Trademarks are an essential part of e-commerce business, as branding, customer recognitions and good will, essential elements of web-based business, are protected by trademark and unfair competition law (WIPO, 2016b).

g) **Loyalty Factors:** E-loyalty is also considered as an important security factor. Since the availability of competitor's websites, where e-commerce businesses are only a click away, the Internet provides an advantage to buyers by

allowing them to compare and contrast the quality and price of products between world-wide sellers. Therefore, in order for businesses to handle this type of competitive pressure, there is an ever growing interest in e-loyalty. Over time, customer loyalty increases the sale of products and company profits. It also costs five to eight times more for a company to acquire new clients, than it does to keep existing ones (Reichheld & Schefter, 2000). Customer loyalty brings cost savings to companies in many ways, such as lower transaction costs, lower turnover costs, lower marketing costs, and lower failure costs, such as warrantees, etc. Customer loyalty also allows customers to stay away from their competitors in the same market sectors. The eight e-business factors that appear to impact e-loyalty are Customization, Contact interactivity, Cultivation, Care, Community, Choice, Convenience, and Character (Srinivasan, Anderson, & Ponnavolu, 2002). All loyalty factors have been verified in the model, this shows how important SMEs consider loyalty for their business. With the loyalty, customers will come again in the future to make more purchases.

5.4.3 Molla and Licker Extend Model

The list of factors and attributes presented in the model shown in Figure 5.3 are reasonable indicator of potential success for start-up of e-commerce in SMEs. The model also verifies the factors stemming from the IS success model. These factors include: content quality, system quality, use, trust, support and service and e-commerce system quality; all of which are being verified in the holistic model. The new version of Molla and Licker model is shown in Figure 5.4 that verified the factors shown in Table 2.3 Chapter 2. The Figure 5.4 shows the factors and variables verified by CFA.

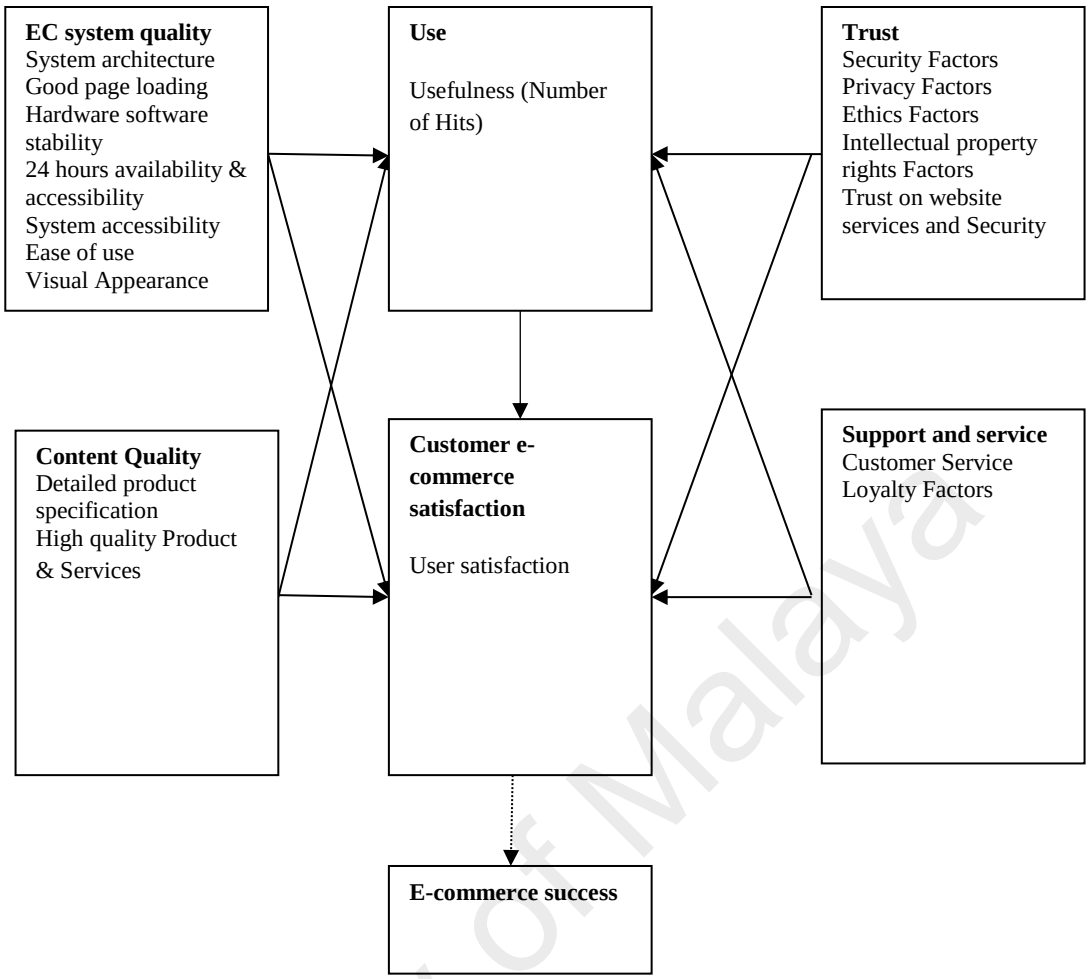

Figure 5.4: Molla and Licker (2001) Verified Model

The Molla and Lickers (2001) model is extended based factors verified in CFA, in future research the model can be further tested and relationship between variables can be tested using SEM. In this research, we have not further tested Molla and Licker model as it is out of this research scope.

E-commerce system quality: The e-commerce system quality is important as in e-commerce, the potential competitors are only click away and site failure results in customer dissatisfaction and non-use of e-commerce systems (Molla & Licker, 2001). The factors that are mention by Molla and Licker (2001) for the e-commerce system quality such as ease of use, 24-hour availability, stability of software and hardware, page loading time, the system architecture, visual appearance and accessibility as a part of e-commerce system quality. These all factors have been verified by making use of

CFA in Figure 5.3 thus have been added in Molla and Licker (2001) model in figure 5.4.

Content quality: Content quality represents quality of information presented in e-commerce system. The factors included in version 2 in Figure 2.4, chapter 2 has been verified in IS model version 2 shown in figure 5.4.

Use: The use of the e-commerce system is measure by the number of hits/visits the website receives in daily basis. The usefulness factor is verified by CFA.

Trust: According to Molla and Licker (2001), trust consists of security and privacy factors that may affect the use of e-commerce system and customer satisfaction. The version 2 shown in Figure 2.4, chapter 2 have added ethics, intellectual property rights and their variables (availability of electronic contracts, secure and approved links to other seals, guarantees/disclaimer or other seals, trademark usage and protection, patents protection, copyright protection) as part of Trust in Molla and Licker (2001) model. In Figure 5.4 of Molla and Licker extended model these factors are validated.

Support: The question that most of the e-commerce operators are interested in knowing that will the customer will return to their site after initial experience, i.e. loyalty. Loyalty can be maintained by giving good support and customer service to the clients. The IS success model shown in Table 2.3, chapter 2 have added additional variables that are considered to increase loyalty of customers such as trust on website services and security, satisfaction with past services, reputation building and frequency. These factors are verified shown in the Figure 5.4 by CFA.

5.5 Interview and Observation Analysis

Kumar & Feldman (2011), define content analysis as the analysis of interview content or observation fields notes in order to identify the main themes which emerge from the responses given by respondents or observation notes made by the researcher. A total of five themes are identified from interviews with different SMEs, namely security factors, success factors, limitations of e-commerce model, security model and successful e-commerce system, as explained in Section 3.8.3, Chapter 3. A sample of themes is shown in Appendix I. Here the main theme that were identified during the analysis of interview and observation helps to verify the holistic e-commerce model.

The analysis is carried out on the responses obtained from interviews and observation (refer to appendix H and I). The analysis is conducted based on the model obtained from the CFA as shown in Section 5.4.2. The main reason for conducting the interview and observation is to verify the facts obtained from the survey. The interviews help to verify the model for e-commerce security. The interview is conducted mostly with managers/CEOs of different SMEs and the majority of SMEs included have no more than 50 employees working in their company.

5.5.1 Success Factor

When asked about the success factors which are necessary for an e-commerce site, most of the respondents' consider implementation factors to be most important. Most of the answers from the respondents are customer focussed, such as providing good services to their clients, where they can interact with them, good functioning website with good product, easy to use and attracts clients toward their website. For example, one of the respondents states, quite similar to others, that "good, easy and understandable website that our customers are able to use it and all transaction can be conducted on it"

(Respondent 6). This verifies our CFA model finding, as implementation factors are similar to those confirmed by AMOS.

5.5.2 Security Factors

When asked about whether they deem the security factor as necessary for their e-commerce site, most of the respondents answer in general terms. For example, one respondent simply answers, "trust, loyalty and privacy" (Respondent 5), while another focuses more on payment and transaction security which helps to increase trust between them and their customers. Indeed, this is similar to a few of the responses, e.g.

"We implemented all the security and privacy measure to conduct the transaction between our clients and us smoothly" (Respondent 6).

"Any security services that allow our student to trust our services and actually they do trust our sources and information" (Respondent 7).

One of the respondents states that they are 'providing several types of payment methods to be used so that customers can choose the method of their choice' (Respondent 8). This helps to understand that security and privacy of data is very important, and must be considered by companies which already have an e-commerce system. They are also providing different measures with which to protect the data from unauthorised access. Based on the responses in the interviews, although one can see that respondents cover most of the security factor, they hardly mention intellectual property rights. This is considered interesting as during the survey most of the respondents, one way or another, agree that intellectual property rights are important for their company. This leads to the conclusion that although intellectual property rights are assumed to be important among SMEs, the attention remains very much on security and privacy factors. This differs from more developed countries such as USA and UK where intellectual property rights

are growing in popularity (Hargreaves, 2011; Candelin-Palmqvist, Sandberg, & Mylly, 2012; Kim et al., 2016).

5.5.3 Limitation of E-commerce model

At the start of the interviews researcher ask respondents whether or not they think there is a limitation on e-commerce models which can help SMEs toward secure adoption of e-commerce. Most of the respondents answer "Yes" (Respondents 1, 2, 4, 5, 6, 8 and 9) or that they are not sure as to whether or not this type of model existed. As one of the interviewee responds, "There are many guidelines available on Internet if you search for it. But I am not sure about Model" (Respondent 3). Others respond similarly, with one of the respondents saying that they do not make use of any model because they take the help from the professional web developer or vendor (Respondent 7). Although most SMEs take help from the professional e-commerce system developer, it is necessary that they know a model against which they can measure their e-commerce website's success. The model should help SME managers to set guidelines which should be achieved in order to develop a fully successful e-commerce system.

5.5.4 E-commerce Security Model

When the managers of the SMEs are asked what type of model they prefer, the majority of the respondents answer that the model that is easy to follow and implement in their company. Other than that, most respondents state that the model should provide all of the security features which must be followed in order to achieve a secure e-commerce system. Respondent 8 answers, "the model that can easily incorporate in my existing business and I don't have to make any drastic change, that will make process easier and efficient for me and my customers". Overall respondent agree that they want an easy to

use and implement model which is very similar to the model being proposed using CFA consisting of 32 factors to make any e-commerce website secure and easy to use.

5.5.5 Successful E-commerce Site

Most of the respondents agree that a successful e-commerce site, for them, is one which drives the growth of their business. This will allow more people to know about their product and services, which will help "to increase customer and sell services online and stay in contact with them" (Respondent 6). When asked why they have not implemented an e-commerce site previously, most of the managers respond that they did not think it was important at that time. This can be because of too little knowledge and information regarding new technologies among SMEs managers. Indeed, as pointed out by one of the CEO of Manpower Company; "actually we didn't have much knowledge and experience about this technology" (Respondent 1). Other answers make reference to alternative modes of communication, including facebook, blogs, and traditional marketing to make their business known among customers. Certain new businesses related to education, services and retailer businesses attest to making use of the e-commerce system as soon as they started their business ventures. This affirms that new businesses know the importance of a good e-commerce system and will not hesitate to implement it in their organisation.

During an observation of a car dealership company, it is evident that their whole business depends on the e-commerce site. All of their vehicles are sold to the clients using the e-commerce site. All employees in the company handle orders, payments, and invoicing; delivery and customer service also happened via the e-commerce site. However, should customers have any queries they can send e-mails or make a call to an employee. They can even contact the CEO of the company, whose contact details are available. The company is conducting very successful e-commerce business and is

considered to be one of the largest car dealership companies in Malaysia and Singapore. It customers come mainly from Malaysia, Singapore, New Zealand, South Africa and all over the world. During the interview conducted with an SME CEO, he agrees that all of his business is due to a good e-commerce system which his company has implemented.

5.6 Summary

In conclusion, this study develops and verifies a model for secure e-commerce. A total of 62 factors are identified as being necessary for the secure and successful adoption of e-commerce in Malaysian SMEs. Descriptive statistics are also used to verify the factors needed for secure implementation of e-commerce in SMEs. Based on descriptive statistic results, transaction security and its dependent factors are all considered being critical. Beside that loyalty factors were also considered to be important. This is followed by intellectual property rights, which represent a mild surprise. However, this is an indicator that there is more global awareness with respect to the issues of software privacy and knowledge capital. Implementation factors are also considered to be very important as they are necessary for the final implementation of the site. Another mild surprise relates to the organisation factor (firm size, financial resources, number of employees) with its relatively low rating. This is indicative of e-commerce participants' recognition that there are other critical factors when it comes to establishing an e-commerce relationship.

The model is then developed and verified using CFA of AMOS, with the verification of 32 factors so as to develop and confirm the model. The model verifies factors from the IS success model by Molla & Licker (2001). The factors include content quality, system quality, use, trust, support and service and e-commerce system. The implementation

factors in holistic model are the success factor that is consider necessary in successful implementation of e-commerce site in SMEs. This model is later validated by conducting interviews and observation within SMEs. The next chapter develops an e-commerce system using this CFA model and tests the system to gauge its usage among SMEs. Surveys and interviews are also conducted in order to validate a secure e-commerce system, which in turn verifies the model.

CHAPTER 6: SYSTEM DEVELOPMENT AND TESTING

6.1 Introduction

This chapter is divided into two parts. The first part deals with the development of two e-commerce systems. The first system is based on how SMEs' are currently conducting their business using e-commerce, whilst the second system is developed based on the security model verified by CFA in Chapter 5. The second part of the chapter deals with verifying the system through a comparative analysis of responses and comments received from the survey. The focus group is conducted with SMEs to verify the e-commerce system and model.

6.2 System Development

The first system is developed based on how companies conduct their business using e-commerce. The second system is designed according to the model and factors which are identified and verified from the literature review and survey. These are factors which must be incorporated into the website.

6.2.1 Software Solution: Once the system design is completed, and the system requirement is identified (Refer to Section 3.10 and 3.11 in Chapter 3), it is time to look for software solutions with which e-commerce system should be developed. After some consideration and observation, Shop Factory 7.0 and x-cart software are selected to develop the e-commerce system for website 1 and website 2 respectively. Shop Factory and x-cart are suitable software packages with which to develop an e-commerce website because of the following reasons: ease of use, quick checkout, quick implementation

and integration, complete support, seamless upgrades, higher Return on Investment (ROI), access to sales data anywhere, anytime, real-time information and reporting, lower database licensing cost, easier on-going maintenance, minimising company network traffic, etc.

The comparison of shop factory and x-cart with other software solutions is shown in Table 6.1.

Table 6.1: E-commerce Software Comparative Analysis

Categories	Shop Factory	X-Cart	Pinnacle Cart
Installation	No installation required. Just publish your shop on the Internet with the integrated publishing	Online installation wizard + authorised installation service	Expensive to authorise hosting from company installation service on company host. No partner hosting service
Web design	Allows you to create a complete website with print and click feasibility. It is much faster and easier to use. Free design and website layout provided	Cart modification takes time. This is because their coding style has a steeper learning curve than other shopping carts	Easy template system. Without any background in programming can still create custom landing pages
Technical support	Free forum access for registered users. 30 days free support on general questions, further support requires flat-rate monthly renewal	Provides authorised technical support service, forums, knowledge base in the private members area	Provides free e-mail and phone support for 30 days after purchase knowledge base ticket system
Experience	It was initially known as shop wizard and was launched in 1996	It is new shopping cart so its usage has not been tested as much as others	The shopping cart is quite new and as such has not been tested for bugs as other carts have been

Shop Factory 9.0 is a powerful software package which allows users to develop a WYSIWYG (What You See Is What You Get) environment. The term is used to describe the system in which the content, including text and graphics displayed on the screen during editing appear in a form which corresponds closely to its appearance when printed as a finished product. This finished product can take the form of slides, web pages or printed documents. The second software package been used is the x-cart. X-cart is a software package written to use PHP as the server-side scripting language and MySQL as its database. It is a very powerful and capable shopping cart system.

The decision is taken to make use of shop factory and x-cart to develop an experimental prototype through which to verify our model of secure e-commerce success. This is because the e-commerce system develops more quickly and easily, which in turn gives a researcher more time to concentrate on other aspects of research.

6.2.2 E-commerce System

In order to more effectively analyse and verify the model, two e-commerce systems are developed (Wang & Law, Hellemans & Govers, 2005; 2013). The first system is known as ‘system 1’ and second system as ‘system 2’. The two systems are developed to measure and analyse users’ responses to current e-commerce systems in the market with the new e-commerce system (Loiacono & McCoy, 2006). This allows for analysis of the shortcomings of the systems for SMEs compared to new secure e-commerce systems (Sinkovics, Yamin, & Hossinger, 2007; Rorissa, Potnis, & Demissie, 2010). With this in mind, two prototype systems are developed, namely system 1, which is based on the current e-commerce system on the market and system 2, which is developed based on the holistic model verified in Section 5.4.2 in Chapter 5. Both e-commerce systems are explained in the following sections.

a) System1: The first system prototype is developed based upon the e-commerce system currently available and most famously used by consumers for buying computers and their accessories. The search criteria used to find the websites are entered into the most commonly used search engine, 'Google'. The first few sites are Techzone (http://www.techzone.com.my/), PCDepot (http://www.pcdepot.com.my/) and IT Hyperstore (http://www.ithyperstore.com.my). Based on these three websites, an initial e-commerce system is developed, including all of the features which are part of the selected three e-commerce websites. Figure 6.1 shows how, based on three e-commerce systems, our first system operates.

The next section verifies whether or not factors in the holistic model are present in system 1.

i. **Implementation:** Delivery and payment services are provided by e-commerce sites. However, they provide limited choices of payment and delivery for customers to choose from. The e-commerce system is available 24/7 to the customers. The affiliates have no way to contact the business, in case they want to do online advertisement. The number of hits is not available on an e-commerce system.

ii. **Trust:** System 1 is not able to recover data in case the website goes down. The e-commerce sites do not provide transparency in terms of users writing their reviews about the product and services, thus providing a lack of integrity on the SME side.

iii. **Security:** The security is provided within the e-commerce sites by allowing a user to login and sign-up to access the website. The security policy is, however, not available.

iv. **Privacy:** The privacy policy is not made available on the front page. However, it is briefly mentioned on the terms and conditions page. Limited Employee

privacy is given at back-end system as one user Identification (ID) is needed for all logins. Customers are also not able to adjust cookies according to their needs on an e-commerce site, thus compromising their privacy.

v. **Ethics and Legal issues:** The ethical factors of an e-commerce site not available or if available, are minimal.

vi. **Intellectual Property Rights:** A copyright statement is available under terms and conditions. However, a patent description is not available.

b) System 2: System 2 is developed based on the model which is verified by Confirmatory Factor Analysis (CFA) in Section 5.4.2, Chapter 5. The e-commerce system is developed based on the factors identified by SMEs managers that consider being important for their e-commerce system. All of the factors verified in the holistic model (shown in Table 5.20, chapter 5) are included and used to develop the e-commerce system. The e-commerce system contains many features which help companies to provide a good security measure for their customers. Figure 6.2 shows how the second system operates. In next section, is demonstration of how each factor in the holistic model is used to create system 2.

i. **Implementation:** The e-commerce website provides secure payment and delivery services to their clients. There are multiple payment and delivery methods made available for customers to choose from. The security is provided in terms of VeriSign and confirmation e-mails are sent to customers each time they make a new purchase. Shipment and delivery updates are continuously sent to customers whilst a return service is also provided in case customers are not satisfied with the product. Number of hits is also recorded by the website. An e-commerce site is accessible 24/7 to customers, and has a pleasant and easy to use layout to work with. FAQ and 24-hour support

services are available in case customers are faced with a problem. The e-commerce system allows affiliates to place their advertisement on the website by creating an account with the company.

ii. **Trust:** Trust is an important part of an e-commerce site as users are asked to provide their personal and confidential information and to take part in online transactions frequently with the company. The website provides a recovery of data service in case the website fails or there is a loss of data. This maintains the trust of customers that their data is protected.

iii. **Security:** System 2 provides complete security as users have to login to access their customised web page. It therefore provides complete authorisation and authentication to an e-commerce system. The security policy is also made available on the front page.

iv. **Privacy:** Privacy factors are made readily available on system 2. Privacy policies/statements, seals, and managing cookies is provided on the front page. Employees' privacy is provided at the back-end of the system where each system user or employee is given a unique user ID and password using which they can login and access the system.

v. **Ethics and legal issues:** System 2 provides secure links within the site and also to other sites. All the products on the site are from authorised wholesalers with specified prices, thus allowing users to match and compare the prices. The warranties and guarantees for the products are given with the return policy in case customers are not satisfied and want to return the products.

vi. **Intellectual property rights:** System 2 provides customers with a terms and conditions page, as well as a copyright statement and disclaimer to ensure that the competitors are well aware of the company's intellectual property rights.

vii. **Loyalty:** Loyalty is an important part of an e-commerce system as it means customers will come back to a website again in the future. To maintain customer loyalty toward the e-commerce site, it provides many features for customer satisfaction such as rate/comment, recommend to friend, return products, ask question and like/comment on their services on Facebook, Google+ and Pinterst. These services provide transparency between customers and the website, thus increasing customer satisfaction and company reputation. As a result of thics, customers are more likely to visit the website.

In Table 6.2 show how used holistic model to identify requirements for system 2 and translated it into system design

Table 6.2: System Requirement Document

Factors	Requirement	System 2
Implementation	– Good Delivery system	– Secure payment and delivery services to their clients – Multiple payment and delivery methods – VeriSign and confirmation e-mails are sent – Shipment and delivery updates
	– Website provide good customer service	– 24/7 to customers – Online chat – Forum to connect with customer, if customer representative busy – Connect via fcaebook, google+ and pinterst
	– Website is useful/success in term of hits its received on daily basis	– Number of hits counted on website
	– Hardware/software stability	– Hardware/software stability – High tech software available in market is used
	– Good page loading time	– Good page loading time
	– Visual appearance	– Good color scheme – Easy to read text
	– System architecture	– Good back-end system
	– Accessibility as part of the e-commerce system quality	– Easy to use
	– E-commerce site 24 hour availability and accessibility	– FAQ and 24-hour support services
	– Appropriate site marketing/advertising	– Affiliates to place their advertisement
Trust	- Website recovery system	– Recovery of data service
	- Data Integrity or Reliability	– Data provided is reliable
Security	- Protection of site from unauthorized access/outsiders	– Provide authorize access to outsides and customers
	- Provide Authentication - secure access to website	– Login to access their customised web page – Provide Authentication
	- Data Security policy	– Security policy
Privacy	- Privacy policy	– Privacy policy on the front page
	- Third part privacy seals assuring the trustworthiness of Internet vendors	– Third part privacy seals
	- Cookies control consent	– Managing cookies is provided on the front page – pop-up message display to ask to place cookies
	- Privacy of employees in using website	– Each system user or employee is given a unique user ID and password using which they can login and access the system.

Factors	Requirement	System 2
Ethics and legal issues	- Availability of Electronic contracts	– Electronic contracts avaliable
	- Secure and approved links to other seals	– Secure links within the site and also to other sites – authorised wholesalers with specified prices, thus allowing users to match and compare the prices
	- Guarantees/disclaimer or other seals	– Warranties and guarantees for the products – return policy
Intellectual property rights	- Trademark usage and protection	– Terms and conditions page – Disclaimer to ensure
	- Patents protection	– Terms and conditions page – Disclaimer to ensure
	- Copyright protection	– Copyright statement and
Loyalty	- Customer trust in site services in term security policy	– Detail security policy given or customer data and privacy policy provided
	- Reputation building	– Rate/comment – Recommend to friend – Return products – Ask question – Like/comment on their services on Facebook, Google+ and Pinterst
	- Customer satisfaction with past services	– Like/comment on their services on Facebook, Google+ and Pinterst – Recommend to friend
	- Frequency of purchase	– Access to their customize webpage – Recommending the products they like

In order to understand more about the two systems, the user manual is provided in Appendix L. Figure 6.1 and Figure 6.2 provide an explanation on how each system is developed with and without usage of holistic model.

System 1

Figure 6.1 explain how the e-commerce system 1 works. System 1 is developed based on the e-commerce currently being used in the market.

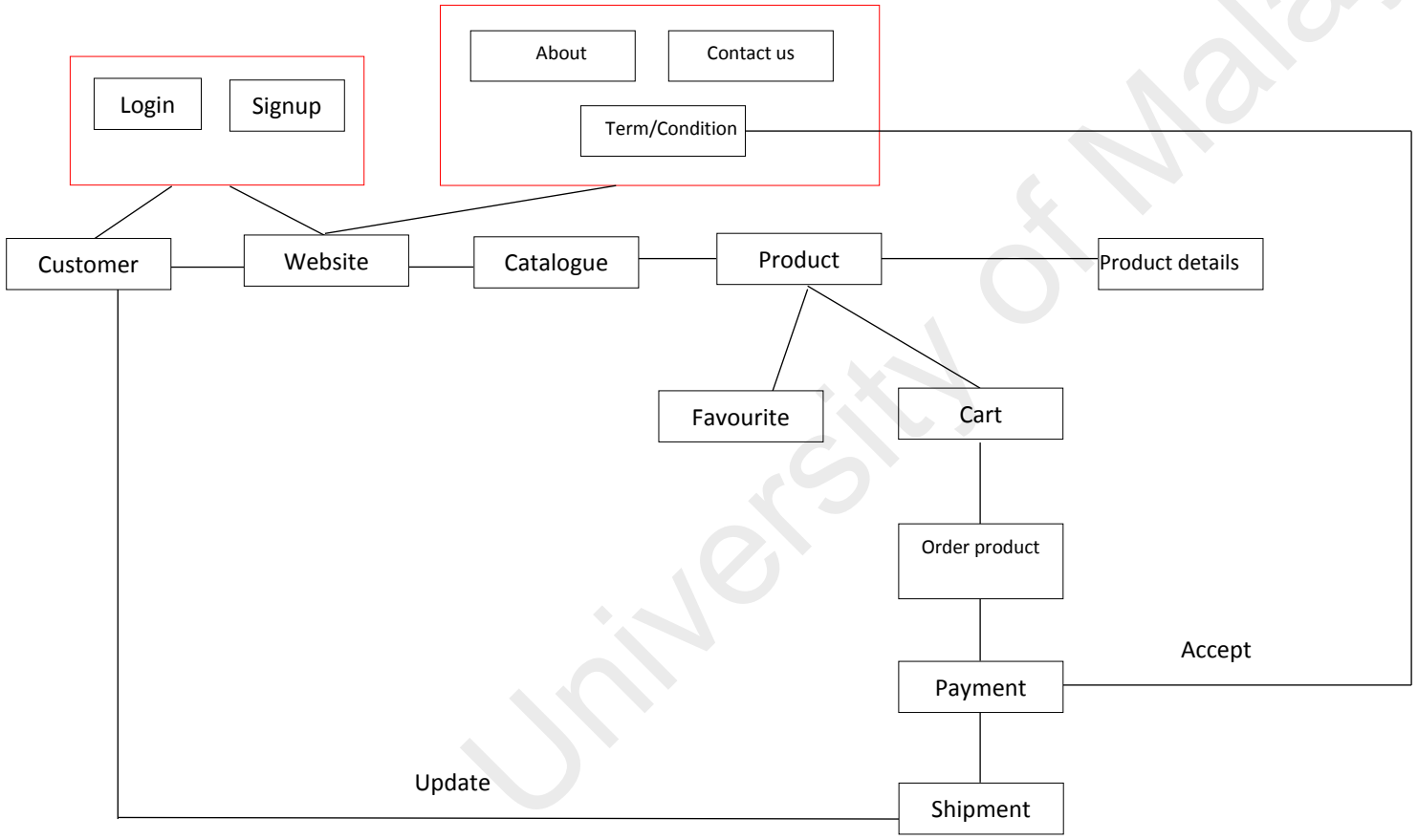

Figure 6.1: E-commerce System 1

System 2

Figure 6.2 explains how e-commerce system 2 works.

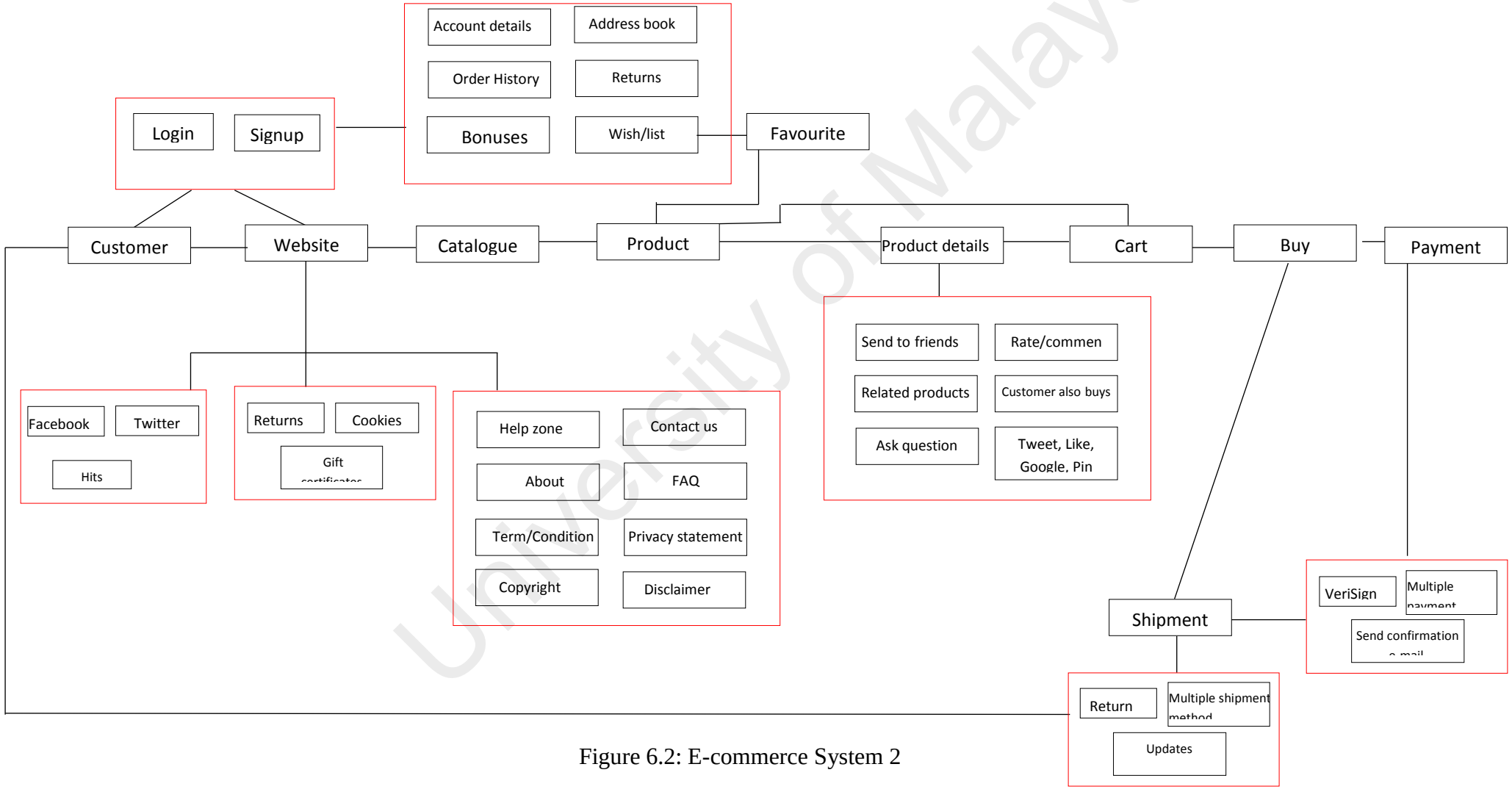

Figure 6.2: E-commerce System 2

6.3 System Reliability

The focus group is conducted using the same group of SME managers involved in the previous interviews and survey. To ensure that the system is reliable, the questionnaire is conducted on both e-commerce systems to establish which e-commerce system is most preferred by SMEs. The opinion of SMEs manager is noted to ensure that the system is working according to their requirements and the model which is previously developed and verified.

6.4 System Evaluation

A system evaluation is conducted by making use of a focus group. Focus groups are a strategy used in qualitative research, thus allowing for the exploration of attitudes, opinions or perception towards an issue, product, service or programme. It takes the form of a free and open discussion between members of a group and the researcher (Carson, et al., 2001; Saunders, 2007; Kumar, 2010). As this section deals with the evaluation of the system, focus group method is considered to be the most efficient for a collective review of the e-commerce system from SMEs. The SMEs are the same respondents who previously participated in the survey and interview. There are a total of 12 participants from the respective SMEs included in this focus group.

The system evaluation using focus group is conducted to test the holistic model accuracy in real world. Besides the questionnaire, comments are recorded from the respondents in order to gauge their reaction, comments and future expectations of the system. After the survey SPSS is used to analyse the responses, whilst results are also evaluated.

6.4.1 Test Procedure

The twelve respondents involve in this study are provided with the first e-commerce system to evaluate, followed by the second e-commerce system. At first, they are given the necessary instruction and background information about the research, system and scenario. The researcher then invites them to view the website. The twelve participants are instructed to view, access, and make purchases from the e-commerce system as they normally do when accessing any online site. During the evaluation, the researcher only observes the participant, although no verbal communication takes place. The observation process helps the author to understand user feelings, mood and thought processes when evaluating the e-commerce website. Hence, users are allowed to be vocal about their feelings and processes when accessing the website.

Once users finish accessing the website, the researcher then invites them to take part in a survey which allows them to rate the website based on a secured model proposed in Chapter 5. They are also allowed to make comments about the website. The survey is essential in order to keep the participants focussed on the objective of the e-commerce system and to verify the model based on the factor rating. The second e-commerce system is then provided to participants, and same process used with system 1 is repeated. The group interview is also conducted with participants so as to develop further understanding of their experience and evaluation. The researcher continues to act as moderator and keeps focus on the e-commerce system evaluation.

6.4.2 Test Location

In order to keep participants comfortable during the test, evaluation and survey, it is deemed sensible for the location to be close to the natural surroundings in which respondents usually conduct their online transactions. Thus, the correct behaviour/responses can be recorded. In this case, the respondents' natural environment for online shopping can be a computer owned or used by the participant. This is most likely to be found in an office or home.

Therefore, in order to conduct this evaluation the researcher downloads the system onto the participant's laptops. In cases where participants do not have a laptop, the researcher provides a laptop for the test. The time of the test is proposed by researcher and accepted by the participants.

6.4.3 Data Analysis and Presentation

Data is collected using an online questionnaire which automatically stores data in excel format. The questionnaire appears in Appendix J. The excel file is then transferred to SPSS where statistical operations are performed. SPSS is used to analyse the data and to conduct the comparative analysis based on questionnaires between the two systems. The comments made during the survey and interviews are recorded and stored in tabulated form in Appendix K.

6.4.4 Evaluation Results

The evaluation result is explained in terms of factors evaluated during the survey and interviews conducted during the Focus Group. This evaluation is conducted in order to answer research question 4, as shown in the following section.

> What are the system requirements components in development of holistic e-commerce prototype system?

The factors are identified through analysis of the data gathered during focus group. The factors considered least important by the SMEs owners are removed, whilst the other factors are discussed according to their importance.

a) Implementation Factors

According to the survey conducted to evaluate the implementation factor in an e-commerce site, most of the respondents view the services/features of system 2 as being either very good or good, as seen in Table 6.3. This means that they are very satisfied with the services provided. The comments provided regarding the website implementation features are satisfactory as most of the respondents state that it is easy and fun to use the website with good visual appearance and sufficient product information (Respondents 1, 9, 10).

With regard to system 1, most respondents feel that the factors are either neutral or not good, whilst some refer to a few factors as good. This means that most of the respondents, although satisfied by the implementation factors in the site, remain hopeful that improvements will be made to one factor or another. Due to the fact that most of the respondents point out a lack of education and awareness factor (FAQ) (Respondents 1, 9),

visual appearance (colour, small text and product selection) (Respondents 9, 10) as well as website hits should be improved (Respondent 3).

Table 6.3: Implementation Factors

Factor	System	Very Good	Good	Neutral	Not Good	Not Good at all	Total
Delivery factors	System 1 System 2	16.7% 80%	75% 20%	8.3% --	0 --	0 --	100% 100%
Good customer service	System 1 System 2	0% 58.3%	16.7% 33.3%	50% 8.3%	25%	8.3%	100% 100%
Website useful in term of hits and misses	System 1 System 2	0% 91.7%	8.3% 8.3%	33.3% --	41.7 --	16.7 --	100% 100%
Hardware/software stability	System 1 System 2	0% 75%	50% 25%	33.3 --	16.7 --	-- --	100% 100%
Good page loading time	System 1 System 2	25% 83.3%	50% 16.7%	25 --	-- --	-- --	100% 100%
Visual appearance	System 1 System 2	0% 75.0%	50% 25.0%	41.7 --	8.3 --	-- --	100% 100%
System architecture	System 1 System 2	0% 66.7%	58% 33.3%	41.7 --	-- --	-- --	100% 100%
24 hour accessibility	System 1 System 2	16.7% 50.0%	50% 50.0%	33.3% --	-- --	-- --	100% 100%
System quality	System 1 System 2	25% 58.3%	33.3% 41.7%	41.7	-- --	-- --	100% 100%
User satisfaction	System 1 System 2	0% 83.3%	58% 16.7%	41.7	-- --	-- --	100% 100%
Marketing and advertising	System 1 System 2	0% 75.0%	8.3% 25.0%	75%	16.7%	-- --	100% 100%
Education and Awareness	System 1 System 2	0% 83.3%	25% 16.7%	41.7% --	33.3 --	-- --	100% 100%

b) Trust Factors

The trust factor on system 2 is appreciated by most of the respondents as they rate it as either very good or good. This concludes that the respondents are able to easily trust the service on an e-commerce site. This is because the information/data provided on products allows system users to trust the website's integrity and reliability. Most of the comments indicate that they are particularly fond of the website recovery system as it is easy to use (Respondents 1, 8).

With regard to system 1, the responses are diverse, although overall it can be said that respondents are not completely satisfied with the trust factor on the site and only two or three users state that they like the system trust factor. Most of the comments revolve around the fact that they are unable to find the website recovery feature (Respondent 8), or that these factors should be improved (Respondent 2).

Table 6.4: Trust Factors

Factor	System	Very Good	Good	Neutral	Not Good	Not Good at all	Total
Website recovery system	System 1 System 2	8.3% 91.7%	16.7% 8.3%	33.3% --	16.7% --	25% --	100% 100%
Data integrity and reliability	System 1 System 2	16.7% 75.0%	25.0% 25.0%	50% --	-- --	8.3% --	100% 100%

c) Security Factors

Security factors are rated mostly as very good, with only 10% of total respondents rating them as good, whilst the remaining respondents rate them as very good. Compared to the factors mentioned above, respondents are mostly satisfied with the security factors. Indeed, two respondents comment that, 'security access to website was good' (Respondents 1) and 'security policy enables users to trust the security and transaction of website' (Respondents 10). This helps to understand that security policy is an important aspect to enable users to trust the website's security and transactions.

With regard to system 1, most of the respondents consider security to be not good, as they select 'Neutral', meaning that they are not completely satisfied with the system. They also select 'Not Good' as their other response. Most of the respondents' comments on the security factors revolve around the notion that it is not good, for example 'secure login is not that secure' (Respondents 9), 'can't find security policy' (Respondents 1)

and ‘should improve these features’ (Respondents 7). Therefore, the security of system 1 is considered invalid or not satisfactory compared to system 2.

Table 6.5: Security Factors

Factor	System	Very Good	Good	Neutral	Not Good	Not Good at all	Total
Protection of site from unauthorised access/outsiders	System 1 System 2	8.3% 91.7%	8.3% 8.3%	75.0% --	8.3% --	8.3% --	100% 100%
Provide Authentication - secure access to website	System 1 System 2	8.3% 91.7%	33.3% 8.3%	33.3% --	8.3% --	16.7% --	100% 100%
Data Security policy	System 1 System 2	8.3% 16.7%	-- 83.3%	41% --	25.0%	25.0%	100% 100%

d) Privacy Factors

As can be seen from Table 6.6, when it comes to system 2, most respondents consider the e-commerce site’s privacy factor to be very good followed by few who say the services are good. Nobody selects neutral with regard to the privacy factor on the website, whilst there is also no selection of good or not good at all. The comments received were similar to rating as respondents like all the factors (Respondent 1) and one mention these factors as excellent (Respondent 4). This means that everybody is satisfied by the services; a notion which can be verified from their responses.

Compared to system 2, respondents do not rate the privacy factors within system 1 as high. Indeed, they mostly rate it as ‘Neutral’ followed by ‘Not good’ and ‘Not good at all’. The comments provided regarding privacy factors are similar to the rating as most of the respondent’s states that they are unable to find these features on the site or the features are not according to their needs (Respondents 1, 5, 9, 10).

Table 6.6: Privacy Factors

Factor	System	Very Good	Good	Neutral	Not Good	Not Good at all	Total
Privacy policy	System 1 System 2	8.3% 83.3%	-- 16.7%	41.7%	25.0%	25.0%	100% 100%
Third part privacy seals assuring the trustworthiness of Internet vendors	System 1 System 2	8.3% 91.7%	-- 8.3%	50.0% --	16.7% --	25.0% --	100% 100%
Cookies control consent	System 1 System 2	8.3% 83.3%	25.0% 16.7%	41.7% --	8.3% --	16.7% --	100% 100%
Privacy of employees in using website	System 1 System 2	91.7% 8.3%	8.3% --	-- 41.7%	-- 25.0%	-- 25.0%	100% 100%

e) Ethical and Legal Factors

Most of the factors for the e-commerce computer shop system 2 are considered satisfactory as can be seen from Table 6.7. Comments regarding ethical factors are diverse as few respondent states that the services are good (Respondents 1, 4, 8, 9) whereas others states it can be improved (Respondents 1, 5).

In terms of the ethical factor in system 1, most of the respondents comment that it can be improved as they mostly consider it 'Not Good' followed by 'Neutral' (Respondents 1), and most recommend improving this feature in the system (Respondents 4, 8).

Table 6.7: Ethical and Legal Factors

Factor	System	Very Good	Good	Neutral	Not Good	Not Good at all	Total
Availability of Electronic contracts	System 1 System 2	8.3% 58.3%	8.3% 41.7%	33.3% --	41.7% --	8.3% --	100% 100%
Secure and approved links to other seals	System 1 System 2	8.3% 66.7%	8.3% 33.3%	50.0% --	33.3% --	-- --	100% 100%
Guarantees/disclaimer or other seals	System 1 System 2	8.3% 66.7%	-- 33.3%	41.7% --	50.0% --	-- --	100% 100%

f) Intellectual property rights Factors

Overall responses relating to these factors are very good, with respondents particularly fond of copyright protection. The reason for this is that the copyright page is easily accessible on the website as mention by respondents (Respondents 1, 8, 9).

In terms of system 1, however, respondents do not like this feature much as respondents mostly consider it not good. Most users comment that they cannot find this feature on the website (Respondents 1, 8).

Table 6.8: Intellectual Property Rights Factors

Factor	System	Very Good	Good	Neutral	Not Good	Not Good at all	Total
Trademark usage and protection	System 1 System 2	8.3% 75.0%	-- 25.0%	41.7%	50.0%	--	100% 100%
Patents protection	System 1 System 2	8.3% 75.0%	-- 25.0%	50.0%	41.7%	-- --	100% 100%
Copyright protection	System 1 System 2	8.3% 83.3%	-- 16.7%	50.0% --	41.7% --	-- --	100% 100%

g) Loyalty Factors

As can be seen from Table 6.9, 90% of people state that they feel the loyalty factor in e-commerce is very good whilst the remaining respondents rate it as good. As one of the respondents explains, because of good security and privacy features he can trust the website (Respondents 8). Moreover, another state that he will come to make purchases again as he likes the variety of products (Respondents 5). However, with system 2, respondents' views are diverse, with some considering it to be good and others

considering it to be not good. However, most of the respondents consider it to be neutral as a few of the comments received indicate that these feature can be further improved on the site (Respondents 1, 8).

Table 6.9: Loyalty Factors

Factor	System	Very Good	Good	Neutral	Not Good	Not Good at all	Total
Customer trust in site services in terms of security policy	System 1 System 2	8.3% 75.0%	8.3% 25.0%	58.3% --	8.3% --	16.7 --	100% 100%
Reputation building	System 1 System 2	-- 75.0%	41.7% 25.0%	41.7%	16.7%	--	100% 100%
Customer satisfaction with past services	System 1 System 2	-- 75.0%	50.0% 25.0%	50.0% --	-- --	-- --	100% 100%
Frequency of purchase	System 1 System 2	-- 75.0%	41.7% 25.0%	58.3% --	-- --	-- --	100% 100%

6.5 Measuring E-commerce Website Success

Once the system evaluation is done, the measurement of e-commerce website success is conducted. This is done by comparing the proposed model with existing e-commerce success model as done in this section. DeLone and McLean (2003) proposed an updated model with new information system success factors (e.g. service quality, intention to use, net benefits). Based on the update model and literature on user satisfaction, service quality and vendor selection, the research model is propose by Lee & Kozar (2006), for selecting the a most preferred website (refer to Figure 6.3). The model consists of four major website quality factors including information quality, service quality, system quality, and vendor-specific quality. These four website quality factors significantly influence website selection

and the most preferred website will generate the highest business performance (Lee & Kozar, 2006).

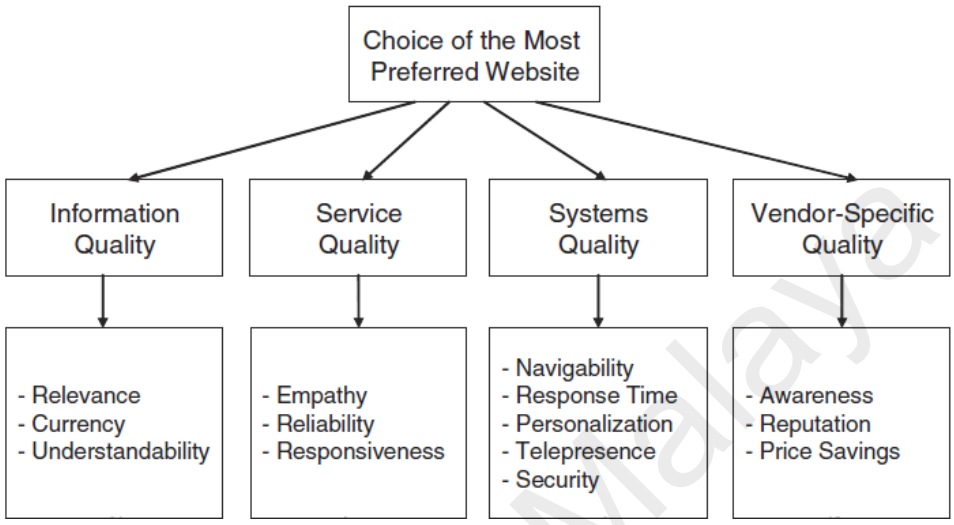

Figure 6.3: Lee & Kozar (2006) Model

Information quality: Information quality, the quality of information that the system produces and delvers, is considered to be a key factors affecting IS success. There is good quality information is provided on the e-commerce system 2 as integrity and reliability of data is necessary to build trust between customers and business that in turn build loyalty for customers who want to make repeat purchases.

Service Quality: Lee & Kozar (2006) include empathy, reliability and responsiveness. These all the factors available on the secure system 2 developed based on secure model. The e-commerce system keep user informs about their services and product, provide different payment method and good customer service.

System quality: System quality according Delone and Mclean (2004) measure by usefulness, usability, reliability and flexibility. According to Lee & Kozar (2006) system quality consist of navigability, response time, personalization and Telepresence. All the

measure of system quality is presented in the secure model making system quality readily available in the secure system 2. Lee & Kozar (2006) consider security to be essential part of system quality, security and its feature are also part of system 2.

Vendor-Specific Quality

Along with three website quality factors discussed above, internet vendor-specific quality, the awareness of internet vendors and their reputation and price competitiveness, has been considered an important e-business success factor.

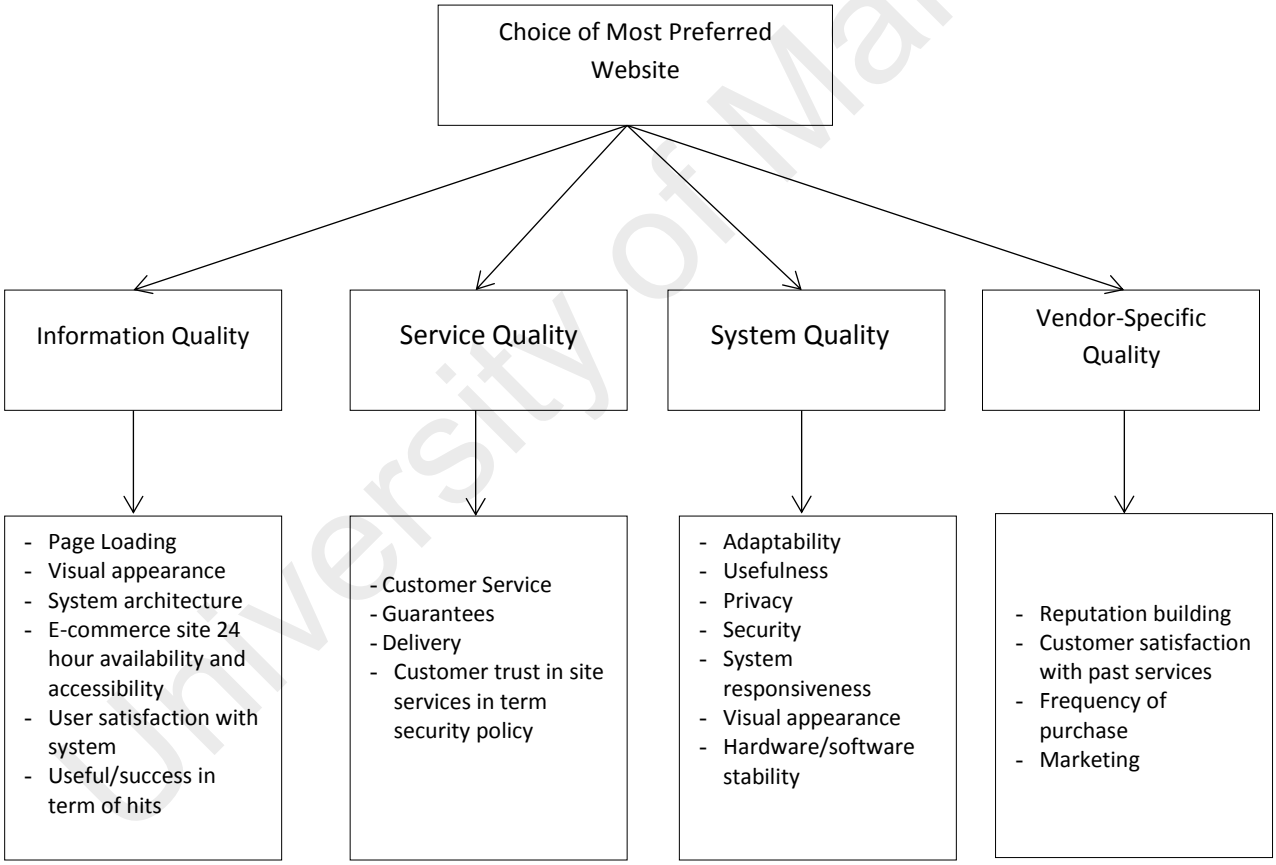

Figure 6.4: E-commerce Success Model for System 2

The ultimate purpose of integrated model (shown in Figure 5.4, Chapter 5) is to provide secure and successful e-commerce system for SMEs. To understand service quality for e-commerce system, the e-commerce researcher should also measure the quality of user

experience and customer usage of and satisfaction with the system. The system developed based on the integrated model should be easy to use and available whenever users want to access it. The information on the website should be complete and according to customer needs. A quick e-mail response to purchase transaction is an issue of online service quality, if e-mail cannot solve the problem there always should be call centre to carter customer need. Customer usage can be measure by number of hits and their satisfaction can be measured by repeat visits. The good system quality depends on the appropriate security and privacy is provided to customer, supplier and employees of business. All the measure displayed in Figure 6.4, represent a comprehensive (but not exhaustive) success measurement model for integrated system based on Lee & Kozar (2006) model.

Lee & Kozar (2006) model provide factors to investigate and selection of the most preferred website. The most preferred website will in turn help business to have financial performance.Lee & Kozar (2006) model provides measures for successful e-commerce system and include many of security factors but the few of the factor have been not included that are as much as necessary for successful implementation of e-commerce. The factors that are not being mention in the model are trust, ethics and legal and intellectual property rights these factors are very important when company is implementing the e-commerce site and protected it against any legal and copyrights issues. Therefore Lee & Kozar (2006) although valid but lack in term of complete security that user nowadays require and are very necessary for success and security of e-commerce system in today business especially in SMEs.

6.6 Summary

This chapter has evaluated the results of previous findings from Chapter 5. For evaluation and testing purposes, two e-commerce systems are developed. System 1 is developed based on the prototype e-commerce system which SMEs currently use to conduct their business. The second system, system 2 is based on the Confirmatory Factor Analysis (CFA) model from Chapter 5. Data is collected from the focus group with 12 SMEs, using instruments like observation, survey and interview. The comparative analysis is conducted to gauge the importance and value of the system among SMEs. The chapter later discusses the evaluation results. The holistic model and system 2 is then compare against Lee & Kozar (2006) model to measure the success e-commerce system 2 against establish model. The next chapter concludes our findings and purpose, whilst also detailing future directions for related work.

CHAPTER 7: CONCLUSION

7.1 Introduction

The chapter presents a summary and interpretation of the study in several sections. The first section provides an overview of the study, including methodology and findings in relation to the research question and objectives. Next comes a discussion on research contribution, strengths, limitations and directions of future research.

7.2 Summary of Study

This research combines two mainstream topics of e-commerce, namely the success factors for adoption of e-commerce and security factors in e-commerce. The factor is identified from both topics, thus helping to generate the comprehensive model for secure e-commerce adoption in SMEs. The research begins by identifying the objectives for this research. The following research objectives are developed (Refer to section 7.2.5 for research questions):

RQ 1: To investigate e-commerce practices in SMEs based on industries and employees.

RQ 2: To identify factors influencing the adoption of e-commerce in SMEs.

RQ 3: To develop a holistic e-commerce model for SMEs that integrates success factors and security factors and to develop a secured e-commerce prototype system.

To achieve the objectives of the study the research is conducted in the following steps:

7.2.1 Literature Review: The literature review is carried out to identify the e-commerce success factors and security factors for SMEs from the existing literature. The literature review identifies a total of 62 factors which are divided into 12 main headings. The six independent factors are success factors e.g. Organisational, Management, Technological, Individual, Implementation, Trust, or Environmental whilst the other six include security factors of e-commerce e.g. Ethical and Legal issues, Security, Privacy, Intellectual property rights, Trust and Loyalty. Together these factors help to develop the conceptual model for secure e-commerce.

Based on these factors, the data collection is carried out, followed by data presentation and analysis.

7.2.2 Collection of Data for Case study: Data is collected by making use of the mixed-method approach, especially an explanatory design when it comes to developing the measurement scale. The questionnaire, interview and observation are used for data collection. The study is conducted sequentially in two phases. First is the quantitative phase, where data is collected using a questionnaire to determine the security factors for e-commerce from different SMEs in Klang Valley, Malaysia. The second phase involves the collection of qualitative data using interviews and observation. Interviews are conducted with managers of SMEs so as to verify the data collected during the survey.

7.2.3 Data Analysis: Data is analysed by making use of SPSS and AMOS: SPSS is used to verify and determine the success factors and security factors identified in the literature review. The AMOS software is used for Structure Equation Modelling (SEM) data analysis which provides Confirmatory Factor Analysis (CFA) for relationship testing. The CFA checks and verifies the conceptual model. During this process 32 factors are verified in

order to achieve a model which is suitable for SMEs. Therefore, the new model of 32 factors is validated with CFA.

7.2.4 System Development: The prototype system is developed based on holistic system (shown in Figure 5.3 in chapter 5). The factors of holistic model are converted into system requirement document to help facilitate the development of prototype system.

The two systems are developed, with the first based on the Malaysian companies used to conduct business and the second e-commerce system based on a new holistic model. The test is conducted to assess whether or not the model developed and verified in section 5.4.2, Chapter 5 is effective when implemented in the real world. Comparative analysis is used to measure the success between the two systems based on factors in the holistic model. System analysis and evaluation are conducted in order to compare the two e-commerce systems, and to verify the e-commerce holistic model. Beside that to measure the success of e-commerce system and holistic model, the comparison is made with established IS success model of Lee & Kozar (2006) shown in section 6.5 Chapter 6.

7.2.5 Conclude the Research: The literature review identifies a total of 62 factors based on research in different countries and their usage of e-commerce in SMEs. During the SPSS analysis of the data collected from SME manager, all factors are considered to be useful and important. Therefore, CFA analysis is conducted to find an appropriate holistic model for SMEs. The research is concluded by answering the research question.

1. Research question 1: What are practices of Malaysian SMEs in adoption of e-commerce?

Most of SMEs before making use of e-commerce site was making use of some type of marketing portal such as blog, Facebook and static website. They were also making use some sort of online or offline market strategy business to make their business visible. Only few mention that they were not using any form of advertisement. This is because as SMEs before adopting e-commerce within their business start with small marketing venture.

Most of the service industry SMEs are using e-commerce for 1-5 years. However, few noted that they were using it for ten years. Mostly, service industry employs less than five employees in their company. Service industry is one that have been using the Internet in their companies as other than service SMEs only one manufacturing industry mention that they have been using e-commerce for more than 10 years. This can conclude that although service industry has highest e-commerce usage, the employee numbers are mostly lesser. Manufacturing-related industries on other hands have a larger number of employees from 5-150, and they are using the Internet for almost 1-5 years, and few of them are using it to 10 years. In manufacturing industry, although there are more employees but usage of the Internet is less than a service industry. Primary agriculture has one of the lesser Internet usages with employee's number 1-19. This concludes that SMEs with a larger number of employees or are bigger in size often ignore the benefits of an e-commerce system for their businesses.

2. Research question 2: What are the factors influencing adoption of e-commerce in SMEs?

   Respondents of survey are, for the most part, satisfied with the factor identified by the conceptual model. The influencing factors for e-commerce adoption are

identified by analysing the survey. Using a scale of 1 (very Important) to 5 (very unimportant) the overall data gathered is summarised in various tables. If the using value of mean is less than 3.0, the data is considered significant. The factors which are considered least important by the SME owners are removed. However, all of these factors are considered important by respondents, and thus 62 factors are retained as they are deemed important for e-commerce in SMEs.

3. Research question 3: What are the components of holistic e-commerce model for SMEs?

The study aims to develop a holistic model which accurately describes the key factors of success and security for SMEs. To develop the holistic model, Confirmatory Factor Analysis (CFA) is used. Although all factors are identified by respondents to be important it is necessary to use CFA to verify a model which is suitable for SMEs' e-commerce system. By making use of CFA, a model is formulated, consisting of 32 factors which are deemed most suitable by the system shown in Figure 5.3 in Chapter 5.

The breakdown of the factors in the model is Implementation (Delivery factors, good customer service, Website useful in term of hits and misses, Good page loading time, Visual appearance, System architecture, e-commerce site 24 hour availability/accessibility, System quality, User satisfaction, Marketing and advertising, Education and Awareness); Trust (Website recovery system, Data integrity and reliability); Security (Protection of site from unauthorised access/outsiders, Provide Authentication - secure access to website, Data Security policy), Privacy (Privacy policy, Third part privacy seals, Cookies control consent,

Privacy of employees) , Ethics (Availability of Electronic contracts, Secure and approved links, Guarantees/disclaimer), Intellectual Property rights (Trademark usage and protection, Patents protection, Copyright protection) and Loyalty (Customer trust in site services in term of security policy, Reputation building, Customer satisfaction with past services, Frequency of purchase).

The model also verifies the factors stemming from the IS success model as shown in Figure 5.4 in Chapter 5. These factors include: content quality, system quality, use, trust, support and service and e-commerce system quality; all of which are being verified in the holistic model. This model and its factor are validated by the interviewers who point out the same factors which are verified in the CFA model.

4. Research question 4: What are the system requirements components in development of holistic e-commerce prototype system?

   Based on the holistic model (refer to Figure 5.3 in chapter 5), an e-commerce system is developed. The factors in the model are included in the development of the system. The factors of holistic model are converted into system requirement document shown in Table 6.2 in chapter 6. This system requirement document is then help to develop e-commerce prototype.

   To evaluate the success and usefulness of the system it is tested among SMEs. The evaluation is carried out using a focus group where user comments and behaviour are recorded by making use of questionnaires, observations and small interviews. Most SMEs state that they are satisfied with the system's performance and the security features. The system developed based on holistic model is also tested to

measure its success by comparing it with establish model Lee & Kozar (2006), therefore confirming its usefulness for SMEs.

7.3 Overview of Practice and Lesson Learned

There are many lessons have been learned during this research. The thesis is full of challenges, as facing various issues and working through them to emerge successfully has taken much effort and time. Memorable experiences come to mind, especially during the data collection process, when researcher has to contact several government and non-government organisations to seek their cooperation in conducting a survey among SMEs. Most of the organisations refuse to cooperate as conducting a survey represents a fairly difficult challenge, especially with owners, managers or SME CEOs. Finally, a total of two main SME organisations agree. The first is the biggest government based organisation in Malaysia whilst other, rather smaller organisation is WENA. Besides this, other SMEs are contacted on an individual basis by sending the e-mails to fill up the questionnaire. The whole data collection process takes almost 2-4 months to complete. This is because the present research uses a multi-method data collection approach such as questionnaires, interviews and observation in order to answer the research questions.

In order to analyse the vast amount of data, many data analysis techniques are used, especially for the questionnaire. As the author is lacking previous experience with many software packages such as SPSS and AMOS, learning "as you go" approach is adopted. Besides that, author have attended different workshop to better equip her with these software packages. Data is analysed using Cronbach's alpha, descriptive statistics and CFA. The research has provided the author with critical evaluation skills. Indeed, this critical evaluation approach is important and the researcher learns to apply it to primary data

collection & processing and literature review chapters. The author is now able to look at things from different angles and develop a deep understanding. Overall, the author has put a lot of effort into completing this research and is satisfied with the outcome.

7.4 Contribution

There is much research conducted on various security factors such as security, trust, loyalty, ethics, and intellectual property rights. However, there are not many studies which discuss these factors under one roof as discussed in this research. Indeed, it provides a holistic approach toward the adoption of e-commerce in SMEs by combining the two mainstream topics of e-commerce, which is a success factor for the adoption of e-commerce, and security factors in e-commerce thus helping to generate the comprehensive model for secure e-commerce adoption in SMEs. There are various statistical methods used to verify the factors and model such as cronbach's alpha and confirmatory factor analysis.

The holistic e-commerce model is developed based on the IS success model by Molla & Licker (2001). The newer version of Molla & Licker (2001) was developed and verified in this study as shown in Figure 5.4 in Chapter 5. Further research can be conducted to verify this model to improve theoretical base and operational constructs of the model. In addition, this study examines different industries of Malaysian SMEs and provides a detailed case study description on each of the industries, as well as IT adoption and challenges. This research involves all SME industries in Malaysia, e.g. manufacturing (including agro based), Manufacturing-related Services, Mining and Quarrying, Services (including ICT), Construction and Primary Agriculture. Although there are many studies on Malaysian SMEs these mostly examine one industry and its trends. In contrast, this study develops a model for all SMEs, regardless of the industries to which they belong.

To test and evaluate the usage of the model in SMEs, an e-commerce system (system 2) is developed based on a holistic model. Another system (system 1) is also developed according to the e-commerce prototype which is used currently available in market and used by SMEs to conduct their business. A focus group is conducted to collect data from SMEs. Comparative analysis between the two systems is also conducted in order to assess which system is preferred by SMEs for their businesses.

7.5 Discussion and Implication

The list of factors and attributes presented in the integrated model for secure and successful adoption of e-commerce are reasonable indicators of potential success for start-up e-commerce SMEs. The holistic model also verifies the factors stemming from the IS success model. These factors include content quality, system quality, use, trust, support and service and e-commerce system quality; all of which are being verified in the secure model. As expected, the implementation factors verified in a secure model are the success factor that is considered necessary for the successful adoption of an e-commerce site in SMEs. The adoption of e-commerce requires proper planning and a workable and realistic policy to promote the use of e-commerce among customers of the website. Adequate and proper planning usually results in success. What is also clear from the research is that factors such as ethical (Das, et al., 2013; Nguyen, 2016), intellectual property rights (Liu, 2016) and loyalty (Xiao, et al., 2016; Choshin & Ghaffari, 2017) for SMEs are as important as trust in security and privacy factors as previous studies (Palvia, 2009; Choshin & Ghaffari, 2017) (refer to section 2.8 and 2.9 in chapter 2) they did not consider important . These are the factors that are to be considered during the final phase of the implementation of e-commerce system. Intellectual property right is indicators that awareness among SMEs are

increasing in regards to protecting their patents, copyrights, and trademarks. Loyalty factors such as reputation and customer satisfaction as shown in Figure 5.3, Chapter 5 have very high loadings followed by guarantees under ethics. This means for businesses, customer's satisfaction and the reputation of SMEs are important factors when conducting transactions online. Adequate e-commerce implementation and security in SMEs results in success. Therefore SMEs wishing to adopt e-commerce in their business need to have extended infrastructure, with good working website and strength in their security system.

This research suggests that all security factors play a critical role in formation and maintenance of long-term relationship with SMEs customers. The present study compiled the list of 19 items related security (grouped under six factors) that SMEs can use for their e-commerce system to increase their customer satisfaction and repurchase intentions. This research also found that for online businesses, ethics play important role in consumer trust and commitment building. On the other hand, high trust in business products and services build consumer satisfaction and repurchase intentions that lead increase loyalty among consumers. Thus, online businesses should foster practices which can reliability reveal the honesty of products and services to online consumers to promote favourable customer attitudes of online retailer, which in turn will increase customer loyalty and satisfaction.

In e-commerce market, where there is the high competition, e-commerce website should differentiate their products and services from other sites by providing advanced ethical performance. The value achieved by consumers increases when online practitioners continuously attempt to build organizational trust across tools of ethical managements such as availability of electronic contracts, secure and approved links to other seals, guarantees/disclaimer or other seals.

Security and privacy are more relevant predictor of e-commerce success. This is because in online environment it is important for small businesses to build stronger relationship with customers because online customers can easily transfer between retailers with minimal associated switching costs, SMEs with e-commerce sites first focus on decreasing customers' anxiety regarding transaction security and fulfilments. Therefore for SMEs to increase their business there is a need to provide complete security and privacy measures. Additionally, the e-commerce system is easy to use by consumers of the site as e-commerce system where customers are not able to access and buy the products and services easily and according to their requirement will be abandoned by consumers as soon as they use it.

The finding of this study provides several managerial implications. The basic evidence of the proposed model was that SMEs should understand comprehensively the factors that are necessary for successful implementation of e-commerce but will improve security, trust, and privacy of e-commerce system within organization. The SMEs are able to increase their e-commerce performance by verifying the factors in their e-commerce system. The factors will give SMEs a guideline as for how to conduct business through e-commerce, not just for adopting e-commerce but also to make it more secure for their business and consumers. On the other hand, the framework will give customers of business a clear picture of SMEs business strategies. This information transparency will ease their concerns while conducting business with SMEs. It will allow the two parties to build long term relationship to reach win-win situation.

The research also provides theoretical implication, in order to predict the usage of e-commerce holistic model for businesses today, this research integrates selected IS model

for e-commerce success and its factors to test the appropriateness of current e-commerce holistic model. In testing the e-commerce holistic model, the IS model factors were verified and additional factors are identified under one of the factors. This IS model and new verified factors add body of knowledge, this model can further be tested and verified in future research.

The practical implication includes, it now allow business to predict the internal and external resources that they will need in implementation of e-commerce in their respective business before actually engaging in the expensive process of developing new e-commerce system. This will help them to save resources such as time and money, and allow them to use it more effectively based on their current business needs. Secondly, the businesses that had already implemented the e-commerce system in their business, they can easily compare their e-commerce system with holistic e-commerce model. This will help them to determine remaining factors that they need implement to make current system more efficient for their customers. The prototype system (shown in chapter 6) also includes recommendations toward business improvements, therefore allowing SMEs good understand type of system most efficient for their businesses.

This study also provides the system requirement document (shown in Table 6.2 in chapter 6) based on the holistic system to simplify the designing and developing of e-commerce system for SMEs. There is no need to depend on external consultant to design the system requirement for them they can easily utilize the system requirement document (shown in Table 6.2 in chapter 6), to modify and develop new system for their business.

7.6 Limitation

The research provides a holistic e-commerce model for SMEs which are considered as valuable to the manager, information system researchers, and designers. However, there are parts of the study which can be further enhanced. It must be stated, as in Chapter 5, that the respondent's sample size is considered to be small. A total of the 108 respondents are involved in this study, and all come from the Klang valley area in Malaysia. However, this study involves SME owners, managers, and CEOs, and with their busy schedules, data collection is fairly difficult. As a result of this, the sample size is considered to be reasonable and justified.

7.7 Future Research

The research has provided some bold conclusion, and it is hoped that these will be of value to the Information System designer and researchers. This research has managed to provide the holistic e-commerce model for SMEs. Following this the researcher assumes that there is additional work which can still be done based on this research.

The future work could involve re-examining the e-commerce success model with new SMEs managers; using the same questionnaire to allow for a comparison of the results and to confirm the Confirmatory Factor Analysis (CFA) of the current model. The work allows for further refinement of the model, and ideally the model should then be critically analysed by independent researchers.

In this research, we have added new factors such as ethics and intellectual property right under trust that previously include security and privacy factors (refer to Figure 5.4 in

chapter 5). These factors in Molla and Licker (2001) in future work can be tested using Structural Equation Modelling (SEM) structural model.

Examining the use of the questionnaire in different countries or regions can provide cross sample data and allow for more advanced analysis using CFA. Analysis should also be conducted in order to assess whether or not the same questionnaire can be used by different countries with either the same economic or geographical conditions. This study concentres in SMEs in Malaysia, a comparative study can be conducted with different countries or different business characteristics to test the difference or extension toward development of holistic e-commerce system.

A larger sample size could also be used to conduct the survey. Although the sample size used in this research is reasonable, a larger sample size would help to gain a better perspective on SMEs in this region.

7.8 Summary

Electronic commerce play an important role in growth of SMEs as it allows them to compete efficiently in both domestic and international markets. The Internet makes markets more contestable and reduces the barrier to enter the market for SMEs. E-commerce for SMEs can improve the quality of marketing, sales and (customer) support and procurement process by delivering more complete, accurate and timely information to the point of sale, decision and support. This has also made it possible for the smaller firms to improve communication and information flow with their customers, introducing new products to the market and identifying potential partner/suppliers.

The consumer lack of the confidence in online information is not merely about security of value but also about trust in information society. Privacy and security concerns are number one reason web users are not buying on the Internet and non-adoption of e-commerce in SMEs. There are limited numbers of models that can help in secure and successful adoption of e-commerce. This paper attempts to develop a holistic e-commerce model for SMEs. This is done by combining two main research streams, e-commerce success factors and e-commerce security factor for SMEs. The factors are identified from exhaustive literature review for the past 23 year starting from 1991 to 2016. Total of 12 independent and 62 dependent factors were identified. Data is collected from a total of 108 of the top manager/owners of SMEs via Internet survey. Confirmatory Factor Analysis was used to verify the model and its factor whereas Cronbach alpha is used to verify the validity of factors. By making use of structural equation modelling 32 factors were verified significantly effect of secure e-commerce.

The objective for this research given at section 7.1 were attained and assessed by reviewing the type of knowledge produced in this research. This research has managed to provide knowledge based on the research finding related to the area of e-commerce and Information system generally. This thesis has confirmed the factors that are necessary for successful and secure adoption of e-commerce.

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LIST OF PUBLICATIONS AND PAPER PRESENTED

A list of journals and articles consulted is provided below:

Journals

- **'Model for Electronic Commerce adoption for Small and Medium-Sized Enterprises (SMEs)', accepted by International Journal of Innovation, Management and Technology (IJIMT), available at http://www.ijimt.org/papers/203-M00003.pdf**
- Electronic commerce (e-commerce) plays an important role in the growth of small and medium-sized enterprises (SMEs) as it allows them compete efficiently in both domestic and international markets. This paper aims to develop a conceptual model based on factors which affect Business-to-Consumer (B2C) e-commerce success. The factors are identified by examining the past 20 years of research conducted in this field. This model assists SMEs who are currently considering or conducting business using e-commerce. The model consists of seven main factors which fall under internal and external business environment effecting e-commerce success in SMEs. Each factor is examined in detail, whilst explanations are also provided as to how it will allow companies to integrate e-commerce into their businesses.

Model of Security Factors for Electronic commerce accepted by International Journal of Scientific Research and Development (ISSN: 1115-7569) (ISI)

– Despite the recent economic downturn in the telecommunication sectors and the

Internet, electronic-commerce (e-commerce) continues to grow, and websites remain as an important communication channel between companies and their customers. As with time, the number of Internet users continues to increase, but many customers are still reluctant to provide their sensitive personal information because of their lack of trust on the Business-to-Consumers (B2C) e-commerce sites security and privacy. This paper aims to find the factors to increase security and privacy in e-commerce sites. For that conducted a detail literature search covering the past 23 years. This had helped us to find a total of 32 security factors of e-commerce in businesses that are divided into seven main categories: Security, Privacy, Ethical & legal issues, Intellectual property right, Trust and Loyalty. Based on the factors a conceptual model will be developed, this model will assist businesses or individuals who currently considering or conducting business using e-commerce. This review will list, discuss, analyse and evaluate these e-commerce security factors.

- **Electronic commerce adoption in Malaysia: An empirical Study of Small and Medium-sized Enterprises (SMEs) accepted by International Journal of Advances in Electronics and Computer Science (IJAECS), available at** http://www.iraj.in/journal/journal_file/journal_pdf/12-135-14314152495-9.pdf
- Since the advent of the Internet, electronic commerce (e-commerce) has grown substantially across the globe. The Small and Medium-Sized Enterprises (SMEs) should take advantage of the internet and refocus their business strategies to improve their competitiveness. The aim of this paper is to identify the usage of e-commerce in SMEs based on industries and employee number. Based on the data collected from 108 SMEs located in Klang valley, Malaysia it is found that usage of

e-commerce is high in the service industry having less number of employees in the industry. The results also show that over recent years more SMEs are involved in using e-commerce in their business operations and marketing campaigns.

Conferences

- **'Electronic Commerce Adoption Model for Small & Medium Sized Enterprises' accepted by 2012 International Conference on Education and Management Innovation – ICEMI 2012, available at** http://www.ipedr.com/vol30/3-ICEMI%202012-M00003.pdf
- Electronic commerce (e-commerce) plays an important role in the growth of Small and medium-sized enterprises (SMEs) as it allows them compete efficiently in both domestic and international markets. This paper aims to develop a conceptual model based on factors, which affect the success of Business-to-Consumer (B2C) e-commerce. The factors are identified by examining the past 20 years of research conducted in this field. This model will assist SMEs which are currently considering or conducting business using e-commerce. The model consists of six main factors which fall under internal and external business environment effecting e-commerce success in SMEs. Each factor is examined in detail, with an explanation provided regarding how it will allow companies to integrate e-commerce into their businesses.

- **Electronic commerce adoption in Malaysia: An empirical Study of Small and Medium-sized Enterprises (SMEs), published by Proceeding of Sixteenth TheIIER International conference, March 14, Kuala Lumpur Malaysia, available at** http://www.iierdl.org/up_proc/pdf/20-142814255420-24.pdf
- Since the advent of the Internet, electronic commerce (e-commerce) has grown substantially across the globe. The Small and Medium-Sized Enterprises (SMEs) should take advantage of the internet and refocus their business strategies to

improve their competitiveness. The aim of this paper is to identify the usage of e-commerce in SMEs based on industries and employee number. Based on the data collected from 108 SMEs located in Klang valley, Malaysia it is found that usage of e-commerce is high in the service industry having less number of employees in the industry. The results also show that over recent years more SMEs are involved in using e-commerce in their business operations and marketing campaigns.

- **Model Of Security Factors For Electronic Commerce paper accepted by International Conference on Science, Technology and Management (ICSTM 2015) at Kuala Lumpur on 9th-10th October 2015**
- Despite the recent economic downturn in the telecommunication sectors and the Internet, electronic-commerce (e-commerce) continues to grow, and websites remain as an important communication channel between companies and their customers. As with time, the number of Internet users continues to increase, but many customers are still reluctant to provide their sensitive personal information because of their lack of trust on the Business-to-Consumers (B2C) e-commerce sites security and privacy. This paper aims to find the factors to increase security and privacy in e-commerce sites. For that conducted a detail literature search covering the past 25 years. This had helped us to find a total of 32 security factors of e-commerce in businesses that are divided into seven main categories: Security, Privacy, Ethical & legal issues, Intellectual property right, Trust and Loyalty. Based on the factors a conceptual model will be developed, this model will assist businesses or individuals who currently considering or conducting business using e-commerce. This review will list, discuss, analyse and evaluate these e-commerce security factors.

- **'Electronic Commerce success factors for Small and Medium Sized Enterprises' paper presented at 1st University Malaya Postgraduate Research Excellence Symposium (PGRes) 2001**

Chapter in book

Fatima Ajmal and Norizan Mohd Yasin, 'Electronic Commerce Adoption Model for SMEs, International proceeding of Economics Development and Research, Education and Management Innovation, IPEDR Vol. 30 2012, ISBN: 978-981-07-1473-4