E-business Adoption among SMEs in China:

A Study of the Perceptions of SMEs in Hunan Province

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Abstract

The significance of small and medium-sized enterprises (SMEs) for China's economy has received increasing attention over the last decade, with the latest official reports suggesting that it is becoming increasingly difficult to ignore the key role of e-business in sustaining and developing China's SMEs and an unprecedented range of benefits brought by the business innovation.

This thesis reviews the most commonly used research theories and conceptual models in the research area of organisational technology adoption, taking into account the characteristics of business environment faced by SMEs in China. It appears that Diffusion of Innovation theory (DOI) has the greatest potential to provide a useful framework for explaining the unique phenomenon.

Based on the proposed conceptual model derived from DOI, this study investigates the role of e-business in developing and sustaining SMEs in China and how small business decision makers perceive the innovation, through examining the applicability of the adoption elements and adapting them to fit the business context. This research is one of the first to comprehensively study e-business and SMEs by adopting China's latest SME criteria which was released by the Ministry of Industry and Information Technology of China in 2011.

In terms of research methodology, this study combines the research methods that cross quantitative and qualitative strategies to maximise the strengths of both. First, a questionnaire-based survey is used to collect data from 103 SME owners or managers in Hunan Province, China. Second, a selection of 20 firms are invited to participate a semi-structured interview, thus the qualitative inquiries can facilitate interpretation of the findings from quantitative analysis.

The findings reveal that DOI theory is applicable to e-business adoption issues for SMEs in China, with all of the four proposed elements being found relevant. The study has valuable implications to practitioners and policy makers in general, and can serve as the theoretical basis for future research.

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ABBREVIATIONS

B2B	Business-to-business
CNNIC	China Internet Network Information Center
CRM	Customer Relationship Management
DOI	Diffusion of Innovation Theory
DTI	Department of Trade and Industry
EDI	Electronic Data Interchange
ICT	Information and Communications Technology
MIIT	Ministry of Industry and Information Technology
MoC	Ministry of Commerce
OA	Office Automation
OECD	The Organisation for Economic Co-operation and Development
PIT	Publish, Interact and Transform model
RBT	Resource-based Theory
SEO	Search Engine Optimisation
SME	Small and Medium-sized Enterprise
SNT	Social Network Theory
TAM	Technology Acceptance Model
TOE	The Technology-Organisation-Environment Model
TPB	Theory of Planned Behaviour

CHAPTER 1 INTRODUCTION

1.1 The background and significance of the chosen topic

The significance of small and medium-sized enterprises (SMEs) for China's economy has received increasing attention over the last decade. Meanwhile, the latest official reports (MIIT, 2010; MoC, 2013; CNNIC, 2014) have suggested that it is becoming increasingly difficult to ignore the key role of e-business in sustaining and developing China's SMEs and an unprecedented range of benefits brought by the business innovation. However, far little academic attention has been paid to this important area.

Despite the extensive research on the adoption of information and communications technology (ICT) among SMEs, the existing literature suggests that research attention has primarily been focused on developed countries. As a result, most research theories and conceptual models are derived from and are constructed based on empirical data from developed countries or regions. Given the unique characteristics of China's business environment and the significance of SMEs in China's economy, this study aims to investigate the role of e-business in developing and sustaining SMEs in China and how small business decision makers perceive the innovation, through examining the applicability of existing e-business adoption theories and adapting them to fit the business context in China. Although there is a large volume of published studies investigating SMEs in China, It has been noticed that many of the research (Feng and Mei, 2012; Liu and Abdalla, 2013; Qiao *et al.*, 2013) adopted the significantly different SME standards either of the 2003 version or from other countries. Given that it remains unclear the implications of the new criteria on e-business adoption of China's SMEs, this research is one of the first to comprehensively study the area of e-business and SMEs by adopting China's latest SME criteria which was released by the Ministry of Industry and Information Technology of China (MIIT) in 2011.

With regard to research strategy, the area of information system research has been overwhelmingly dominated by quantitative approach (Orlikowski and Baroudi, 1991). However, the past decade has seen the rapid development of mixed methods research in a number of subject areas in order to diminish the weaknesses of mono-method research (Bryman and Bell, 2011). This study seeks to combine the research methods that cross quantitative and qualitative strategies to maximise the strengths of both.

The findings from this study will have important implications to practitioners and policy makers in general, and will serve as the theoretical basis for future research.

1.2 Research aims and objectives

This study will focus on examining the factors, from businesses' perspective, that affect e-business adoption among SMEs in China, and will also give an account of developing existing adoption theories and models to suit China's business environment.

In support of the aims, the following objectives will be addressed:

- To evaluate the existing e-adoption adoption theories and models and examine their applicability for SMEs in China
- To examine the applicability of innovation, communication, social system and time elements in terms of e-business adoption among SMEs, and adapt and/or extend existing e-adoption theories and models, taking into account political, cultural, economic and other contingencies specific to China
- To examine the perceptions of small business decision makers on the role of e-business, and investigate how the innovation, from businesses' perspective, develops and sustains SMEs in China

1.3 Structure of the thesis

The thesis has been organised in the following way. Chapter 2 begins by looking at the research context of this study, and lays out the theoretical dimensions of the research. The chapter of literature review is divided into two sections. The first part contains the review of various key terms and definitions, and the background of China's business environment. The rapid development of ICT infrastructure in China over the last decade has boosted the ICT adoption by both individuals and organisations and has subsequently changed the landscape of doing business in China. As the vast majority of businesses in China, SMEs have played a crucial role in sustaining the economic development and contributing to knowledge transfer. The current status and unique characteristics of China's SMEs are examined in this section and the knowledge gap is identified here.

The second part reviews the major theories on organisational adoption of ICT technologies. Following a review of existing literature, five of them have been identified as the most commonly used theories to construct conceptual models by many researchers. Each of them is examined within the research context and is then compared with the chosen criteria for respective advantages and disadvantages.

After the justification of the choice of theory, in chapter 3, the key elements of the theory are explored in details and relevant limitations are addressed. The proposed research model(s), based on chosen theory, is given at the end of the chapter and the research questions are introduced accordingly.

Chapter 4 reviews and justifies the research methodology adopted in this study. It is revealed from the existing literature that e-business research has been dominated by quantitative survey for a long time. This phenomenon reflects the theory testing tendency and the emphases of quantification in the collection and analysis of data among e-business researchers. Despite the debates over philosophical and practical considerations, this research employs a mixed methods design. This chapter starts with the debate of underlying research philosophy for the chosen methodology. It is then followed by the review and

selection of differing research approaches. At the end, it comes to the practical consideration with the design of data collection methods.

The thesis then will go to the analysis of data and the presentation of research findings. An online questionnaire is used to collect quantitative data. The web link which contains the questionnaire is sent with a covering letter in emails to owners or managers of small businesses in Hunan Province in southwest China. The collection of quantitative data is reported in chapter 5 along with the demographic background of the research participants. Various analytical techniques are applied to examine the research model(s) and to explore various relationships between the elements.

Chapter 6 presents the findings from the qualitative research stage. A total of 20 semi-structured interviews are conducted to collect qualitative data from participating SMEs. The interviews are recorded and transcribed, before NVivo is used to analyse the data. Research findings and discussions are provided subsequently in this chapter.

Finally, results from both quantitative and qualitative stages are cross-checked, and a conclusion is provided in the last chapter. Final comments on this study including addressing limitations and making suggestions for improvements, and speculating on future research directions are presented at the end of the thesis.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction of literature review

Over the last decade the notion of systematic review has emerged as a focus of interest in the area of business and management research. Some writers (Bryman and Bell 2011, p.94) have suggested that more explicit procedures of literature review should be adopted to reduce the biases of researchers and to promote evidence-based approaches. As a relatively young field which derives from social sciences, business and management research has generated rather low consensus concerning the way to conduct literature review. As suggested by Creswell (2014, pp.25-50) and Bryman and Bell (2011, pp.94-101), the main steps of the review process adopted in this research will be explained in details in the following paragraphs.

Bryman and Bell (2011, pp.95-98) propose that literature review should start with specifying the research question(s) and making a plan. In order to establish the relationships between different variables and specify the research questions, four elements will be looked into, namely: Context, Intervention, Mechanism and Outcome.

- Context: this refers to the units, settings and/or relationships being studied. SMEs are the units to be studied in this research; China's business environment will be considered as the institutional setting, as this research focuses on SMEs in this specific country.
- Intervention: this relates to the impact factors or elements which cause the relevant actions or activities being studied. These factors or elements can be roughly categorised as independent variables. This study intends to contribute to the knowledge in understanding the influences of different impact factors and elements on Chinese SMEs with regard to e-business adoption.
- Mechanism: it relates to what Mechanisms operate in the influence of Intervention (adopting factors) on Outcomes (actual e-business adoption).

- Outcomes: this consists of the intended and unintended effects of the Intervention and how they can be measured. The outcomes refer to e-business adoption and can be treated as dependent variables in this case.

To sum it up, this study indents to answer the following question:

In China's business environment (Context), what factors (Intervention) influence the adoption of e-business technologies (Outcomes) by SMEs (Context), and what Mechanisms explain the relationships?

The objectives of the literature review are:

- To explore the literature on e-business adoption theories
- To identify the adopting factors and to establish the nature of the relationships between the relevant factors/elements and e-business adoption action
- To generate insights and create a conceptual model that could inform policies aimed at fostering e-business adoption among SMEs
- To identify areas for future research

The review will start from the more explicit ideas of Outcomes (e-business adoption) and Context (SMEs and China's business settings). Although the three elements will be tapped into separately, the focus will be on the interconnections between them. The less definite elements Intervention and Mechanism will be examined in later sections.

2.2 E-business

2.2.1 The concept of e-business

As a relatively new innovation, the term 'e-business' covers a plethora of different aspects that the industry and academia have long tried to grasp and to find apt definitions for. Although e-business is a commonly used notion in business practices, it is a concept difficult to define precisely due to the continuing evolution of technologies. The term embodies a multitude of

definitions which range from specific technological concepts over more concrete and tangible aspects of the phenomenon to specific business practices that have been developed over time. This section seeks to establish the most appropriate definition for this study, serving as a foundation for a better understanding of the challenges posed by the academia and practitioners.

It is understandable why there is a lack of consensus about the definition of e-business, as it is 'both an old and a new phenomenon' (Beynon-Davies 2004, p.3). The most comprehensive definition should be able to capture the dynamic nature of e-business which is changing over time as ICT has been continuously used to innovate new ways of trading behaviour for a number of decades.

Some definitions are commonly quoted and adapted by many e-business studies. One of the most cited definitions, suggested by IBM (2001, pp.5-6), states that e-business is 'about using the Internet infrastructure and related technologies to enable business anywhere and anytime', and encompasses e-commerce which focuses on buying and selling products and services over the Internet. The Gartner Advisory Group (2000, cited in Damanpour and Damanpour 2001) emphasises the degree of use of new electronic channels to conduct business and acknowledges the importance of the Internet. In 2009, OECD member states (2011) reviewed and defined an e-commerce transaction as 'the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders'.

It has also been noticed that the terms 'e-commerce' and 'e-business' have been used interchangeably in different contexts. Precisely, e-commerce focuses on the use of ICT to enable external activities and relationships of the business with customers or other organisations; e-business comprises the use of ICT to enable communication and coordination between both the internal stakeholders and external actors of the business (Beynon-Davies, 2004). In this study, the term 'e-business' is used in its broadest sense and includes all business activities (internal and external) that use ICT.

2.2.2 E-business adoption models

To indicate an organisation's progress and sophistication of e-business adoption, UK's defunct Department of Trade and Industry (DTI) developed an e-adoption ladder, as shown below, for the Business in the Information Age study:

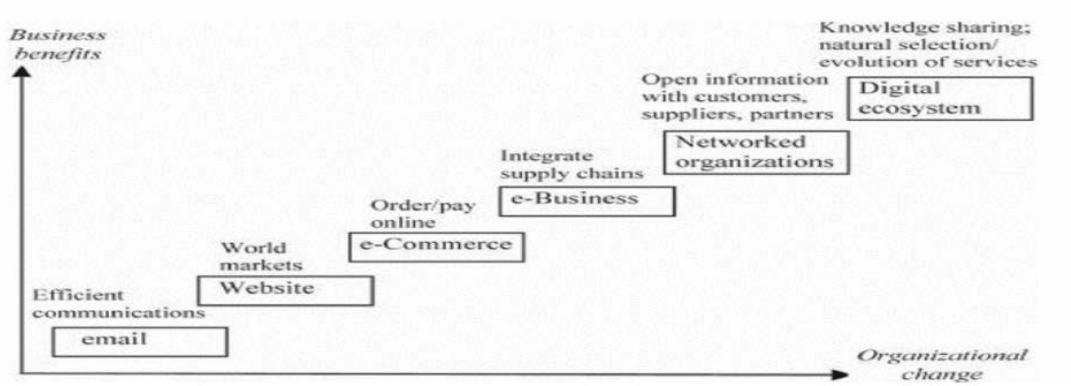

Figure 1 E-adoption ladder

(Source: Mpofu *et al.*, 2009)

As one of the earliest and most commonly cited models, this adoption ladder reflects a mainly technological perspective and tends to suggest that engagement with e-business technologies is sequential and progressive.

According to the model, knowledge management, as shown in the figure, has been included as one of the e-business adoption factors and has been placed on the top of the ladder (Gloet and Terziovski, 2004). In a sense, the barriers to change from traditional business operations to e-business not only relates to the technological prospect such as the availability of suitable information systems but also relies on the appropriate management of business related knowledge (Chong *et al.*, 2014).

Perhaps the most prominent weakness of this model is that this adoption ladder implies businesses will benefit from ICT as the direct result of organisational change and increased ICT sophistication, and suggests that this is the only path to successful adoption and not finishing the prescribed course means failure (Taylor and Murphy, 2004).

Foley and Ram (2002) provide a more sophisticated way to view and interpret the patterns of e-business engagement with their PITs model. The model is named after the three increasingly sophisticated functions that ICT can be used for: Publish, Interact and Transform. Unlike the e-adoption ladder, the model distinguishes the functions that ICT can bring from the activities it can be applied to. The authors have identified six essential areas of business activity which can be seen in the following figure. That is to say, the progressive sophistication of e-business adoption can be applied to just some, rather than all, of the areas of business activities depending upon a firm's needs. The PITs model appreciates that ICT may be introduced into different activities of a firm at different rates and at different times, and also recognises the unevenness and complexity of e-business take-up by different firms.

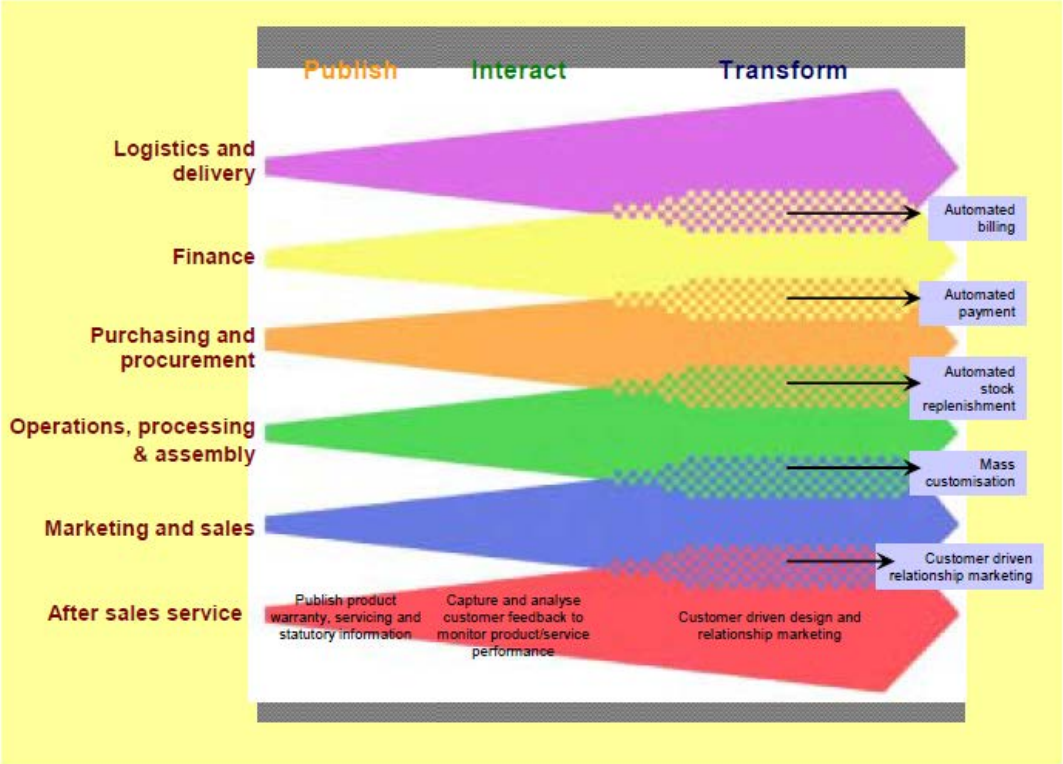

Figure 2 The PITs model

(Foley and Ram, 2002)

2.2.3 The benefits and risks of e-business

With the emergence of Internet technologies, e-business has become vital for businesses from supporting business operations to helping them to gain competitive advantages. It is widely accepted that organisations can benefit from e-business and Internet technologies. For example, e-business could remove geographical and physical barriers and enable better relationships with customers (Fillis *et al*., 2004). Tan *et al.* (2010) list reduced operating costs, more efficient management and improved communication as the most prevalent perceived benefits for adopting Internet-based ICT. More specifically, the implementation of ERP can result in reduced inventory, improved customer service, reduced planning cycle time and improved communication (Kale *et al.*, 2010). Those mentioned above can be summarised as gaining competitive advantage and increasing efficiency in various functional areas (Damanpour and Damanpour 2001).

However, making e-business investment decisions is by no means an easy one. The e-business engagement is associated with different risks with financial and legal risks being the most predominant ones. A recent study has suggested that the perceptions of e-business risk tend to be influenced by the experience of using e-business technologies and the knowledge of key staff (Grant *et al.*, 2014). There are also various barriers that impede firms, especially smaller one, to adopt e-business. As summarised by Tan *et al.* (2010), unconvinced benefits, high cost of hardware and software, and lack of relevant skills top the list of the widely cited barriers to ICT adoption. Nonetheless, many of these stem from the newness and rapidly developing pace of the underlying technologies. Predictably, these risks and barriers might disappear as e-business becomes more mature and more available to and accepted by the general population (Beynon-Davies 2004).

Given the complex and dynamic nature, it has been acknowledged that there is no ‘one fits all’ solution in conducting e-business (Damanpour and Damanpour 2001; Tan *et al.* 2010; Schneider 2011). First, evidence shows that firm size can be an important factor to take into account (Brown and Kaewkitipong 2009;

Bordonaba-Juste *et al.* 2012). For example, the research conducted by Bordonaba-Juste *et al.* (2012) reveals that outsourcing is not a suitable strategy for large firms in conducting e-business due to the high costs and risks. Additionally, small and micro firms have considerable lower proportion in adopting e-business and have more problems in implementing e-business in business processes. Second, not all products or services can be well suited to e-commerce. For low-value transactions or items that rely on personal selling skills, traditional commerce model may prove to be superior (Schneider 2011, pp.15-17). Third, the social context related to a particular region plays an important part in developing a business model (Pouloudi *et al.*, 2003). Issues like culture, legal system and economic environment could all shape how e-business can be implemented and evaluated (Beynon-Davies, 2004). All of the above imply that careful strategic planning and effective performance evaluation rather than a simple sense of urgency are needed in conducting e-business.

2.3 SMEs

2.3.1 The definition of SMEs

It is necessary here to clarify exactly what is meant by SMEs in this study, since there is not a set of universal criteria in place. Varied from country to country, the definition of SMEs is typically based on the number of employees, annual turnover or the combination. In the European Union (European Commission, 2009), the broad criteria for SMEs are: micro firms are those with up to 10 employees; small enterprises have the staff headcount of up to 50; for those who have up to 250 employees, they are defined as medium-sized businesses. To quality for SMEs, firms also need to make sure that they meet the turnover or balance sheet ceiling. In the US, the Small Business Administration (2013) sets the size standards based on different factors but typically SMEs mean those who have less than 500 employees.

In China, the first distinctive definition of SMEs was published in 2003 through the SME Promotion Law and the Provisional Stipulations of the Standards of SMEs

which replaced the rough guidelines that came into effect in 1988, and the supplementary criteria of 1992. This set of definitions, which remains the most frequently used criteria in academia, is rather complicated and effectively comprises a number of large firms. On top of that, only seven industrial sectors are included in it. The Stipulations have been criticised for being too general and lacking of considerations of micro enterprises (MIIT 2010, p.23). In 2011, a significantly revised definition for SMEs was published by the Ministry of Industry and Information Technology of China and three other governmental agencies (The Central People's Government of China, 2011). Compared with the last one, the new definition covers a more comprehensive list of industries and specifically classifies the category of micro enterprises. SMEs in China can therefore be defined, depending on industrial sectors, by the number of employees, operating income or total assets. Apart from agriculture, construction and real estate sectors, companies from all other sectors can be broadly classified by the number of employees. Typically, businesses are defined as 'micro' with fewer than 10 employees, 'small' if less than 100 or 'medium' with up to 300.

It has been noticed that even the latest research published on China's SMEs adopted the significantly different standard from 2003. Therefore, it remains unclear the implications of the new criteria on e-business adoption of China's SMEs.

Industrial Sectors	Micro	Small	Medium	Alternative criteria
Agriculture, forestry, animal husbandry and fishing	n/a	n/a	n/a	Annual turnover
Industry	<20	20-299	300-999	Annual turnover
Construction	n/a	n/a	n/a	Annual turnover and Total assets
Wholesale trade	<5	5-19	20-199	Annual turnover
Retail trade	<10	10-49	50-299	Annual turnover
Transportation	<20	20-299	300-999	Annual turnover
Storage	<20	20-99	100-199	Annual turnover
Postal and courier activities	<20	20-299	300-999	Annual turnover
Accommodation	<10	10-99	100-299	Annual turnover
Food and beverage service activities	<10	10-99	100-299	Annual turnover
Information and communication	<10	10-99	100-1999	Annual turnover
Software and IT service activities	<10	10-99	100-299	Annual turnover
Real estate development and trading	n/a	n/a	n/a	Annual turnover and Total assets
Real estate management	<100	100-299	300-999	Annual turnover
Rental and leasing activities and business support activities	<10	10-99	100-299	Total assets
Others	<10	10-99	100-299	n/a

Table 1 Definitions of SMEs in China

(Source: The Central People's Government of China, 2011)

2.3.2 The characteristics of SMEs

The role SMEs play for a country's economy has received increasing attention over the last few decades. The research results from early studies have changed the views towards SMEs in many countries, and have provided the theoretical basis for the continuing development of SMEs related studies.

With the opening-up of China as part of the market-oriented reforms initiated by the central government in the 1980s, private SMEs had been finally recognised as

vital to the country's economic development. As a result of the policy change, most SMEs in China have a history of less than 20 years. However, the SMEs in China have achieved rapid and sustainable growth over the past two decades. According to a report from the Ministry of Commerce (2013), the registered number of small and medium-sized enterprises in China was over 13.6 million at the end of 2012. The same report also pointed out that along with another 40.5 million individuals running their own household business in the country (*Getihu*), China's SMEs accounted for over 99% of the country's total enterprises.

Since the 1990s, SMEs sector has played an increasingly significant role in China's economic development. According to MIIT (2013), the SMEs in China generate about 60% of the GDP, contributing almost 50% of the country's total tax revenue. In term of labour market, small firms provide 80% of the job opportunities in urban areas. Additionally, 65% of the country's patent applications, more than 75% of technological innovations, and over 80% of new products development are contributed by the SMEs. China's SMEs have become significant as a source of employment and as contributors to the economy and structural reform.

Despite the contributions to economic growth and employment, SMEs in China face enormous challenges as China integrates into world economy. According to the Chinese SMEs' E-business Development Report 2009 (MIIT, 2010), small businesses have been particularly facing a number of challenges since the outbreak of global financial crisis in 2008, namely obtaining orders, financing, logistics, payment, technological innovation, trust and information management:

- Nearly 80% of SMEs have difficulties in obtaining orders. The situation is even worse for foreign trade companies due to global financial crisis.
- Financing channel is limited for SMEs, with only less than one third of SMEs having successfully obtained corporation finance in the past.
- More than 70% of SMEs need to use logistics services for their business operations but they face various problems ranging from high costs to delayed delivery.
- 57% of SMEs have payment problems (e.g. trust and security).

- Most SMEs are lack of research and development capabilities, with over 40% companies claiming they are short of skilled employees.
- 57% of SMEs have serious management problems especially in sales, customer relationship and financial management. The incapacity for efficient management of business information system has widened the distance between SMEs and their larger counterparts.

Over 90% of SMEs in China are either small or micro in term of size (MIIT, 2010). Empirical evidence has shown that small and micro firms are less likely to conduct e-business than medium-sized and large firms (Bordonaba-Juste *et al.*, 2012). This is probably due to the relatively weak linkages with external market, weak innovation capacity, and limited financing sources that have limited growth of small businesses. A majority of the founders still serve as the top executives or stay in top management due to the relatively short history of Chinese SMEs. In a sense, the characteristics and connections of the owner or manager have a strong influence on a firm's strategic decision and performance (Qiao *et al.*, 2013).

2.4 China's business environment

The business environment with which a firm is engaged encompasses anything outside of the organisation. It constitutes a complex network of relationships and activities between the firm and other agencies in the economic, social and political spheres (Beynon-Davies, 2004). The environmental systems can be relatively easily defined at the level of nation state, given the specific political system, economic situation and social values of that particular country. The environment can in turn constrain what a business is able to do in terms of its trading activities.

2.4.1 China's economic development and ICT infrastructure

The economic environment is probably the most important one for commercial organisations. China's current economic restructuring and rapid development have provided a good opportunity for the development of e-business. The rapid development of Chinese economy has increased the requirements for

sophisticated ICT infrastructure at organisational level (Chien *et al.*, 2007). As suggested by World IT Report (2003, cited in Liang and Xue, 2004), the development of SMEs' technological infrastructure is considered to be of high priority to the nation's economy. Since 2000, China has experienced tremendous growth in e-business adoption (Voola *et al.*, 2010; Feng and Mei, 2012; MoC, 2013). By the end of 2013, the Internet penetration rate in China has reached over 45% with an annual growth rate of around 10% (CNNIC, 2014). Never before has a country raised its 'teledensity' so rapidly, China has emerged 'from being a marginal player to become one of the world's leading markets' over a short period of time (Economist Intelligence Unit, 2006).

However, the extremely unbalanced development of China's ICT infrastructure may complicate the prospect of e-business adoption and development. China Internet Development Report (CNNIC, 2014) reveals that regional digital divide still widely exists across the country. For instance, the Internet penetration rate has reached over 75% and 70% in Beijing and Shanghai respectively, and more than 60% in four relatively developed coastal areas: Guangdong, Fujian, Tianjin and Zhejiang, which are already comparable with a number of developed countries. In contrast, the rest of the country has far lagged behind with less than half of their population having access to the Internet. The penetration rates of eleven provinces from the underdeveloped inland area are even lower than 40%, which indicates their Internet adoption rate is merely around half of that in the most developed regions of the country. Due to the fact that most e-business activities are based on the Internet, by and large, it implies that treating China as a monolithic entity is inappropriate.

2.4.2 China's social environment

The social environment concerns the cultural life of China. A number of preconditions are required for the successful uptake of electronic service delivery by a business's external stakeholders such as customers. In order to keep e-business viable, Beynon-Davies (2004) claims that such stakeholders must be

aware of the benefits of e-business, show interest in it, have access to it, possess the right skills, actively use it and in turn trigger the threshold of mass market.

Regarding social attitudes, issues such as data protection and privacy, and the low trust towards online commerce have potentially affected such preconditions in different ways (Beynon-Davies, 2004; Duan *et al.*, 2012). Particularly, key concerns have been expressed over trust placed in online transactions in China, especially in the initial stages of a business relationship (Davison and Ou, 2008).

2.4.3 China's political environment

Particularly concerned with government and legal frameworks, the political environment is a major constraining force on business behaviours (Haley, 2002; Beynon-Davies, 2004). The traditional concept of law is profoundly challenged by the emergence of online trading due to the lacks of geographical boundaries and centralised controlling authority. The Ministry of Industry and Information Technology and The Ministry of Commerce of China have initiated plans with regard to legislation and policy setting in some of the key areas including the use and enforcement of contracts and intellectual property rights in electronic context (Feng and Mei, 2012).

2.5 E-business adoption by China's SMEs

Since 2008, the global financial crisis has brought huge impact on SMEs in China in the areas of obtaining orders and labour costs (MoC, 2012). However, there is evidence showing that SMEs using e-business have much better performance than those who chose not to adopt the innovation. According to the Chinese SME E-business Adoption and Development Survey (MIIT, 2010), the survival rate of SMEs who use e-business is 5 times higher than those who do not. In addition to that, the report reveals that every 1% increment of SMEs adopting e-business could create 40,000 job opportunities. From SMEs' own perceptions, the same report indicates that about 60% of SMEs have recognised the usefulness of e-business and 32% claim they have significantly been benefited from using it. In

other words, e-business has great potential become a critical solution for most SMEs to overcome financial crisis and to increase competitiveness.

Nevertheless, the Chinese SMEs E-business Adoption and Development Survey conducted in 2009 (MIIT, 2010) reveals that the majority of China's SMEs are still at the early stage of adopting e-business. Lack of understanding of e-business, shortage of professionals and funds are regarded as the greatest barriers to adopt e-business by many small firms. Those mentioned above, coupled with the insufficiency of legal system and lack of trust, have all placed tremendous pressure on Chinese firms to improve their operational performance based on new information systems.

Findings from a number of latest reports (MIIT, 2010; MoC, 2013; CNNIC, 2014) have reaffirmed the low adoption level of e-business technologies by China's SMEs. According to China Internet Network Information Centre (CNNIC, 2014), less than 50% of SMEs have their own enterprise websites or web presence on third-party platforms. Less than 30% of firms use Internet to conduct sales or procurement activities. Chinese SMEs E-business Development Report 2009 (MIIT, 2010) shows that over 70% of SMEs use e-business technologies in less than three of their business activities. Procurement and marketing are the most likely business activities that are conducted over the Internet by small firms in China. To summarise these findings, e-business adoption by China's SMEs has the following characteristics:

- Online marketing has become the main choice among various marketing channels for SMEs. Search engine marketing, instant messaging services and third-party platforms are the most popular online marketing channels with the adoption rates of over 50%.
- In terms of firm size, smaller firms tend to be less proficient in using e-business technologies. The e-business adoption rate among micro-sized firms is significantly lower than the average level. The only exception is the usage of online payment, as the existing financial system and business

environment in China are more suitable for online transactions with small amounts of money.

- Digital divide between the developed costal area and developing inland results in the unbalanced e-business adoption level among SMEs in different regions of China. The adoption rate of online sales for SMEs from east China is significantly higher than that of the rest of the country thanks to more sophisticated business infrastructure and logistics services. This is in line with the fact that most e-business service providers are based in the developed costal area (MoC, 2013).
- There is a significant variance from industry to industry. Businesses from manufacturing, trading, and IT-related industries have higher proportion of e-business usage especially in electronic procurement and online sales. Firms from certain industries, for example, construction and service industry, tend to merely use the Internet to conduct marketing activities, but to maintain trading activities offline.

From the above review, we can confidently conclude the significance of the research:

1. SMEs play a significant role in China's economy;
2. E-business can provide SMEs with an unprecedented range of benefits and is essential for most firms;
3. Further work in this field needs to be undertaken to serve as the theoretical basis for practitioners and policy makers.

2.6 Directions of current e-business and SMEs research

The role of ICT in business activities has attracted increasing attention from both industry and academia. The early literature focused on the effective adoption of the first commonly used technologies, for example, Electronic Data Interchange (EDI). After that, a large body of literature has investigated into the use of a single e-business technology, such as e-mail, the Internet and website, instead of a global measure of e-business use. More recently, due to the advancement of

technology, a growing body of research has focused on the adoption of the latest Internet-enabled technologies such as cloud computing (Alshamaila *et al.*, 2013) and mobile devices (Harris and Patten, 2014).

Another stream of e-business research focuses on business initiatives and organisational implementation instead of the technology itself. As suggested in Section 2.2.2, the sophistication level of E-business usage was defined as incremental steps and represented in the form of an 'e-adoption ladder' (Xu *et al.*, 2008). Other researchers have examined the phenomenon from the perspectives of e-business strategy (Caniato, 2009), e-adoption factors (Molla and Licker, 2005) and e-business development (Fillis and Wagner, 2005).

Since the turn of the century, given that many countries have changed their views towards SMEs and the lack of anticipated engagement in E-business among SMEs, a growing number of practitioners and scholars have agreed that firm size is a significant factor in terms of technology take-up due to unbalanced infrastructure, expertise and experience, and finance. For example, some authors (Xu *et al.*, 2008) have applied DTI's e-business adoption ladder in the SMEs sector and modified it with the influential factors identified in their empirical study. By and large, ICT adoption and usage among small firms have developed into a derivative but relative independent research subject area. Since then, a considerable amount of e-business and SMEs literature has been published on the fields such as the benefits and barriers of e-business, relevant government policies, support from service providers, new business models, and innovative business practices.

Due to the differing nature across industrial sectors, some researchers focus on specific sectors by studying the application and effectiveness of e-business in a particular sector. As the US and European corporations have been leading the business world in the use of the Internet, most early research collected their data from the Western setting. In recent years, a significantly increasing number of studies focusing on developing countries or regions have been published as a consequence of their growing access of the Internet. For instance, Molla and Licker (2005) develop and validate a conceptual model that identifies the relevant

contextual and organizational factors that might affect e-commerce adoption particularly in developing countries. In a sense, the research area of e-business and SMEs has yielded a number of sub-fields.

China started relatively late in e-business and SMEs research for two reasons. On the one hand, the official definition and policy regarding SMEs did not exist until 2003. On the other, the relatively weak ICT infrastructure and extremely unbalanced development of the economy have hindered the e-business phenomenon on a national scale. Recent years, however, have witnessed the emergence of a great amount of the literature thanks to the rapid development of national economy and China's increasing significance on global trading activities.

To illustrate the various directions of e-business and SMEs research, the following diagram is drawn with one example being given for each research focus. The diagram is meant to be indicative rather than holistic, thus research focuses and their associated literature are not limited to the diagram. The main purpose of the diagram is to indicate where this study sits among existent literature and limit the scope of the current study.

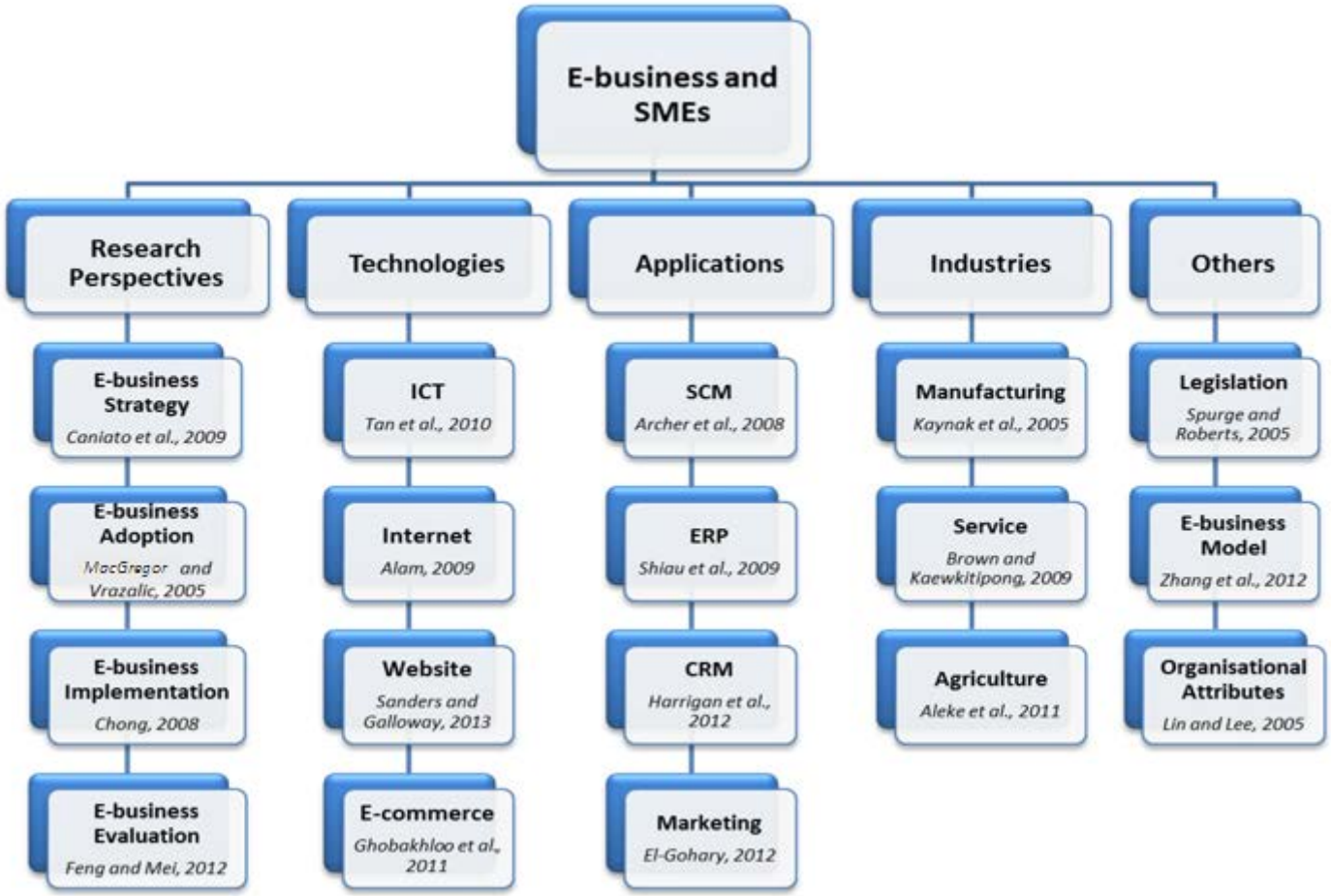

Figure 3 Literature map of e-business and SMEs research

2.7 Review of e-business adoption theories

SMEs adoption of e-business has attracted extensive academic attention. Searches on Scopus and Web of Knowledge revealed that more than 300 journal articles were published over the last decade. Also, at least 40 UK PhD theses have been indexed in British Library EThOS. Ostensibly, this subject area already has an established presence to a certain extend in existent literature. On the contrary, no consensus has been reached on adoption models and a great deal of literature on e-business adoption focuses almost exclusively on the perceived benefits and barriers by SMEs. Hence, this study intends to fill the gap in understanding the influences of different impact factors/elements that influence China's SMEs' e-business adoption decision.

The review of existing literature has also suggested that most research has primarily been conducted in one or two countries. This phenomenon may lead to the problem of overgeneralising in terms of locality due to a lack of consideration of different context, for example, culture (Bryman and Bell 2011, p.195). Taking into account of the differences in economic development, business models, user behaviour and consumer expectations, it can be assumed that businesses in China face varying challenges.

Based on a review of existent literature and cross-checks with theoretical reviews provided by other scholars (Molla and Licker, 2005; Tan and Macaulay, 2007; Parker and Castleman, 2009), it is found that most research models to investigate e-business adoption are based on one or combination of the following theories:

- The Technology-Organisation-Environment Model (TOE)
- Technology Acceptance Model (TAM)
- Theory of Planned Behaviour (TPB)
- Resource-based Theory (RBT)
- Diffusion of Innovations Theory (DOI)

These theories have different focuses and examine different aspects of technology adoption. Some examine only the technological aspects of adoption,

while the others pay more attention on the organisational environment of adopters. To minimise the limitations of each theory, researchers typically choose to combine or extend them in constructing their research models.

2.7.1 The Technology-Organisation-Environment Model (TOE)

The TOE framework, introduced by Tornatzky and Fleischer (1990), is a popular tool for investigating the adoption of latest technologies in an organisation. It classifies the factors that influence an organisation to adopt a new technology into three groups: technology, organisation and environment.

A great deal of research on the adoption of ICT innovations has used the three factors to construct varying adoption models. TOE framework was first used to study the adoption of EDI by organisations (Iacovou *et al.*, 1995). More recently, it is not uncommon to see researchers to employ TOE to investigate the adoption factors of different ICT technologies. For example, based on TOE framework, Ifinedo (2011) conducted a questionnaire-based survey with top management of Canadian SMEs. He found that perceived benefits, management support and external pressure were important factors towards SMEs' acceptance of Internet and e-business technologies. By extending TOE framework with trust context, Duan *et al.* (2012) identified positive relationships between the perceived direct benefit, top management commitment, external pressure, trust and the adoption of e-market in Australian SMEs. In addition to these findings, Scupola (2009), by applying qualitative research approach in TOE concept, realises that top management of SMEs start taking into consideration of employees' suggestions when making e-commerce adoption and implementation decisions. Oliveira and Martins (2010) collected data from companies across different European countries in two industries to compare their differences regarding the adoption of e-business. Their TOE-based model reveals that there is an industrial rather than national difference in e-adoption. Brown and Kaewkitipong (2009) applied TOE in their study on e-business use in small and medium sized tourism enterprises in Thailand. In addition to the influence from technology providers, they found that the relative size of an organisation was significant in e-adoption.

Other studies (Haley, 2002; Gibbs and Kraemer, 2004; Thatcher *et.al,* 2006) have recognised government's impact on e-business adoption through policy making and legislation.

However, those who apply TOE to their adoption models typically investigate e-business benefits and barriers at a single point. Some researchers now argue that ICT continuously experiences rapid technological changes and continuous innovation (Troshani and Doolin, 2007), it is not uncommon to see SMEs adopt new technologies and stop using them at a later stage due to their dissatisfaction with the experience (Rogers, 2003).

2.7.2 Technology Acceptance Model (TAM) and Theory of Planned Behaviour (TPB)

TAM is mainly built with perceived ease of use and perceived usefulness to predict an individual's intention to use technology (Davies, 1989). The theory helps to predict and explain ICT usage intention and adoption behaviour, and has been widely viewed as an information system theory which helps to understand the adoption and use of information technology (Gibbs *et al.*, 2007; Chatzoglou *et al*., 2010).

Nevertheless, TAM has been criticised by a number of writers for not accounting for the influence and personal control factors on behaviour, including the lack of consideration to factors such as external influences from the environmental attributes, supplier, customers and competitors (Manueli et al., 2007; Parker and Castleman, 2009). In the field of adoption of ICT technologies, it is not uncommon to see various factors or models to be used to supplement TAM. By way of illustration, Oh *et al.* (2009) include industry environment in their study of the adoption of e-trade innovations by Korean SMEs to supplement perceived usefulness and perceived ease of use. In a study of individual IT adoption, Zhang *et al*. (2008) believe the users personality, the characteristics of the specific technology and the external conditions in the IT adoption environment should be considered along with the other elements. Based on TAM, Chatzoglou *et al*. (2010) incorporated factors such as social influence, management support and

perceived service quality to study personal computer acceptance among Greek SMEs. Unlike most studies, Yu and Tao (2009) explicitly apply TAM to business-level innovation adoption. They include the characteristics of adopting organisation itself to investigate the adoption of Internet-based information system and technology by large Taiwanese firms. Some scholars (Aleke *et al.*, 2011; El-Gohary, 2011) choose to combine TAM with other theories in an attempt to improve the ability of the chosen models to predict the adoption and use of new technologies.

TPB, a similar model which predicts adopter behaviour, argues that attitude, subjective norms and perceived control collectively influence people's adoption intentions (Ajzen, 1991). Researchers have used TPB to predict and explain human behaviour when people encountering ICT technologies. A research project, let by Nasco *et al.* (2008), applies TBP to their study of e-commerce adoption intentions among Chilean SMEs. The findings from 212 SME managers and/or owners show that only subjective norm and attitude have impacts on adoption intentions. Saffu *et al.* (2008) combine TPB and TAM with other factors to investigate e-commerce adoption decision of Ghanaian SMEs. But similar to TAM, TPB ignores the social and interpersonal influences that could significantly shape e-business adoption patterns (Parker and Castleman, 2009).

2.7.3 Resource-based Theory (RBT)

To stress a firm's competitive strategy, some researchers (Fahy, 2000; Salwani *et al.*, 2009; Voola *et al*., 2010) choose to use Resource-based Theory as the main analytical tool to study firms' e-business adoption. RBT emphasises that businesses need to exploit and develop unique resources and capabilities to gain competitive advantage from e-business adoption. Resources can be internal to a firm or external from its business environment. RBT also recognises companies need both tangible and intangible resources to gain competitive advantage (Fahy, 2000). In e-supply chain strategy, for instance, Kotzab (2003) argues that the most important resources are human, IT and financial. Although some argue that e-business is a commodity due to the fact that the technologies are widely

available on the market, the real value is created through the capabilities of integrating different information systems and sharing information which are closely connected to the resource base and vary from business to business (Salwani *et al.*, 2009). Due to the interactive nature, capabilities tend to be the most difficult resource to be duplicated and the most likely source of sustainable competitive advantage (Fahy, 2000).

However, RBT has drawn criticism for its insufficiency to recognise the heterogeneous origin of a firm's resources which is particular the case for small businesses (Liu *et al*., 2011). Therefore, what seems to be lacking is a clear conceptual model that explains how the heterogeneity arises and how the organisational transform process is implemented. Moreover, RBT fails to capture the complicated nature of decision making by owners or managers of small businesses. It assumes that companies should adopt a proactive approach to take up technologies rather than being pushed by external pressures (Voola *et al.*, 2010), but the decision makers of small businesses are usually engaged in complex environmental and social context which means that they do not necessarily have same business goals (Parker and Castleman 2009). By and large, RBT cannot sufficiently explain adoption decisions of non-entrepreneurial companies, because those companies may not always use resources to their fullest potential. Given such considerations, RBT does not seem to be sufficient for depicting the full picture of small firms' digital transformation.

2.7.4 Diffusion of Innovation Theory (DOI)

Rogers' (2003) DOI defines four main elements in the diffusion of an innovation: namely the Innovation, Communication channels, Time and the Social system. He argues that diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system.

Studies in the past have supported the claims that innovation diffusion theory is applicable to technology innovation in an organisation (Rogers, 2003), but there is still a lack of empirical study on the influence of innovation diffusion processes on SMEs. On the other hand, most ICT-related studies that have used the DOI

model have typically just applied the Innovation or Time elements rather than explicitly consider all the four elements together to explain the e-adoption phenomenon (Parker and Castleman 2009). By way of example, Tan *et al*. (2009a, b) used the Innovation element with additional factors to study the benefits and barriers of ICT adoption by SMEs from Malaysia. Aleke *et al.* (2011) adapted the decision making process from DOI to study the adoption of ICT in small Nigerian businesses. Another example of this is the study carried out by Brand and Huizingh (2008) in which the Time element was used to examine innovation adoption by SMEs in Netherlands. By simplifying the decision process proposed by Rogers, they find that current adoption level has significant effect on further adoption intention.

By and large, in comparison with theories discussed above, DOI theory appears more comprehensive and has the potential to provide a useful framework for explaining small company e-business adoption. Since it aims to explain the social and relational aspects of e-business diffusion and how this occurs over time in a social system (Gibbs *et al.*, 2007; Parker and Castleman, 2009).

2.7.5 Comparison of existing theories

The literature has clearly suggested that the development of a theoretical framework is still an on-going process, as no consensus has been reached on e-business adoption models, particularly with regard to small businesses. Given the review of the existing theories, the criteria to study e-business adoption by SMEs can be summarised as: the characteristics of the technology itself (e-business), the attributes of adopters (small organisations), time factor and social context.

In short, TOE recognises the attributes of e-business technology, organisation and environmental factors which can affect adoption intention but oversimplifies the complicated decision making process. TAM and TBP emphasise the attributes of technology and the attitudes of adoption units toward it, but they fail to appreciate the significant social influence that could have on adopters. RBT seems to have included most elements but it is insufficient to address the idiosyncratic characteristics of small firms and their social context. By applying all

the elements described by Rogers, DOI seems have the greatest potential to provide a useful framework for explaining e-business adoption by small businesses. The attributes of each theory can be summarised as the table below:

Intervention / Theories	Technology	Attributes of adopters	Time factor	Social context
TOE	Yes	Yes	No	Yes
TAM	Yes	Yes	No	No
TBP	Yes	Yes	No	No
RBT	Yes	Insufficient	No	Insufficient for SMEs
DOI	Yes	Yes (through communications and social system)	Yes	Yes (through social system)

Table 2 Different theories used in SME e-business adoption research

2.7.6 Conclusion

Based on the review of existent literature, it can be concluded that a consensus regarding the research models on e-business adoption is far from being reached. By examining various theories used by previous studies, it appears that Rogers' DOI theory has the greatest potential to provide a comprehensive framework to explain e-business adoption in small firms. Rather than just studying e-business technology itself, DOI aims to explain the social and relational aspects of innovation diffusion and how this occurs over time. In order to reflect the unique characteristics of decision making in SMEs and business culture in China, theories related to *guanxi* network can be used to supplement the social context provided by DOI. Additionally, it would also be interesting to see how the findings of a research based on the new SMEs criteria would differ from previous studies.

CHAPTER 3 PROPOSED RESEARCH MODELS

Although existing literature has shown a relationship between innovation diffusion processes and technology adoption, this study intends to construct and empirically verify an adoption model(s) based on Diffusion of Innovation theory. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 2003). Rogers identifies four main elements affecting the adoption rate of innovations, namely: the innovation, communication channels, time and the social system. The conceptual model will be fundamentally based on the four elements, which results in the examination and development of specific main and sub-models to be tested in the research.

3.1 The innovation

An innovation constitutes an idea, practice or object which is perceived as new by potential adoption units (Rogers, 2003). In the terms of e-business adoption, newness seemed by small firms not only involves new knowledge but also a favourable or unfavourable attitude towards it which can lead to a decision to adopt or not. The innovation characteristics described in DOI to explain the adoption rate of e-business are relative advantage, compatibility, complexity, trialability and observability. As Rogers (2003, p.223) explained in his book, this study focuses on individuals' perceptions of the attributes of e-business technologies rather than the objective classifications by experts, because this is what actually affects the adoption rate of the innovation. The following sections will explain each of the characteristics and other relevant ones in more details.

3.1.1 Perceived advantages

A firm may adopt e-business if there are more perceived benefits than existing barriers. This proposition has been widely tested in Internet-based technology adoption studies. A great number of research (Alam, 2009; Chibelushi and Costello, 2009; Shiau *et al*., 2009; Tan *et al*., 2009b; Oliveira and Martins, 2010; Ghobakhloo *et al*., 2011; Ifinedo, 2011; Duan *et al*., 2012; Kannabiran and

Dharmalingam, 2012) have found that perceived relative advantage of e-business is positively related to its adoption rate, although different items have been used to examine this relationship.

For example, in his survey on Malaysian SMEs, Alam (2009) believes that reduced transaction costs, improved cash flow, increased productivity, better customer service, competitiveness, reaching new customers, better relationships with existing customers and improved operational efficiency are the perceived benefits that could facilitate adoption of the Internet.

Chibelushi and Costello (2009) conducted qualitative interviews with 73 company managers in West Midlands, UK, to find out the challenges facing ICT-oriented SMEs. Their findings reveal that the lack of perceived benefits in adopting new technologies would hinder business ICT investment. Reversely, increased competitive advantage, such as producing better quality products or services, producing lower cost products or services and better customer services and operating more efficiently could trigger ICT investment.

A questionnaire-based survey conducted on 235 Iranian manufacturing SMEs (Ghobakhloo *et al*. 2011) proposed the following perceived relative advantages: providing new opportunities, enhancing productivity and saving time, improving job performance, allowing for better procurement, learning more about competitors, allowing for better advertising and marketing, enhancing the company's image and increasing profitability.

In their cross-industry study of e-business adoption in European countries, Oliveira and Martins (2010) concluded that perceived benefits should outweigh perceived obstacles to increase adoption. Based on previous literature, Tan *et al*. (2009b) have summarised the typical benefits of ICT adoption, which are reducing operating cost in communicating with stakeholders, increasing delivery speed, enhancing efficiency, making closer relationship with trading partners, gaining more market information and knowledge, getting bigger market exposure, and improving business management. The major barriers include not being convinced

of the financial benefits, lack of qualified IT staff, poor network infrastructure, expensive hardware and software, and low return on investment.

Although a great number of items and different wordings have been used to examine perceived benefits of e-business, some observations can be made from existent literature. First, the majority of the writers agree that e-business allows for better marketing and can provide more business opportunities. Second, many have mentioned that e-business can improve relationships and communications between different stakeholders including customers and trading partners. Thirdly, adopting e-business could result in better management and improved job performance which could lead to increased profitability and overall competitiveness. The following items will be used to test perceived advantages of e-business in this study:

	Items	Level of measurement
1.	E-business improves our competitiveness	Ordinal
2.	E-business provides us new business opportunities	Ordinal
3.	E-business allows for better advertising and marketing	Ordinal
4.	E-business enhances communications with customers and suppliers	Ordinal
5.	E-business creates better ways of managing and organising our business	Ordinal
6.	E-business allows us to improve our job performance	Ordinal
7.	E-business increases our profitability	Ordinal

Sources: Lin (2008); Alam (2009); Chibelushi and Costello(2009); Shiau *et al*. (2009); Tan *et al*. (2009b); Oliveira and Martins (2010); Ghobakhloo *et al*. (2011); Ifinedo (2011); Duan *et al*. (2012); Kannabiran and Dharmalingam (2012)

Table 3 Items of Perceived advantages of e-business

3.1.2 Compatibility

The compatibility of an innovation is perceived as the degree of its consistence with existing system. Adapted from Rogers' (2003, p.240) concept, e-business can

be compatible or incompatible with (1) organisational culture and practice, (2) existing information system, and (3) client needs for e-business.

Organisational culture is important in affecting the adoption and usage of e-business (Alam, 2009). When the values and norms are suitable with the new technology, the adoption rate can be much greater. Alam's (2009) study also proves that an organisation is more likely to adopt the Internet if the innovation is persistent with preferred work practices.

Technical compatibility is also a crucial factor because organisations need adequate infrastructure for the adoption and the existing information system needs to be compatible with new technologies (Alam, 2009).

The social compatibility of e-business should be taken into account as well, as it may reflect client needs for e-business. For example, in their research on online intermediaries, Davison and Ou (2008) found that the emergence of online intermediaries had brought significant impact on some social values which are essential to Chinese business process.

The following items are used in this study to examine the compatibility of e-business:

Items	Level of measurement
1. E-business is compatible with our enterprise culture	Ordinal
2. E-business is compatible with our preferred work practice	Ordinal
3. E-business is compatible with our customers	Ordinal
4. E-business is compatible with our existing infrastructure and information system	Ordinal

Sources: Davison and Ou (2008); Lin (2008); Saffu *et al*. (2008); Alam (2009); Sophonthummapharn (2009); Tan *et al*. (2009b); Ghobakhloo *et al*. (2011)

Table 4 Items of Compatibility

3.1.3 Complexity

An innovation may be classified on the complexity-simplicity continuum; and the complexity of an innovation, as perceived by potential adopters, can affect its adoption rate in a social system (Rogers, 2003). E-business has been generally regarded as a complex innovation because it involves both organisational changes and technological implementations (Lin, 2008).

The high complexity is widely considered as a major barrier to adopt e-business technologies especially for small businesses. In their model of e-commerce adoption barriers, MacGregor and Vrazalic (2005) find that the different adoption barriers for small businesses can be grouped into two main factors, namely 'Too difficult' and 'Unsuitable'. The 'Too difficult' factor consists of both technical and financial difficulties experienced by small firms, and it is the perceived technical barrier that is closely related to the complexity of an innovation. By and large, lack of technical knowledge in the organisation and associated security concerns are the key barriers of technical impediment. Shiau *et al.* (2009) further explain that an owner and/or manager's knowledge and understanding of e-business technologies, which is ERP in their study, can affect a small business' adoption. On one hand, owners and managers of a business tend to focus more on managerial rather than technological issues of the organisation; on the other hand, a SME's internal IT expertise tends to be not sufficient enough to provide valuable technical advice and support to their decision makers. Those mentioned above may inhibit small businesses' owners or managers from investing their limited resources on IT.

On the whole, to adopt a complicated innovation such as e-business, great skills and resources are required. For successful implementation of e-business, those who struggle with the understanding and use of the innovation may still adopt it through help from other change agents, such as business consultants and IT service providers.

In this study, the complexity of e-business is examined as perceived ease of use. The following items are used to probe into the element:

Items	Level of measurement
1. E-business technologies are secure and low-risk	Ordinal
2. Our enterprise has information system / e-business expert(s)	Ordinal
3. E-business service providers can meet all the requirements by SMEs	Ordinal
4. The current legal system for e-business is sufficient	Ordinal
5. Online transactions are safe	Ordinal

Sources: MacGregor and Vrazalic (2005); Lin (2008); Shiau *et al*. (2009); Tan *et al*. (2009b)

Table 5 Items of Complexity

3.1.4 Trialability and observability

Rogers claims both trialability and observability of an innovation, as perceived by its potential adopters, are positively related to its adoption rate. However, it is surprising to find that most previous research on e-business characteristics chose to omit these attributes. Limited empirical evidence shows little connection between trialability and e-adoption especially in Asian countries, which is likely due to the high availability of pirated software in those areas (Tan *et al*., 2009b).

Regarding observability, from his research on e-commerce adoption in Australia and Singapore, Chong (2008) finds that ICT success observed by SMEs on other companies such as trading partners and competitors may increase the chance of adopting similar technologies by themselves. With regard to e-business adoption, however, the success is less visible to others because of the intangible nature of the innovation itself. Trialability and observability will be measured by the following item in this study:

Items	Level of measurement
1. We can try e-business applications with limited resources	Ordinal
2. The result of adopting e-business can be easily demonstrated	Ordinal
3. There are successful competitors in the industry who have adopted e-business	Ordinal

Sources: Chong (2008); Tan *et al*. (2009b)

Table 6 Items of Trialability and observability

3.1.5 ICT cost

In addition to these perceived characterisers, as Rogers (2003, p.226) stated, there are other possible attributes that may be important in a specific situation (business environment in China) for a particular set of individuals (SME decision makers) adopting a unique set of innovations (e-business applications). In addition to the five characteristics, the ICT adoption cost has been identified by a number of studies (MacGregor and Vrazalic, 2005; Alam, 2009; Shiau *et al*., 2009; Tan *et al*., 2009b) as a major barrier to implement e-business.

Items	Level of measurement
1. The cost of e-business implementation is high for us	Ordinal
2. The maintenance and support fees for e-business applications are high for us	Ordinal
3. The e-business investment costs are greater than expected return on investment	Ordinal

Sources: MacGregor and Vrazalic (2005); Alam (2009); Shiau *et al*. (2009); Tan *et al*. (2009b)

Table 7 Items of ICT costs

3.2 Communication factors

3.2.1 Sources of information

Although existent research (Chong, 2008) has suggested that there is a lack of reliable information source for SMEs to gain knowledge of e-business, few studies have related communication factors in their research models to investigate the adoption phenomenon.

Rogers (2003) claims that the diffusion of an innovation involves communication through certain means. In order to get the new idea from the one with the relevant knowledge or experience to other units of adoption, a communication channel connecting the units is needed. The nature of the channel can determine the effectiveness and efficiency of such a knowledge transfer.

Although the term 'communication channel' is used throughout his book, Rogers (2003, p.204) suggests that 'information source' can describe the element more accurately, as his focus is on the individual or institution that originates the information rather than the actual means which transfers it. He further explains that the sources of communication can be distinguished between mass media and interpersonal channels. Mass media channels are relatively effective in knowledge creating. That is to say, they can rapidly reach a large audience, making them aware of the existence of the innovation and letting them gain an understanding of how and why it functions. Mass media can be utilised by institutions (governmental or quasi-governmental institutions, trade associations, technology suppliers and consultancies, and the like) to spread information rapidly and to minimise the adoption barriers (Troshani and Doolin, 2007). Mass media channels are relatively more important for earlier adopters of an innovation, since earlier adopters tend to have more exposure to mass media, rely less on interpersonal and local experiences, and are more venturesome oriented (Rogers 2003, pp.211-212).

Interpersonal channels or sources, which involve a face-to-face exchange of information between individuals, are more important to form and change

potential adopters' attitude towards innovation; because most individual evaluations are influenced by the experience of their close contacts rather than the basis of scientific research (Rogers, 2003). Contrary to mass media channels, the nature of peer communication implies that interpersonal contacts are crucial in influencing people's decision to adopt or reject a new idea and are particularly important for late adopters and laggards, since most effective human communication takes place between people with similar views, experiences and social status. Rogers (2003, pp.207-208) further explains that interpersonal channels may be either localite or cosmopolite. As some degree of heterophily is needed for communication about innovations, cosmopolite interpersonal channels tend to be the most effective means to communicate innovations to later adopters.

In his latest version of *Diffusion of Innovations*, Rogers (2003, pp.215-216) mentioned the emergence of the Internet and describes the means as an 'interactive communication channel'. The Internet appears to have the characteristics of both mass media and interpersonal channels, and might speed up the adoption rate of some innovations. However, it remains unclear the influence of the innovative channel on organisational e-adoption, as little research has so far included the Internet in their adoption model. At least, to a certain extent, Chong's (2008) empirical study of e-commerce implementation in Australia shows that the use of a greater variety of commination channels can increase the awareness and knowledge of e-commerce and can subsequently lead to higher level of adoption.

Chong (2008) categorises communication factors as information sources and communication channels, proposing that both are influencing factors of e-commerce adoption. Information sources indicate the variety of material and organisational sources that a firm uses to attain information about e-business. In this regard, the various 'communications channels' described above are to be grouped under the umbrella term 'sources of communication'. The variety of a firm's information sources to some extend shows the firm's exposure to outside world and in turn implies its innovativeness (Rogers, 2003).

Items	Level of measurement
Which sources do you currently use to gather information about e-business issues relevant to your business? 1. Information or training from government agencies 2. News or services from Chambers of Commerce or industry associations 3. Mass media (e.g. newspaper, magazine) 4. Online sources (i.e. Internet) 5. Personal contacts (e.g. colleagues, friends) 6. Others	Dichotomous/ Ordinal
Sources: Rogers (2003); Troshani and Doolin (2007); Chong (2008)	

Table 8 Information sources

3.2.2 Communication channels

Communication channels, on the other hand, are defined as various channels firms used to deliver information about e-business (Chong, 2008). The various communication channels used by SMEs to communicate information of e-business can be roughly divided into external and internal channels. Externally, for example, a SME could attain the latest industry-specific information through attending promotional seminars, presentations or demonstrations arranged by E-business vendors or consultants. Internally, they can carry out on-the-job training which aims to increase the awareness of e-business technologies and hands-on experience among employees.

Items	Level of measurement
1. We actively communicate e-business information through promotional seminars, presentations or demonstrations	Ordinal
2. We actively use on-the-job training to communicate the benefits of e-business with existing employees	Ordinal
3. We actively seek for cooperation with R&D institutions on e-business development	Ordinal
Source: Chong (2008)	

Table 9 Items of Communication channels

3.2.3 Model for communication factors

Some researchers (Chong 2008; Chong *et al.* 2009) adopt the inter-organisational insights into their communication models. Chong's (2008) cross-country study of e-commerce implementation examines the frequency of communication between a firm and its trading partners. Similarly, in a study of e-business adoption in the supply chain of Malaysian SMEs, Chong *et al.* (2009) focus on the influence of inter-organisational relationship which reveals a significant relationship between quality communication with trading partners and better e-adoption.

Adapted from Rogers (2003) and Chong's (2008) communication conceptions, a model which consists of information sources and communication channels is presented below:

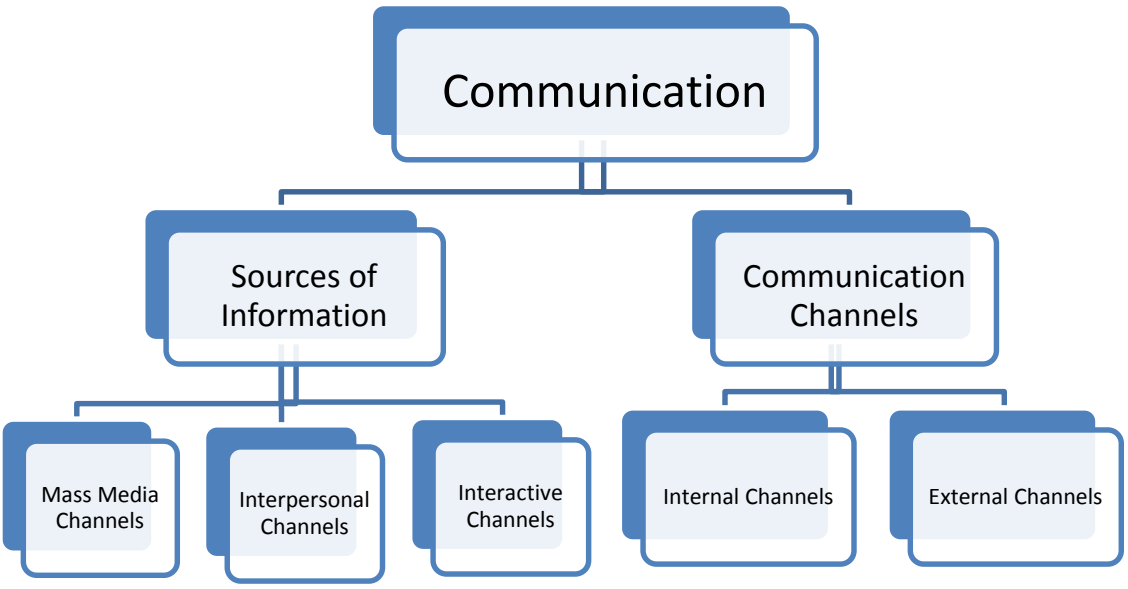

Figure 4 Model for communication factors

(Sources: Rogers, 2003 and Chong, 2008)

3.3 Social context

A social system, defined by Rogers (2003), consists of a set of interrelated individuals, informal groups and organisations which have norms of expected behaviour between them. Rogers believes that members of a system can play

different roles in facilitating diffusion of an innovation. The most innovative members are often not seen as norm followers by other system members, so they have little impact on persuading others to adopt the innovation. He argues that opinion leaders are most likely to influence others to change because they possess more technical competency, social respect and widely accepted norms. Their role-model status can be used by change agents to introduce innovations to a social system.

The social structure (including formal and informal structures) and norm of a system can affect the diffusion of an innovation and may impede a change to happen. The research conducted by Thatcher *et al.* (2006) on B2B e-commerce adoption indicates that Chinese culture has a significant impact on adoption decisions. As stated by Boisot and Liang (1992, cited in Cunningham and Rowley 2010 p.144), 'the Chinese enterprise's economic scope is narrower than a Western one, but its social scope is much wider'. In a sense, it can be undoubtedly said that social factors of a Chinese business play a significant role in their e-business adoption decision making.

It's interesting to notice that some researchers choose to extend the elements of social system with other related theories. For instance, Aleke *et al.* (2011) combined DOI, TAM and Social Network Theory (SNT) from both organisational and individual perspectives to study the adoption of ICT by small agri-businesses in developing countries. By conducting a focus group of 27 business proprietors from Nigeria, they recognise the importance of social imperative on ICT adoption. The main concern of DOI is that it assumes decision makers are only engaged in a single social system which is often not the case. Parker and Castleman (2009) claim that smaller firms are highly idiosyncratic in nature and their business owners and managers are engaged in a complex social network with varying or even contrasting social systems which can influence their decision making. In China, small and micro-sized businesses account for over 90% of the total number of SMEs (MIIT, 2013). Complicating this, there appears a different approach to view social networks in Asia especially Chinese society in which the concept of *guanxi* plays a significant role in its social connections (Ordóñez de Pablos, 2005).

From a sociological point of view, *guanxi* is 'absolutely essential to successfully complete any task in virtually all spheres of social life' in China (Gold *et al*. 2002, p.3). As a central concept in Chinese society, *guanxi*, as suggested by some scholars (Wellman *et al*., 2001), can be studied from a social network approach. As described by Zolkiewski and Feng (2011, p.17), *guanxi* is 'a network of multi-lateral relationships comprising families, relatives, friends, classmates, colleagues, acquaintance, or even rivals and "foes" 'with 'coexistence of positive and negative dimensions'. These discussions of *guanxi* network suggest that adopting e-business can be of a complicated social phenomenon, since small firm owner-managers are engaged in complex networks and various interpersonal relationships (Parker and Castleman, 2009). However, despite the fact that *guanxi* has received massive research attention from academia, few have applied its implications on e-business models and its impact on business owners or managers' adoption intention.

In order to construct the conceptual model for this study, three aspects will be included under the umbrella term 'social context': social influence, social norms and *guanxi* network. Social influence refers to the pressure and incentives a firm can receive from its external stakeholders (suppliers and customers) and the business environment (competitors, government and differing service providers). The items used to examine this factor are listed below:

Items	Level of measurement
1. Many of our competitors have already started using e-business	Ordinal
2. Many of our trading partners are demanding the use of e-business in doing business with them	Ordinal
3. We could lose many customers if we do not use e-business	Ordinal
4. The government is encouraging and demanding us to adopt e-business technologies	Ordinal
5. E-business service providers are actively promoting e-business technologies and are encouraging us to adopt them	Ordinal
Defined by researcher	

Table 10 Items of Social influence

Social norms, in this research context, refer to the values and beliefs held by the internal stakeholders of an organisation (management and employees) and the region and industrial sector the business serves. The following table lists the items used to test this factor:

Items	Level of measurement
1. The management is supportive of the use of e-business technologies in our operations	Ordinal
2. E-business is widely understood by the employers	Ordinal
3. E-business is suitable for the industrial sector	Ordinal
4. E-business is suitable for the area	Ordinal
Defined by researcher	

Table 11 Items of Social norms

As a unique cultural phenomenon, the influence of *guanxi* network in Chinese business settings can by no means be neglected. The following listed items will be used to measure the factor:

Items	Level of measurement
1. E-market can be trusted at all times	Ordinal
2. Developing trust with trading partners does not require seeing and talking to them	Ordinal
3. Compared with traditional business models, E-business does not require *guanxi*	Ordinal
Defined by researcher	

Table 12 Items of *Guanxi* network

Given the different social environment and cultural system in which Chinese businesses are engaged, all of the three social factors (social influence, social norms and *guanxi* network) are used to construct the model of social context which extends the social system described in the DOI.

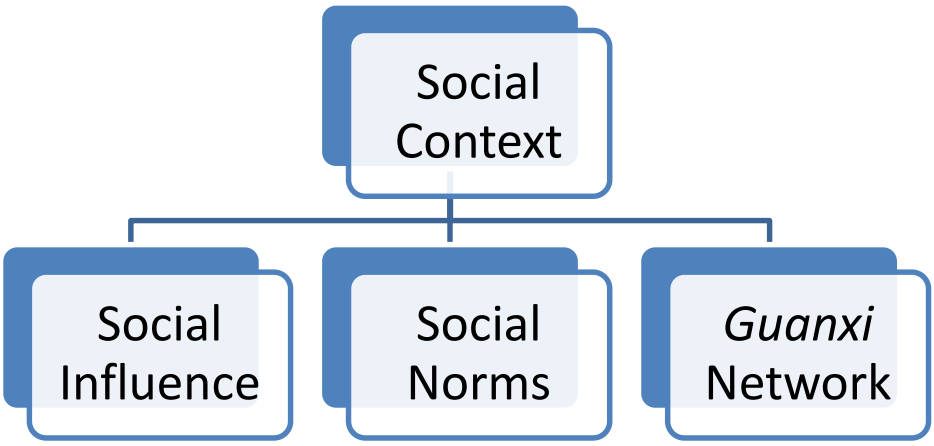

Figure 5 Model for social context

3.4 Time

3.4.1 The five-stage model

One of the strengths of DOI theory is that it includes time as an important element to study the phenomenon of innovation diffusion. One major drawback of many studies is 'that the time dimension is simply ignored or does not matter' (Rogers 2003, p.20). Many, if not most, researchers study e-business adoption phenomenon by investigating e-business benefits and barriers at a single time-

point (Eastin, 2002; Dubelaar *et al.*, 2005; Kaynak *et al.*, 2005; Tan *et al.*, 2010). However, this approach is problematic, as it is not uncommon to see adopters (especially later ones) of new technologies to stop using them at a later stage due to dissatisfaction with their experience (Rogers, 2003). Moreover, diffusion of innovation like information technology continuously experiences rapid technological changes and continuous innovation (Liu *et al.*, 2005), and it is more and more accepted that technologies like e-commerce can be adopted at multiple levels (Brand and Huizingh, 2008).

Rogers (2003, pp.169-170) conceptualises the innovation-decision process into five time-ordered steps: knowledge, persuasion, decision, implementation and confirmation. According to this model, an individual or other decision making unit goes through the process, seeking and processing information, to reduce uncertainty about e-business technology. The whole process usually leads to a decision of adoption or rejection, but such a decision can be reversed at a later point. The decision making process can be more complicated when an innovation-decision is made by a system rather than by an individual. In this study, for example, a small or medium-sized organisation may decide to implement the e-business technologies on the basis of a small number of individuals' (i.e. owner and top managers) authority decision. Individual employees may have little say in this regard.

3.4.2 The three-stage model

Compared to other types of adoption model, the unique explanatory power of the process-oriented model is that it reveals a firm's attitude and behaviour towards e-business adoption in a dynamic manner by examining whether the impact of different factors varies with different adoption levels. Only a few studies (Brand and Huizingh, 2008; Yu and Tao, 2009) have applied Rogers' decision process to e-business adoption.

By investigating business attitudes towards the adoption of Internet-based information system and technology, Yu and Tao (2009) re-conceptualise the decision process into three decision sets, namely pre-decision, in-decision and

post-decision. The pre-decision stage, which includes Rogers' knowledge and persuasion stages, is when decision making units attain, either actively or passively, information of the technology and develop their favourable or unfavourable attitudes towards the innovation. Both characteristics of the firm and the perceived characteristics of the innovation could influence the attitudes of the businesses at the pre-decision stage. During the in-decision stage, businesses are engaged in activities which lead to a choice to adopt or reject the innovation. Implementation and confirmation are grouped into the post-decision stage in this model, where reinforcement for their previous decision is sought immediately. Consequently, previous adopters may either continuously use the innovation or stop using it due to dissatisfaction. Conversely, non-adopters could continuously reject adoption or become late adopters after being convinced of the innovation.

3.4.3 The two-stage model

Brand and Huizingh (2008) further simplify the adoption processes by only examining small businesses' current adoption level and further adopt intention in their study of testing an e-commerce adoption model in 98 SMEs in the Netherlands. Their findings reveal that the current adoption level of e-commerce has a significantly direct effect on adoption intention.

In this study, the two-stage adoption process model is preferred for two reasons. First, the five-stage model by Rogers is designed to study individual adopters and may not be entirely appropriate for organisational level innovation-adoption (Rogers, 2003). Moreover, many small firms may lack of an established e-business strategy, which means a simple and straightforward approach is required to examine their e-business plan. Second, due to limited resources, it is impractical to conduct a longitudinal research in this study. Hence, the sequence-oriented model may serve as a good substitute.

The different stages of adoption-processes are illustrated in the following figure:

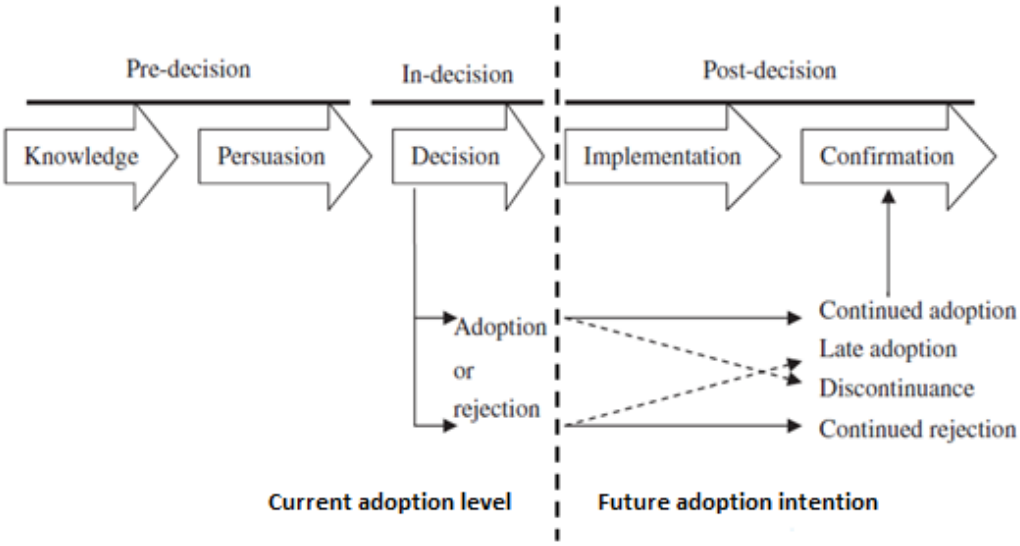

Figure 6 The stages of e-business adoption decision

(Sources: Rogers 2003; Brand and Huizingh, 2008; Yu and Tao, 2009)

3.5 Integrated conceptual models and hypotheses

The literature review illustrates how the above separate streams of research contribute to this study on how e-business is adopted among SMEs in China. An integrated research framework needs to be constructed, and the following questions are sought to be answered:

- Is DOI theory applicable to e-business adoption among SMEs in China and if so which elements are relevant?
- Is the current level at which e-business has been adopted directly related to the intention to further adopt the innovation?
- How do the selected elements influence SMEs' current e-business adoption level and their relevant future intention?

Rogers' DOI defines four main elements in the diffusion of an innovation; however, the theory does not suggest how the named elements should be interconnected to construct a framework to examine the phenomenon. The same dataset could be analysed by more than one possible conceptual model, thus how to design the best model becomes crucial. One possible solution is to treat each element individually. Based on this conception, perceived characteristics,

communication factors and social factors are independent with one another, but they are all related to a firm's e-business adoption issues. A firm's e-adoption level will be assessed at two time-points: the current usage of e-business and their plan to use e-business in the near future. By and large, this conceptual model is proposed to examine if SMEs' perceived characteristics of e-business, communication factors, and social networks are related to their current e-business adoption level and future adoption intention respectively. Seven hypotheses are yielded to examine the relevant relationships from this proposal.

A possible modification of this proposed model suggests that there could be further sub-factors influencing the adoption process, which implies the possibility of certain (sub-)factors interrelating with each other in the decision making process. For example, business decision makers' perception of e-business might have something to do with the social influence and their communication patterns. With this borne in mind, four extended hypotheses have been proposed here, while less focus will be put on them in analysis.

According to this conception, the research model is illustrated and the relevant hypotheses are presented as follows:

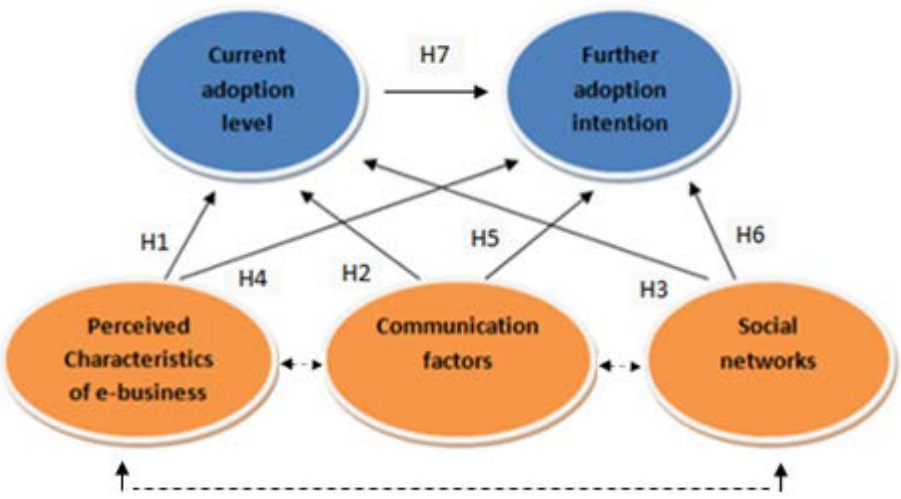

Figure 7 Proposed conceptual model

H1. There is a significant relationship between perceived characteristics of e-business and SMEs' current e-business adoption level.

H2. There is a significant relationship between communication factors and SMEs' current e-business adoption level.

H3. There is a significant relationship between social factors and SMEs' current e-business adoption level.

H4. There is a significant relationship between perceived characteristics of e-business and SMEs' future e-business adoption intention.

H5. There is a significant relationship between communication factors and SMEs' future e-business adoption intention.

H6. There is a significant relationship between social factors and SMEs' future e-business adoption intention.

H7. There is a significant relationship between SME's current e-business adoption level and their future adoption intention.

(H8.) There is a significant relationship between social factors and perceived characteristics of e-business.

(H9.) There is a significant relationship between social factors and communication channels.

(H10.) There is a significant relationship between information sources and perceived characteristics of e-business.

(H11.) There is a significant relationship between information sources and communication channels.

3.6 The relationships between variables

Variables are commonly divided into independent variables and dependent variables (Agresti 2002, p.2). If a variable is thought to be responsible for the change in a model, it can be defined as an independent variable (Curwin and

Slater 2008, p.782). Dependent variables are used to measure the effect of independent variables (Leech *et al.* 2005, p.3). If a variable is both a product of the independent variable and a cause of the dependent variable, then it is called intervening variable (Bryman and Cramer 2011, p.285). In this study, whether a variable is treated as an independent variable or a dependent variable depends upon how it functions in a conceptual model and its relationships with other variables.

In the conceptual model, the main aim is to examine if SMEs' perceived characteristics of e-business, communication factors, and social networks are related to their current e-business adoption level and future adoption intention respectively. For H1, H2 and H3, perceived characteristics of e-business, communication factors, and social networks are the independent variables, respectively; current e-business adoption level is the dependent variable. For H4, H5 and H6, perceived characteristics of e-business, communication factors, and social networks are the independent variables of future adoption intention which, in this case, is the dependent variable. For H7, current adoption level is the independent variable, and future adoption intention is the dependent variable.

In terms of the extended hypotheses, the causality is less clear-cut and experience-based. For H8 and H9, social factors is the independent variable, perceived characteristics and communication channels are the respective dependent variables. Similarly, for H10 and H11, information sources is the cause of perceived characteristics and communication channels which might in turn influence their e-business adoption level.

CHAPTER 4 RESEARCH METHODOLOGY

4.1 Philosophical considerations

Research methodology is concerned with how we come to know the world from a practical point of view (Eriksson and Kovalainen 2008, pp.15-16). When adopting a methodology, it is important to identify its appropriateness for the contextual setting of the particular study. The concept of methodology itself is inconsistent between business writers, as sometimes it refers to the overall research strategy (i.e. quantitative and qualitative strategies), but in other cases it implies the selection of specific research methods. According to Eriksson and Kovalainen (2008, p.16), research methodology focuses on describing 'how a given issue or problem can be studied' and is 'the philosophy of methods'. A researcher's choice of methodology is in close connection with his/her underlying epistemology which involved the philosophy how s/he comes to know the world.

Many business and management writers do not explicitly state their philosophical viewpoints. This is particularly a case in traditional quantitative research, as philosophical positions are taken for granted by most researchers (Orlikowski and Baroudi, 1991). However, it is believed that the exploration of philosophical concepts can help researchers in deciding what kinds of questions can be asked for a particular research project and in what ways those questions can be answered, and in turn assist them in specifying the overall research design and strategy (Eriksson and Kovalainen, 2008).

The most addressed philosophical concepts by business and management research writers are epistemology, ontology, paradigm, strategy and research methods (Blaikie, 1993; Robson, 2011). Despite the dominance of the concepts in research philosophy literature, there are different ways of understanding and relating them to each other. Making it even more complicated, the use of those philological terms varies from writer to writer.

4.1.1 Epistemology

Epistemological considerations are associated with the question of what can and should be accepted as knowledge in a scientific discipline. At large, epistemology defines the criteria of possible knowledge and sets out the limits of that knowledge (Csorba, 2013). Within epistemology, there are several different directions which are associated with the main philosophical positions in social science. Eriksson and Kovalainen (2008, pp.14-15) point out the foundation for different epistemological directions. According to their claim, three underlying assumptions (whether epistemologies being considered foundational, the autonomous degree of the researcher and the closeness between concept and observation) are the key divisions between differing epistemological directions.

Positivism, which expresses an objective view of the world that external reality exists (Bryman and Bell 2011, p.15), has been the mainstream of business and management studies for years. The essential claim of positivism is that research is value free and that only legitimate knowledge can be found from experience (Eriksson and Kovalainen 2008, pp.17-18). Positivists believe that the conceptualisation of reality by scientists directly reflects that reality itself, and advocate the application of natural science methods to the study of social science. They believe in observation and measurement, and assert 'only things that are measurable can be dealt with' (Eriksson and Kovalainen 2008, p.18). Thus human beings are observed, measured and tested and will behave according to certain generalisable laws (Bruce et al., 2008). However, Bryman and Bell (2011, p.16) have warned that positivism should not be seen as the exact equivalent of science and that there is lack of distinction between the philosophical position itself and the application of a general natural science approach. The main drawbacks of positivism are the ignorance of context, exclusion of meaning, inapplicability of general data to individual cases and exclusion of emergent findings (Guba & Lincoln, 1994).

Developed from positivism, postpositivism claims that researchers cannot be totally separated from what they study but rigorous methods should be applied

to cope with the inevitable subjectiveness (Blaikie, 1993; Eriksson and Kovalainen 2008, p.19). Despite various directions of positivism, it is agreed that seeking causalities and regularities of the world should be the only aim (Eriksson and Kovalainen 2008, p.18).

Interpretivism, or called constructionism by some writers, is contrasting to positivism, and appreciates the differences between people and objects and allows subjective explanation by social scientists (Bryman and Bell 2011, p.16-17). Interpretive researchers argue that reality is socially constructed and ever-changing rather than being external and independent to people. Interpretivists assume that meaning is not automatically presented and people seek understanding of the world where they live (Petty *et al.*, 2012). Therefore, 'understanding social process involves getting inside the world of those generating it' (Rosen 1991). They emphasise understanding and interpretation of human action and language, and allow the complexity and differing interpretations of same data (Blaikie, 1993; Robson, 2011). Some writers (Gummesson, 2003) argue that all research is interpretive in nature. According to the subjective epistemological view, there is 'no access to the external world beyond our own observations and interpretations' (Eriksson and Kovalainen 2008, p.14). Although it can provide a nature way of gathering data, it uses excessive resource when it comes to data analysis and its interpretation (Easterby-Smith *et al.*, 2002).

Eriksson and Kovalainen (2008, p.21) present another two philosophical positions, namely postmodernism and poststructuralism, which stand for more extreme rejection of positivism. With varying degree, both postmodernism and poststructuralism reject common and shared ground for knowing truth and have strong emphasis on getting knowledge from language. They are relatively new and mainly influential within qualitative research.

Realism is another philosophical position that provides an account of the nature of scientific practice. Realism agrees with positivism that there is external reality which is independent from researchers (Eriksson and Kovalainen 2008, p.19), and

that social scientists should apply similar approaches which are adopted in natural science (Bryman and Bell 2011, p.17). Bryman and Bell (2011, p.17) also point out that most advocates of realism just affirm that reality can be understood by the application of appropriate methods. Critical realists, however, argue that this kind of realism (empirical realism) is oversimplified and claim the importance of underlying generative mechanisms which 'offers the prospect of introducing changes that can transform the status quo' (Bryman and Bell 2011, p.17).

Critical realists sit in a middle position between positivism and postmodernism (Bryman and Bell 2011, p.616). They believe in the independent existence of social reality, but claim that a researcher's access to social world is subjective. Critical realism encourages a holistic exploration of phenomena, and addresses multiple research questions by using a variety of research methods (Walsh and Evans, 2014). Critical realism has attracted more and more interest within business and management discipline, as the philosophical approach provides one alternative for business and management researchers and allows the possibility of multi-methodological approaches (Eriksson and Kovalainen 2008, p.19).

The philosophical assumption I make in dealing with the research questions is, that there does exist an independent social reality out there awaiting inspection through the deployment of a suitable methodology. Normatively, the philosophical assumption will influence the criteria that are used to evaluate the findings of the research. In the research of e-business adoption, the perspective of critical realism allows the business and cultural conditions to be seen as having an existence independent of social interaction. The research subjects (i.e. SMEs) are thus seen as choosing whether or not (or to what extent) to adopt the relevant technologies rather than being entirely determined by the social conditions.

4.1.2 Ontology

An ontological issue concerns 'the idea about the existence of and relationship between people, society and the world in general' (Eriksson and Kovalainen 2008,

p.13). It is related to the question of what is there in the world. A scientist's ontological claim is usually closely related to his/her epistemological position. As epistemology raises the question of that if it is possible to neutrally observe social reality, ontology concerns if social reality exist independently of the cognitive processes.

Ontological assumption can be roughly divided into objectivism and subjectivism. The different perceptions of the conception of reality define a researcher's ontological position (Eriksson and Kovalainen 2008, pp.13-14; Bryman and Bell 2011, p.20).

The objective view of ontology assumes that the reality of social world independently exists and is separate from social actors (Blaikie, 1993; Robson, 2011). This means that social entity is external to social actors and possesses tangible reality of its own. That is to say, social phenomena are beyond researchers' reach or influence. Quantitative research approaches are usually based on this objective ontological assumption (Eriksson and Kovalainen 2008, p.13).

In comparison, subjectivism appreciates the social interaction of people and claims that reality can only be produced through social and cognitive process (Bryman and Bell 2011, pp.21-23). It suggests that the social world, in contrast to natural world, is not external to individuals and is constituted through our interaction (Blaikie, 1993; Robson, 2011). It also implies that social phenomena are constantly changed over time and context and may be perceived differently by individuals. Instead of looking for 'what', researchers with social constructionist perspective tend to investigate 'how'. The subjective ground of this ontological position has significant influence on a number of qualitative research approaches (Eriksson and Kovalainen 2008, p.13).

Constructionism is a term which is more commonly used by academic writers to describe subjectivism, but using the term to describe an ontological position implies the social world itself (Bryman and Bell 2011, pp.22-23). In a sense, constructionism is increasingly used as an epistemological term (see Eriksson and

Kovalainen, 2008) and to be in relation to the conception of knowledge of the world.

4.1.3 Paradigm

The concepts of epistemology, ontology and methodology are all related to each other and can form research paradigms that were first suggested by Thomas Kuhn (1970). As a natural scientist, he claims that social sciences are still at the pre-paradigmatic stage as there is no shared basis for theoretic and methodological choice by researchers. Guba and Lincoln (1994, p. 105) define it as 'the basic belief system or worldview that guides the researcher'. Burrell and Morgan's (1979) four-paradigm model (namely functionalist, interpretative, radical humanist and radical structuralist) has gained wide popularity in the business research community. The categorisation of paradigm is based on the subjectiveness and radicalness of researchers, and can suggest their assumptions about the nature of the social world and how it can be studied. The choice of paradigm may inevitably have implications for the choice of research strategy and the design of the research. However, whether research paradigms are as incommensurable as they were suggested by their early proposers (Kuhn, 1970; Burrell and Morgan, 1979) has been constantly questioned (Bryman and Bell 2011, pp.24-26).

These philosophical assumptions about epistemology, ontology and paradigm are always subject to contention and debate. The point is although a piece of research cannot be conducted without adopting some epistemological and ontological position, researchers should be aware of their own philosophical choices. Therefore, theses paragraphs presented above are aimed to critically inspect the philosophical options and justify the choice of this study through considering the implications rather than implicitly making the choice.

4.2 Research strategy

4.2.1 Quantitative and qualitative debate

While research philosophy assists researchers in identifying their own epistemological and ontological orientation, research strategy tends to facilitate the decision making on the choice of the most appropriate method for a particular research project. In the subject area of business and management research, the general tendency is to apply the quantitative/qualitative distinction when discussing the research strategy or approach of a research study. Probably the most straightforward way to distinguish between quantitative and qualitative research is to observe if measurements have been employed and if there is an emphasis on the quantification in the collection and analysis of data.

Several writers have suggested that the choice of a research strategy/approach has underlying implications of a researcher's world view or philosophical position (Bryman and Bell, 2011; Creswell, 2014). Quantitative researchers tend to emphasise the testing of theories, be inclined to the approaches of the natural science model and have the objective view of the social world. Qualitative researchers, which is carried out in line with the principles of the interpretative paradigm, contrarily, are keener to the generation of theories, the emphasis of the interpretation of the society and the subjective ontological position (Devetak *et al.*, 2010). The reason to employ the distinction is because it is convenient to tell the differences between the two research strategies and is useful to organise data collection and analysis methods (Bryman and Bell 2011, p.614). There are two types of purist perspectives who always separate quantitative and qualitative approaches to research (Rocco *et al.*, 2003). One purist perspective, which is underpinned by positivists, employs primarily deductive logic and quantitative methods of research. Advocates of the other purism, associated with interpretivism, strive to keep inductive logic and adopt qualitative methods to understand phenomena within their social contexts. Holders of the purist belief claim that different approaches should not be mixed within a single study due to the fundamentally different understandings of the world.

However, it appears that there is a lack of clear distinction between the two research strategies due to our inability to definitively distinguish one approach from another (Bazeley, 2002). Ragin *et al.* (2004) claim that the qualitative/quantitative divide should be treated as a continuum rather than as a dichotomy. Bryman and Bell (2011) point out that whereas there is a set of distinctions between quantitative and qualitative strategies, the contrasts should merely be treated as tendencies or orientations rather as definite ones. First, quantitative research seems invariably associated with numeric measurement, while qualitative researchers are typically seen as using words to describe the social world. Nevertheless, differing degrees of quantification have frequently been shown in qualitative research (Bryman and Bell 2011, p.621).

Second, it is frequently suggested that quantitative research tends to be concerned with the behaviour of the research subject and qualitative researchers are more interested in the underlying meaning of action. However, it has been suggested that the use of quantitative approach can still possibly tap the issues of meaning. A good example is the frequent use of attitude questions in survey designs. It can often be seen that techniques like Likert scales are employed in quantitative survey to study people's attitude towards a certain issue. In this case, the attitude questions are often based on prior study which seeks to bring out the range of possible attitude positions from the point of view of those being studied. To some extent, quantitative researchers also need to examine people's contextual behaviour as to tap the issues of deep meaning. Therefore, both strategies are interested in behaviour and meaning but investigate in different ways (Bryman and Bell 2011, pp.619-620).

Thirdly, a quantitative design often implies the deductive inquiry in nature which involves the testing of theories and concepts; the qualitative approach, however, is typically inductive and sees theories as the outcomes of data collection. This depiction fails to appreciate the exploratory power of quantitative research, as the findings of social surveys frequently entail new opportunities for the generation of concepts and accordingly bring theoretical contributions (Bryman and Bell 2011, pp.620-621).

Fourthly, quantitative research is usually undertaken in artificial settings, whereas qualitative studies often take place in natural environments. Despite the natural claim by many qualitative researchers, the naturalism of qualitative research is often assumed rather than demonstrated (Bryman and Bell 2011, pp.621-622). Interview-based qualitative research is particularly criticised in this regard, since it is extremely difficult to tell the degree of intrusion to interviewees caused by the setting and arrangement of interviews. For this reason, it can only be concluded that qualitative research is likely to be less artificial than methods with quantitative orientation.

To sum up, while it makes practical sense to contrast the two research strategies, trying to employ clear-cut distinction itself is not unproblematic. Additionally, no matter which strategy is chosen, interpretation of data needs to be conducted by the researcher rather than any computer software, therefore whether to use numbers (quantitative) or words (qualitative) to conduct research is not that important *per se* (Gummesson, 2003). On the one hand, a research study may show the characteristics of both research strategies; on the other, it entails the possibility of combining the two within an overall research project.

4.2.2 The use of research strategies in e-business literature

Traditionally, information system research has been overwhelmingly dominated by quantitative approach. As remarked by Orlikowski and Baroudi (1991, p.1), although information system research 'is not rooted in a single overarching theoretical perspective, it does exhibits a single set of philosophical assumptions regarding the nature of the phenomena studied by information systems researchers, and what constitutes valid knowledge about those phenomena'. By reviewing the more recent literature, it is revealed that research in this area tends to be more methodologically diverse with an increasing proportion of studies adopting qualitative or mixed methods approaches. A selection of research with different approaches is shown in the following table:

	Authors	Year of Publication	Research Purpose	Remarks
Quantitative approach	*Simmons, Durkin, McGowan, and Armstrong*	2007	To investigate the determinants of Internet adoption by SME agri-food companies	Telephone survey of 50 SMEs
	Tan, Chong, Lin, and Eze	2010	To investigate the demographic characteristics of SMEs with regards to their patterns of ICT adoption	Questionnaire-based survey used to collect data from 406 SMEs
	Ifinedo	2011	To investigate the importance of selected factors on SMEs' acceptance of Internet and e-business technologies	Questionnaire-based survey used to collect data from 214 SMEs
	Duan, Deng, and Corbitt	2012	To investigate the critical determinants for the adoption of e-market in Australian SMEs	
Qualitative approach	*Choudrie and Culkin*	2013	To understand the actions required for diffusion of an innovation in a small firm	Case study of a small firm including interviews, document analysis and observations
Mixed methods design	*Harrigan, Ramsey, and Ibbotson*	2012	To investigate the role of technology on CRM in SMEs	Survey questionnaire followed by in-depth interviews and projective techniques

Table 13 Research strategies used in previous studies

4.3 Mixed methods research

4.3.1 The potential use of mixed methods research

Argument regarding the strengths and limitations of quantitative and qualitative strategies leads to discussions of the possibility of combining the two research strategies. In order to maximise the strengths and diminish the weaknesses, a possible solution is to combine the research methods that cross the two research strategies.

There have been various motivations for combining quantitative and qualitative methods (Morgan, 1998). In the early history of mixed methods research, multiple methods were used to cross-check the results on the same research question. As a consequence of results failing to converge in many studies, purely seeking for convergent findings has become rare over the development of the strategy. Complementarity, which is the use of the strengths of one method to enhance the performance of the other, has gained its popularity since then.

Nevertheless, combining quantitative and qualitative research is by no means straightforward and without controversy in the light of both epistemological positions and practical considerations (Morgan, 1998; Bryman and Bell 2011, p.630). Although calls for the integration of quantitative and qualitative methods have been advanced especially in the fields of psychology, education and health sciences, it seems researchers in business and management study has yet made the most of the full potential of mixing methods (Azorín and Cameron, 2010).

Despite the various debates over its use, mixed methods research has become more and more common and accepted in the social sciences (Bryman and Bell 2011, pp.630-631). The literature base on mixed methods research has been significantly enriched over the last decade. A great number of books, book chapters, journal articles and studies focusing on this type of research strategy have been made available. Tashakkori and Teddlie's (2003, 2010) *Handbook of Mixed Methods in the Social & Behavioral Research* has been the benchmark of the specialist field by providing a comprehensive overview of the approach since

it was first published in 2003. Various journals specialising in mixed methods research have been launched over the last decade.

Given the fact that mixed methods strategy is a relatively new methodology in research, standard methods procedures should be clearly described to inform the audience. Creswell (2014, p.216) provides a checklist for researchers to develop a mixed methods strategy. Having adapted from the checklist, the table below shows the procedures used in the study so as to justify the choice of the research design.

1.	To inform readers about the potential use of mixed methods research in the chosen area
2.	To provide a basic definition of mixed methods research
3.	To give reasons for using both quantitative and qualitative data
4.	To set the criteria for choosing a mixed methods design and identify the design used in the study
5.	To present a visual model that illustrates the research strategy
6.	To narrate the procedures of data collection and analysis and sampling strategies used for both quantitative and qualitative data collection

Table 14 Procedures used to describe mixed methods research in the study

(Adapted from Creswell, 2014)

4.3.2 The definition and characteristics of mixed methods research

Several definitions of mixed methods research have been identified in the existing literature. Bryman and Bell (2011, p.628) define mixed methods research as the integration of research methods that cross both quantitative and qualitative strategies. Creswell (2014, p.14) indicates mixed methods research as the combination of qualitative and quantitative research and data in a single research study. In simple terms, mixed methods research appears to be defined as an approach, rather than a philosophy that uses two or more methods in undertaking a research study.

Although various terms have been used to describe this approach (Azorín and Cameron, 2010), 'mixed methods research' has increasingly become preferable

by writers, since it better expresses the data-mixing nature of the strategy (Bryman and Bell 2011; Creswell, 2014) and can differentiate itself from multi-method research which only involves either quantitative or qualitative strategy (Creswell and Plano Clark, 2011).

Creswell (2014, p.217) points out some key characteristics of mixed methods research. First, a mixed methods research involves the rigorous collection and analysis of data in both quantitative and qualitative forms. Second, a distinct mixed methods design should be clearly specified with the sequence of data collection and emphasis for each type of data. Thirdly, the research design should be informed by a philosophical worldview.

4.3.3 The philosophical debate of mixed methods research

There is a philosophical debate against the idea of combining the two research strategies (Greene, 2008; Bryman and Bell 2011, pp.629-630). The fundamental grounding of those who are against mixed-methods research is that research strategies and methods are inherently associated with relevant epistemologies and paradigms which have fast-and-hard distinctions and are incompatible with each other.

The advocates of mixed methods research have proposed two different interpretations (Azorín and Cameron, 2010). First, some writers argue that research methods are by no means fixed with particular philosophical assumptions and that a research study can carry multiple worldviews (Bryman and Bell, 2011). They claim that research methods could and should be dealt with at a more technical level and thus can be manipulated for practical reasons. In this sense research methods, which can be specifically divided into methods of data collection and methods of data analysis, are actually much more independent of philosophical assumptions than is sometimes supposed. Nowadays, it is common to see several methods to be used within the same research project. Second, some writers believe that there should be a philosophical worldview which can fit into mixed methods research (Creswell, 2014). Teddlie and Tashakkori (2010) regard this phenomenon as paradigm

pluralism and call for mixed methods researchers to appreciate different philosophical or theoretical stances.

By and large, questions regarding the possibility and sensibility of mixing philosophical frameworks remain debatable (Greene, 2008). Two philosophical positions have been developed for mixed methods research. One position, called dialectical position, deliberately seeks for synergies of integrating different paradigms in order to gain a fuller understanding of human phenomena (Rocco *et al.*, 2003). For the other one, some writers have proposed the term 'pragmatism' as a tool to provide the philosophical framework for mixed methods research (Rocco *et al.*, 2003). For researchers holding pragmatist position, it appears that the choice of a mixed methods approach tends to be driven by specific research questions rather than by any particular philosophical convictions (Biesta, 2010). They do not aim to solve the philosophical differences between the purist positions, since mixed methods research is used as an attempt to fit together the insights provided by quantitative and qualitative research into a workable solution (Johnson and Onwuegbuzie, 2004). Therefore, for many mixed methods researchers, the rationale for a mixed approach can be a pragmatic one.

4.3.4 The reasons for using both quantitative and qualitative data

Creswell (2014, p.218) suggests the criteria for researchers to justify the value and rationale of their choice of mixed methods approach. The choice can be evaluated from three different perspectives, namely general, practical and procedural levels.

At a general level, mixed methods should be able to draw on the strengths and minimise the limitations of both quantitative and qualitative approaches. First, many research questions and topics of interests lend themselves to mixed methods approaches (Rocco *et al.*, 2003). That is to say, the choice of the appropriate research methods should be driven by the research question and context (Azorín and Cameron, 2010; Bryman and Bell, 2011), as research questions suggest what kind of data can be eventually collected (Onwuegbuzie and Leech, 2006).

In their paper, Onwuegbuzie and Leech (2006) have discussed the link between research questions and mixed methods research by examining the nature and typical forms of research questions for each strategy. Quantitative research questions tend to be specific in nature and seek for descriptive, comparative or relational answers of variables. In contrast, qualitative research questions typically describe variables, rather than relate them, to gain insights into social processes within a specific context.

Strategy	**Form of research question**	**Nature of research question**
Quantitative	Is/are, do/dose	Descriptive, comparative or relationship questions
Qualitative	What, how, why	To seek, discover or explore a process, to describe experiences

Table 15 Research questions for each strategy

The following table presents what research strategies can be used to respond each research question:

Research question	**Research strategy**
Is DOI theory applicable to e-business adoption among SMEs in China	Quantitative
Which DOI elements are relevant to e-business adoption issues in China?	Quantitative
Is the current level at which e-business has been adopted related to the intention to further adopt the innovation?	Quantitative
How do the selected elements influence the SMEs' current e-business adoption level and their relevant future intention?	Qualitative

Table 16 Broad research questions

On the one hand, the research question 'Is DOI theory applicable to e-business adoption among SMEs in China?' reveals a strong theory-testing implication which is the underlying orientation of quantitative approach. That is to say, this question entails a deductive approach to the relationship between theory and research. On the other hand, the open question 'How do the selected elements

influence the SMEs' current e-business adoption level and their relevant future intention?' allows the possibility of extension or even generation of theories and concepts which is the strength of qualitative enquiry.

Mixed methods research questions combine both or mix both quantitative and qualitative research questions, and necessitate the collection and analysis of both types of data (Onwuegbuzie and Leech, 2006). Hence, for this particular study, a mixed methods design is appropriate to the research questions concerned.

Second, research attention in the field of organisational technology adoption intention has been primarily drawn on the advantages and barriers predefined the researcher; however, some research findings have revealed the lack of recognition and appreciation by potential adopters even when resources are available. For this reason, this study seeks to explore the area in both ways, so that I can adopt both an unstructured approach to data collection in which research participants' views are the focus of attention and investigate a set of issues through the more structured approach of quantitative research. Hence, it may provide a better understanding of the phenomenon than if just one method had been used.

At a practical level, mixed methods design is ideal since both quantitative and qualitative data are accessible for this research. In addition, as the response rate of questionnaire survey tends to get lower nowadays, when questionnaire response rates are too low to be used as the sole data source upon which to base findings, qualitative interview data provided alternative data source upon which to focus (Bryman and Bell 2011, p.643).

At a procedural level, for this research study, mixed methods research is useful to get a more complete understanding of the research questions in the quantitatively oriented field by explaining quantitative results with qualitative data. This will be explained in more details at a later stage.

4.3.5 The applications of mixed methods research

Various ways of classifying mixed methods research have been identified from existent literature. Hammersley (1996) describes a classification which is based the functional relationship between the two forms of strategy. In his proposal, findings from one strategy can be used to cross-check, facilitate or supplement the findings from the other.

Morgan (1998) creates a more detailed approach which focuses on the priority and sequence of quantitative and qualitative inquiries. In this classification, researchers, from a more strategic level, need to identify if either quantitative or qualitative approach takes more weight than the other, or if they are treated equally in the overall design. At the practical level, the sequence of data collection and analysis should be specified. In other words, does one method precede the other or are the two methods conducted concurrently? This approach consequently yields nice possible types.

Bryman and Bell (2011, pp.631-635) provide a revised way to classify various ways to conduct this type of research. They claim that the classification can be based on 'the purposes of mixed methods studies and roles that the quantitative and qualitative components play in such studies' (Bryman and Bell 2011, p.632). Slightly changed from Bryman's earlier publications, they identify and discuss three principle types of mixed methods research, namely triangulation, qualitative research facilitating quantitative research and quantitative research facilitating qualitative research.

Cresswell (2014) identifies three basic strategies which are very similar to the ones mentioned by Bryman and Bell (2011), namely convergent parallel, explanatory sequential and exploratory sequential designs. He also notices that different variations of the basic forms exist and further explains three more advanced approaches which incorporate the basic ones. For the convergent mixed methods design, researchers collect and analyse quantitative and qualitative data separately and compare the results to see if the findings yielded are consistent. The sample of qualitative participants is expected to be included

in the larger quantitative sample in order to make effective comparison. Several ways can be used to merge the two databases to show how the data converge or diverge. This type of design is mainly employed to compare different perspectives drawn from the two forms of data. Explanatory sequential design, as its name suggests, involves two phases with quantitative data collection and analysis preceding the qualitative stage. When presenting research findings, researchers should report results from both parts and discuss how the qualitative results bring further insights into quantitative results. In terms of sampling, participants from quantitative stage are purposefully selected for the following qualitative inquiry. In contrast, exploratory sequential design starts with exploring qualitative data and uses findings from the initial stage to develop variables and construct instruments for quantitative test.

4.3.6 The choice of mixed methods design

The choice of a particular mixed methods design is based on several procedural and practical factors (Creswell 2014, pp.230-233). At the procedural level, as the research contains cultural relevance, a more in-depth understanding of the research questions needs to be gained. In this sense, explanatory sequential design appears preferable, as it can help researchers get a comprehensive understanding of the research questions by explaining quantitative results with qualitative data (Creswell 2014, p.231).

At the practical level, the sequential strategies (explanatory sequential or exploratory approach) are also more appropriate for a research project conducted by a single researcher, because the investigation can be divided into more manageable tasks (Creswell 2014, pp.232-233).The choice also depends on the inclination of disciplinary field towards certain designs (Creswell 2014, p.232). As the field of technology adoption studies has been dominated by quantitative approach, it seems preferable to adopt the quantitative-driven explanatory sequential design.

Based on the reasons mentioned above, this research study employs the sequential explanatory strategy (Creswell 2014, pp.224-225), which is described

as a mixed-methods quantitative research facilitating qualitative research design by Bryman and Bell (2011, p.635). It refers to collecting and analysing quantitative and qualitative data in two consecutive phases, so the findings of quantitative research 'can prepare the ground for qualitative research' (Bryman and Bell 2011, p.635) through the selection of samples for further study. It appeals to the research fields which are relatively new to qualitative research and helps to get a more in-depth understanding of the quantitative results (Creswell, 2014). The main advantage of this approach is that qualitative inquiries can facilitate the interpretation of the relationship between variables, so 'qualitative findings allowed the authors to arrive at a more rounded picture than the quantitative data alone' (Bryman and Bell 2011, p.640). In a simplest term, the two types of data will be collected sequentially and a greater emphasis will be placed on the quantitative approach.

Based on the notation and labels compiled by Creswell (2014), the visual model that illustrates the research strategy is provided below:

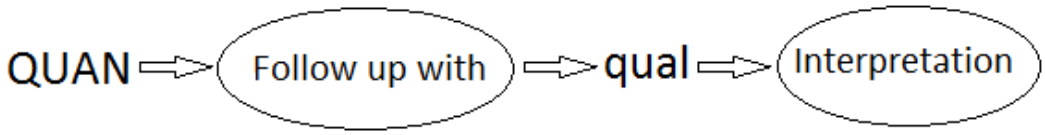

Figure 8 Visual model of the chosen research strategy

The following Q&A table summarises the application of mixed methods in this research project:

Questions	Answers
When?	Mixing will occur when drawing inferences from the interpretation of the findings.
In what order?	Mixing will be done sequentially.
At what level?	Data collection and analysis will be conducted at organisational level.
In what proportions?	Quantitative components will be more dominant.
To what degree are the tools/techniques different?	The data gathering techniques are somewhat similar, as scaled questionnaire and semi-structured interviews will be employed.
Does the type of data dictate the type of analysis?	Not necessarily. Qualitative data may be quantified; some quantitative answers may be qualitatively analysed.
What is one benefit of mixing?	Both confirmatory deductive process of hypothesis testing of theories and exploratory inductive process of generalising are possible.

Table 17 The Q&A of mixed methods in a research project

(Source: Rocco et al., 2003)

4.4 Data collection methods

4.4.1 The choice of quantitative data collection method

In the first part of the study, a social survey is selected as the research design to collect quantitative data from decision makers of SMEs. The purpose of the survey is to generalise from a sample to the population so that inferences can be made about the perception and attitude of SMEs on e-business. A social survey is the preferred type of data collection over content analysis and secondary analysis due to the fact that the main focus of the research is the participants' perception on e-business rather than their actual usage. A social survey is also suitable for a study with tight financial and time constraints, as it enjoys the advantages of being economical and rapid in data collection (Creswell 2014, p.157). For similar reasons, the survey is designed to be cross-sectional with the data collected at one point in time. The time element of the proposed model is reflected through

the design of the questionnaire with the participants being asked their perception of e-business in two different sections.

With the survey design selected, the next step is to evaluate various administration modes and specify the form of data collection. The comprehensive choices of administration modes of survey are provided by Bryman and Bell (2011, p.175). According to them, there are two major ways to conduct a quantitative survey, namely structured interview and self-completion questionnaire. At the more technical level, there are different research possibilities to administrate a survey. For structured interview, survey can be either conducted face-to-face or via telephone with the interviewees; for self-completion questionnaire, three modes of administration are possible: supervised, postal or Internet survey. Due to the fact that the researcher and research participants are based in different countries, structured interview (both face-to-face and telephone), supervised and postal questionnaire appear uneconomic in terms of administration costs and could cause a great deal of inconvenience. Hence collecting the quantitative data through the Internet remains the most efficient and economical way.

Despite a long debate over its use, conducting online social surveys has become a phenomenon over the past decade. Bryman and Bell (2011, pp.661-663) propose three ways of using Internet to collect survey data: embedded and attached questionnaire email surveys, and Web survey. Each mode has its advantages and disadvantages. Embedded email survey combines the instruction and questions in the body of the email and requires the least effort from respondents to reply, whereas it tends to have the dullest and least featured design. Attached email survey requests the respondent to download the attached questionnaire, complete it offline and attach the completed questionnaire to the replied email. Although it could add more features to the questionnaire, this mode of administration raises the concerns over software compatibility (e.g. different versions of word processing software) and computer virus. In either case, potential respondents may be put off participating. With a great number of free or low-cost software packages available to researchers, Web survey has become a widely accepted means in social survey. By employing Web survey, a

questionnaire can be designed online, and a Web address, which respondents can be directed to, can be subsequently created. With its powerful and efficient coding and data retrieving functionalities, the likelihood of human errors in processing data can be significantly reduced. In addition, the questionnaire can also be designed to be filter-question-friendly and to eliminate the problem of missing data. However, the pitfall of Web survey is that unwanted people may contribute without the researcher's knowledge.

With those mentioned above borne in mind, combining email with Web survey appears the most appropriate method to collect questionnaire survey data for this study. That is to say, the purpose-created Web link is sent with a cover letter in the body of the email only to those who are invited to participate in the research. A few advantages of the mixed use of administration modes can be noticed here. First, as the questionnaire is only sent to those who are targeted, researchers have considerably greater control, compared to conventional email surveys, over who can take part in the survey. Second, it could significantly reduce potential respondents' concern over confidentiality and anonymity issues, since they do not have to reply the questionnaire with their own email addresses. Also, it takes full advantage of the flexible design and the automation features provided by Web survey. Last but not least, as it requires relatively little effort or skills to reply the survey, the user experience of the participants can be maximised.

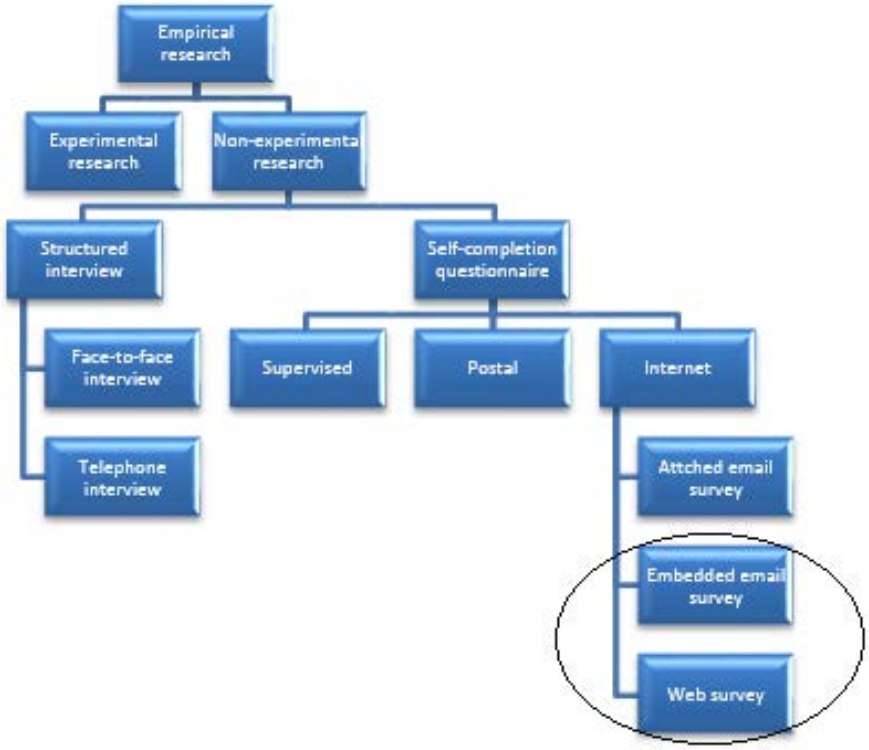

Figure 9 Quantitative data collection modes

There have been various concerns over the credibility of sampling frame with email addresses. Compared with other areas, however, online survey is appropriate in the field of business and management research, because most non-manual workers in an organisation are likely to be online and to be familiar with the usage of email and the Internet (Bryman and Bell 2011, p.664).

Response rate is a massive concern for online survey and is believed to have kept declining (Bryman and Bell 2011, p.665). In order to boost the response rate, sampled firms are invited by telephone to participant the survey at first. Owners or top managers are targeted during the invitation process and their contact email addresses are asked for. Then, they are sent an email instructing them to click the Web link which directs them to the online questionnaire. Follow-up email reminders to non-respondents are also used.

4.4.2 Research procedures

In order to obtain an optimum sample size, the population and sampling frame are determined first. The questionnaire used in the online survey is then

developed. Data are collected from the selected samples before they are analysed based upon the hypotheses constructed. The findings of the quantitative approach are used to test the applicability of the selected theory, i.e. DOI. The detailed procedures for the quantitative phase are as follows:

1. Literature review

   First, existing literature on e-business adoption issues has been thoroughly reviewed. It provides the background knowledge of e-business development among SMEs in China and examines theories used by other researchers in similar areas. This stage has been essential as it has helped to construct the conceptual model on which the research project is based. It has also provided the researcher with previously tested measures and items which can be adopted or adapted for this empirical study.

2. Construction of conceptual model

   A conceptual model has been constructed after literature review. The model is based on the full diffusion of innovation theory (DOI) which includes the innovation, communication, social systems and time elements.

3. Preliminary interviews

   Five SMEs in China were approached to participate in a preliminary interview. This stage has been used to reaffirm the adoption factors and to adjust them accordingly in the research context. It provides the direction on what adoption factors are imperative to SMEs and how these factors should be measured. The draft questionnaire has been developed after this stage.

4. Pilot study

   A survey instrument with questions and multi-item scales was disseminated and pre-tested among owners or managers of 15 participating SMEs. It was carried out to reconfirm the dimensions of the proposed theoretical framework as well as determining the measurement of the dimensions.

5. Revision of questionnaire

Participants were asked for feedback after pilot study so as to make further improvements to face validity of the questionnaire. The questionnaire was then revised accordingly.

6. Online survey

   Upon finishing revision of the questionnaire, the online survey was conducted to collect quantitative data.

The research procedures are illustrated in the following diagram:

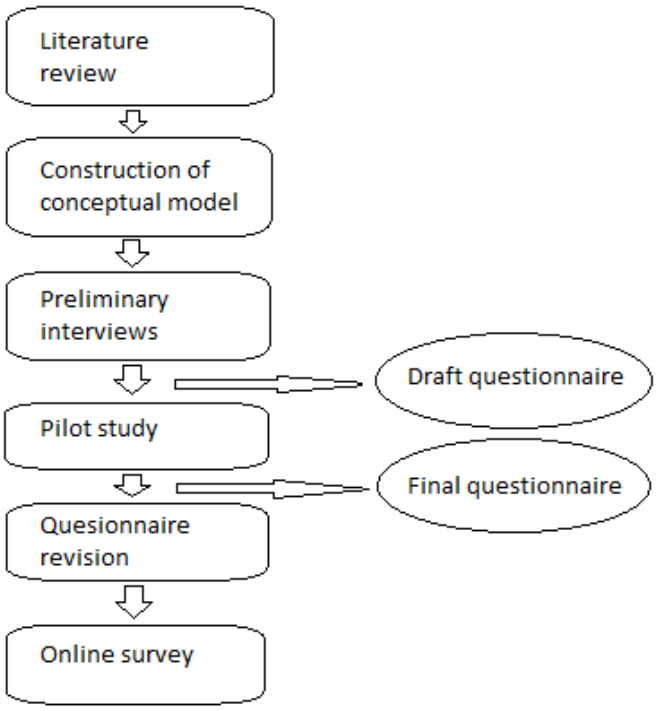

Figure 10 Research procedure in quantitative phase

The second phase is mainly qualitative, with 20 semi-structured interviews conducted with selected respondents of survey. As well as to validate findings from quantitative study, the qualitative interview helps to obtain the in-depth views of decision makers of influences of different elements on ITC adoption. The findings from this stage can be used to adapt and extend different elements of DOI theory making it applicable to China's business settings.

4.4.3 Design of questionnaire

The questionnaire used in this study is designed to measure the variables illustrated in the theoretical models previously. The questionnaire is mainly based on the innovation diffusion literature in order to identify the attributes affecting respondents' e-adoption attitude. Most of the items are adopted or modified from previous studies, while some are developed by the researcher.

As SME owners and managers are particularly time constrained, the questionnaire has been kept relatively short so that potential respondents do not lose interest. The questionnaire consists of six sections with each section addressing each element of the conception models. Section A contains 6 factual questions on SMEs' demographic characteristics with the answers being selected from a scroll-down list. Questions including the industrial sector a firm belongs to, the number of full-time employees and annual turnover can determine the size of a firm according to the latest definition of SMEs in China. Questions on business type, trading type, the age and educational background of business owners or managers can be used to examine the demographic background of participants.

Section B contains 8 questions with the aim of probing into a firm's current level of e-business usage. These questions are designed to examine the adoption level of Internet, e-mail, enterprise website, third-party platform, website promotion, e-payment, integration of e-commerce with internal information system and the overall number of business operations using e-business technologies. Respondents are asked to select one answer from a five-point Likert scale ranging from 1 = very low or no to 5 = very high with 3 as the neutral point to reflect the relevant item's adoption level.

Sections C to E comprise of a number of questions each in measuring the perceived characteristics of e-business, communication factors and social factors of businesses, respectively. To make it as simple for respondents to answer as possible, all of the questions, apart one, use a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree with 3 as the neutral point. Section C is used to examine a firm's perception on e-business from five perspectives:

perceived advantage, compatibility, perceived ease of use, trialability and observability, and cost. Section D contains two parts relating to communication factors. One part asks for the number of information sources used by an owner or manager to gain information on e-business. Respondents are given a list of 5 sources to select from, with 'others' remaining as an option for any unlisted potential answers. The other part measures the channels used by businesses to communicate e-business knowledge. Section E tries to understand SME's e-business issues from the social dimension. This section is divided into social influence, social norms and *guanxi* network.

Section F, similar to section B, attempts to tap into a firm's future intention of using e-business. The 6 questions in this section are used to examine the future intention of using e-business to improve communication, to promote business, for online transaction, for online payment, and for other critical business operations. Respondents are asked to select one answer from a five-point Likert scale ranging from 1 = much lower to 5 = much higher with 3 as the neutral point to reflect the relevant item's adoption intention.

The following table summarises a list of measures used in this study. They are presented with the corresponding indicators, the level of measurement, and an indication of whether they are adopted or adapted from other sources, or defined by the researcher.

Measures	Indicators	Measurement	Adopted / Adapted sources
Demographic information			
Firm size	Industry/number of employees/annual turnover	Ordinal scale	Adopted
Business type	Manufacturing/trading/service	Nominal	Adopted
Trading type	Domestic/international trade	Nominal	Adopted
Age	Age of owner/manager	Ordinal scale	Adopted
Education	Educational background of owner/manager	Ordinal scale	Adopted
Time element			
Current adoption level of e-business	Composite of 8 e-business adoption items	Likert scale	Adopted
Future adoption intention of e-business	Composite of 6 e-business adoption intention items	Likert scale	Adopted
Innovation element			
Perceived advantage	Composite of 7 perceived advantage items	Likert scale	Adopted
Compatibility	Composite of 4 compatibility items	Likert scale	Adopted
Perceived ease of use	Composite of 5 perceived ease of use items	Likert scale	Adopted
Trialability and observability	Composite of 3 trialability and observability	Likert scale	Researcher defined
Cost	Composite of 3 cost items	Likert scale	Adopted
Communication element			

Information sources	Number of information sources	Ordinal scale	Researcher defined
Communication channels	Composite of 3 communication channels items	Likert scale	Adopted
Social factors			
Social influence	Composite of 5 social influence items	Likert scale	Researcher defined
Social norms	Composite of 4 social norms items	Likert scale	Researcher defined
Guanxi network	Composite of 3 *guanxi* network items	Likert scale	Researcher defined

Table 18 Original measures

Most of the items have been tested or modified from previously validated studies with sources being cited, while a small number of them are developed by the researcher in order to help improve the explanatory power of the research model. The questions are originally complied in Chinese language in order to better reflect the nature of the business language used in China. Minor modifications of the wordings are made when they are translated into English for presentation purposes.

4.4.4 Sampling issues

By reviewing existing literature, it is found that SME researchers typically draw their sampling frame from a particular area(s) or industry(s). The selection of sampling frame involves two stages. The first stage of the sampling strategy concerns the selection of a region. Due to the vast size of the country, it is wise to treat province (the highest administrative unit of China) as the primary sampling unit to avoid travelling the length and breadth of the country to conduct the research. SMEs from Hunan province, located in the southwest of China are selected for this study for two reasons. First, an online directory of more than 1250 firms, is provided by a local government agency: Hunan SME Service Centre. Given that most previous surveys on China's SMEs draw their list from chambers of commerce or are based on convenience sampling strategy, and there are no

publicly available databases from government agencies of the other regions of China, this directory, which contains detailed company profiles and contact details, is too good to miss, as the best source of businesses' information is from official sources of the surveyed country. Second, according to China Internet Development Report (CNNIC, 2014), Hunan, as an inland province, has one of the highest growing figures in terms of Internet penetration rate. In a sense, compared with those relatively developed regions, such as Beijing and Guangdong province, Hunan can better reflect the status quo of China's economy.

This then forms the basis for the second stage of the sampling design which involves inviting businesses from the directory to form the sampling frame. The selected firms are contacted by telephone to request for their permission to participate in the survey. Those agreed to participate in the study are sent the link of the online questionnaire through an email. Only owners or top managers are targeted, since they are in better positions to oversee the overall operations of their firms.

4.4.5 The choice of qualitative data collection method

The qualitative data collection method was purposefully selected for this study. Compared with other data collection types, semi-structured interview has a number of advantages (Creswell 2014, p.191). First, interviews allow researchers control over the line of questioning, which is essential for this study. Because the purpose of qualitative inquiry for the mixed methods design is to facilitate the interpretation of the relationships between variables and get a deeper understanding of the quantitative results, interview schedules and questioning should be purposefully designed. Second, since the aim of the research is to investigate into e-business adoption issues from SMEs' perspective, it is appropriate to adopt a method that does not require direct observation of participants. Third, participants can provide historical information during interviews which could complement the cross-sectional design of the quantitative inquiry.

Perhaps the most serious drawback of the method is that interview data is drawn from a designated context rather than the natural field setting (Creswell 2014, p.191; Bryman and Bell 2011, p.496). However, the focus of the study is placed on how participants perceive the business innovation rather than their actual usage or objective evaluation, the naturalistic emphasis claimed by many authors is not a major concern with relation to the chosen research objectives here.

4.4.6 Ethical considerations and procedures

Ethical issues might arise in the course of conducting research and should not be ignored, as they relate directly to the integrity of a piece of research. There are various types of ethical issues to anticipate and these issues apply to different stages of research (Creswell 2014, pp.92-95). Due to the nature of this particular study, the main focus was set on the anonymity and confidentiality of data. Prior to conducting data collection, all participants of the study were informed of the nature of the study and guaranteed the right to withdraw at any time. Permission from interviewees was sought before recording an interview. After fieldwork, raw data was securely stored on encrypted disks that can only accessed by the researcher. Participants were coded and kept anonymous when reporting the research results. No particular ethical issues were raised during the research process.

The research study complies with the ethical rules for research degree students set by the University of Central Lancashire and has gone through the relevant ethical review process. During the Research Programme Approval process, the Ethics Checklist was completed for the study and submitted for review. As there were no outstanding ethical issues, the ethical clearance was granted by the Faculty of Management Ethics Committee before commencement of field work.

CHAPTER 5 QUANTITATIVE DATA ANALYSIS

A total of 351 businesses, which were randomly selected from the directory, were invited by telephone to participate the survey. Of the selected contact list, 149 firms were uncontactable due to either invalid telephone number or unavailability of the owner or manager. Of the 202 enterprises that were successfully approached, a total of 103 SME owners or managers completed and submitted the online questionnaire, with the response rate being 50.1%. The questionnaires were checked upon receiving them before they were coded and imported into IBM SPSS Version 22 for statistical analysis.

Descriptive statistics, such as mean and standard deviation, are used to examine the current e-business adoption level and future adoption intention of SMEs. Exploratory factor analysis is presented to examine the pattern of relationships between multiple items and is then employed to determine the degree to which they can be reduced to a more limited number of factors. Relevant bivariate analysis techniques such as Pearson's r are employed to explore the relationships between different variables. The following sections will present the results of data analysis.

5.1 Demographic background of the survey participants

As shown in the following table, a majority of the participating firms (66%) are micro or small in nature. Regarding business type, over half of the enterprises (56.3%) conduct manufacturing activities, followed by trading and providing services with 35% and 34% respectively. When asked about target market, a majority of the respondents (86.4%) report that they conduct their business mainly in domestic market, with merely 13.6% focusing on foreign market. With regard to the age and educational background of the participants, around half of the owners or managers (50.5%) are at the age of 30 or younger, followed by 33% of the respondents being at the age between 31 and 40, and 13.6% between 41 and 50. Among them, 84.5% have received higher education with over half (52.5%) having gained a degree or above.

CATEGORY	ITEMS	%
Size of company	Micro	17.5
	Small	48.5
	Medium	34
Manufacturing	Yes	56.3
	No	43.7
Trading	Yes	35
	No	65
Service	Yes	34
	No	66
Trading market	Domestic market	86.4
	Foreign market	13.6
Age	30 or under	50.5
	31-40	33
	41-50	13.6
	Over 50	2.9
Education background	High school	15.5
	College	32
	Undergraduate	44.7
	Postgraduate	7.8

Table 19 Demographic background of the survey participants

5.2 Descriptive statistics of e-business adoption

The mean values shown in the table indicate the current usage level of various e-business technologies by the firms drawn in the sample. From the results we can see that the general usage of e-business in daily operations is moderate as the mean value of 'The number of business operations that require e-business' equals to its median value. There is a trend of decreasing adoption level as the e-usage sophistication level increases, with four items ('We make use of the Internet', 'We use e-mail', 'We use third-party platform' and 'We use enterprise website') having mean values above the median value (3 = Moderate) and the rest having below-than-median mean values. What is interesting in this data is that, contrary with suggestion by previous reports, participating firms have higher usage level of their own enterprise websites than that of third-party platforms.

	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
We make use of the Internet	103	3.28	.108	1.097
We use e-mail	103	3.57	.097	0.986
We use third-party platform	103	3.04	.118	1.196
We use enterprise website	103	3.28	.112	1.133
We promote our website	103	2.83	.127	1.292
We use e-payment	103	2.92	.128	1.304
We integrate e-commerce with internal IS	103	2.80	.110	1.115
The number of business operations that require e-business	103	3.00	.110	1.120
Valid N (listwise)	103			

Table 20 Descriptive statistics of current e-business adoption level

The table below indicates that the participating firms tend to have a positive attitude towards their future adoption of e-business technology. All of the mean values of the items are well above the median (3 = About the same). Among various types of e-business usage, the results suggest that it is highly likely for enterprises to use e-business to improve communication, to promote their businesses and to improve the efficiency of critical operations in the near future. It is also interesting to notice that SMEs still have relatively conservative attitude towards the use of online transactions and online payment, with the items 'The use of online transactions' and 'The use of E-payment' having the slightly lower mean values of 3.78 and 3.88, respectively.

	N	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
The use of EB to communicate will be	103	3.94	.089	.906
The use of EB to promote the company will be	103	3.99	.087	.880
The use of online transactions will be	103	3.78	.088	.896
The use of E-payment will be	103	3.88	.092	.932
The use of EB for critical operations will be	103	3.94	.089	.906
The number of business operations that use EB will be	103	3.91	.086	.876
Valid N (listwise)	103			

Table 21 Descriptive statistics of future e-business adoption intention

5.3 Exploratory factor analysis

Exploratory factor analysis can be used to examine the relationships between various variables without determining the extent to which the results fit a particular model (Bryman and Cramer, 2011). When there are a large number of variables, the technique is commonly employed by quantitative researchers to determine the degree to which they can be reduced to a more limited number of factors. As there are 22 and 12 items to measure *E-business characteristics* and *Social context* respectively, the exploratory use of factor analysis can be employed here to examine the item relationships of each element. In order to make the analysis readable, all of the items are coded as shown in the appendix.

The initial step of exploratory factor analysis is to examine the suitability of the data. The first issue needs to be considered is the size of the sample. Although some authors suggest that the sample size for factor analysis should be at least 300, others have different ideas (Pallant 2005, p.174). In general, there seems the

consensus on what the size should be has yet been reached (Bryman and Cramer 2011, p.320). One suggestion is the ratio of subject to items matters; or in other words, there should be more participants than variables before a factor analysis can be conducted (Pallant 2005, pp.173-174; Bryman and Cramer 2011, p.320). According to Gorsuch's (1983) proposal, the study meets the minimum requirements for factor analysis, as there are a minimum of five participants per variable and more than 100 individuals per analysis.

Second, it is necessary to compute a correlation matrix for the relevant items. If there are no significant correlations shown in the result, then these items cannot form one or more factors, which means factor analysis should not be carried out (Bryman and Cramer 2011, p.320).

The next step is to decide how many factors should be kept. There are different criteria used for deciding the number of factors to retain. In the research reported by Wang (2007) and Feng and Mei (2012), the number of factors is set as the number of measures designed in the conceptual model, the design number minus one and the design number plus one respectively. In this study, principal components analysis is applied as the extraction method, with factors being orthogonally rotated; each fixed factor number will be tested. Since factors are unrelated to each other with orthogonal rotation, the information the factors provide here is not redundant (Bryman and Cramer 2011, p.327). To evaluate the test results, the total variance explained by the relevant factors, the factor loadings and the interpretability of factors will be considered. Finally, the chosen factors will be cross-checked with other criteria.

5.3.1 E-business characteristics exploratory factor analysis

A correlation matrix is computed to examine the suitability of the sample data for factor analysis. The result shows that the majority of the items are significantly correlated with each other at less at the 0.5 level, which suggests that they may constitute one or more factors.

In the quantitative survey, 5 measures (*Perceived advantages*, *Compatibility*, *Perceived ease of use*, *Trialability and observability*, and *Cost*), with 22 items in total, were designed to test E-business characteristics. When the number of factors is set as 5 (the designed number in the research model), 6 (the designed number plus 1) and 4 (the designed number minus 1) respectively, principle components analysis is used to extract the communal factors with orthogonal rotation being applied.

When the factor number is 5, the result shows that *Perceived advantages* and *Trialability and observability* are split, with item TRO3 joining *Perceived ease of use* and item ADV6 being relocated to *Compatibility*. From the rotated component matrix, it can be observed that all items have high factor loadings that are greater than the conventional cut-off point of 0.50. The totally explained variance is 71.484% which exceeds the cut-off point of 60% suggested by Feng and Mei (2012). However, the result leaves Factor 5 with only two items which would be insufficient for measurement (Wu, 2004). The display of items is shown in the table below:

Components				
Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
EAS1	ADV1	COM1	COS1	TRO1
EAS2	ADV2	COM2	COS2	TRO2
EAS3	ADV3	COM3	COS3	
EAS4	ADV4	COM4		
EAS5	ADV5	ADV6		
TRO3	ADV7			

Table 22 The allocation of items for 5 factors (E-business characteristics)

If the factor number is set as 6, the totally explained variance will be 75.063% which exceeds the cut-off point of 60%. However, it can be cautiously observed that, in this case, items COM2, COM4 and TRO2 have factor loadings that are less than the conventional cut-off point of 0.50 according to the rotated component matrix. After deleting the three items, the result presents the extraction of three new factors with Factor 4 and Factor 6 being comprised of two items and one respectively which would be insufficient. Moreover, the interpretability for Factor

5 is rather poor as it consists of items from three measures of the original model. The composition of the six factors is illustrated with the following table:

Components					
Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
ADV1	EAS1	COS1	ADV6	COM3	TRO1
ADV2	EAS2	COS2	COM1	EAS3	
ADV3	EAS4	COS3		TRO3	
ADV4	EAS5				
ADV5					
ADV7					

Table 23 The allocation of items for 6 factors (E-business characteristics)

If we set the factor number as 4, the totally explained variance of 67.587% is still conventionally sufficient to explain the measure. Items TRO1 and COM4 are then deleted as their factor loadings are less 0.50. The totally explained variance provided by the second exploratory factor analysis is 69.839%.

Variables	Component			
	Factor 1	Factor 2	Factor 3	Factor 4
EAS4	.884	.030	.012	.116
EAS1	.838	.268	.055	.113
EAS5	.820	.162	.105	.069
EAS2	.707	.101	.223	.114
TRO3	.629	.101	.415	.154
EAS3	.623	.023	.463	.095
TRO2	.544	.368	.235	.213
TRO1	.498	.157	.267	.303
ADV3	.139	.882	.230	-.023
ADV2	.174	.861	.221	.132
ADV1	.140	.830	.137	-.037
ADV7	.275	.698	.383	.055
ADV4	.115	.657	.543	.135
ADV5	.049	.580	.540	.233
COM3	.267	.352	.730	.057
ADV6	.107	.282	.689	.080
COM2	.317	.317	.685	.251
COM1	.434	.387	.563	.110
COM4	.427	.322	.480	.137
COS1	.177	-.017	.120	.841
COS3	.245	.012	-.031	.794
COS2	.059	.155	.269	.677

Table 24 Item loadings on orthogonally rotated first four principal components (E-business characteristics)

From the table above, it can be seen that items TRO2 and TRO3 have been extracted to form a new factor with the five items of *Perceived ease of use*. It is logical to combine the *observability* of e-business with *Perceived ease of use*, because for the decision makers of SMEs, whether the effectiveness of e-business can be easily demonstrated is closely related to their perceived easiness of the innovation. In this case, the name *Perceived ease of use* is retained for the combined factor. The result also shows that ADV6 has been taken from *Perceived advantages* to form *Compatibility* with the remaining three items of the measure. Given that there is only one change in each of the measures, the names of the two factors (*Perceived advantages* and *Compatibility*) will be retained. The analysis shows that the composition of *Cost* remains same. The display of items is shown in the following table:

Components			
Perceived ease of use	*Perceived advantages*	*Compatibility*	*Cost*
EAS1	ADV1	COM1	COS1
EAS2	ADV2	COM2	COS2
EAS3	ADV3	COM3	COS3
EAS4	ADV4	ADV6	
EAS5	ADV5		
TRO2	ADV7		
TRO3			

Table 25 The allocation of items for 4 factors (E-business characteristics)

The choice of 4 factors is then cross-checked with the scree test. The result of the scree plot shows that it is reasonable to retain 4 factors, as they lie before the point at which the eigenvalues seem to level off.

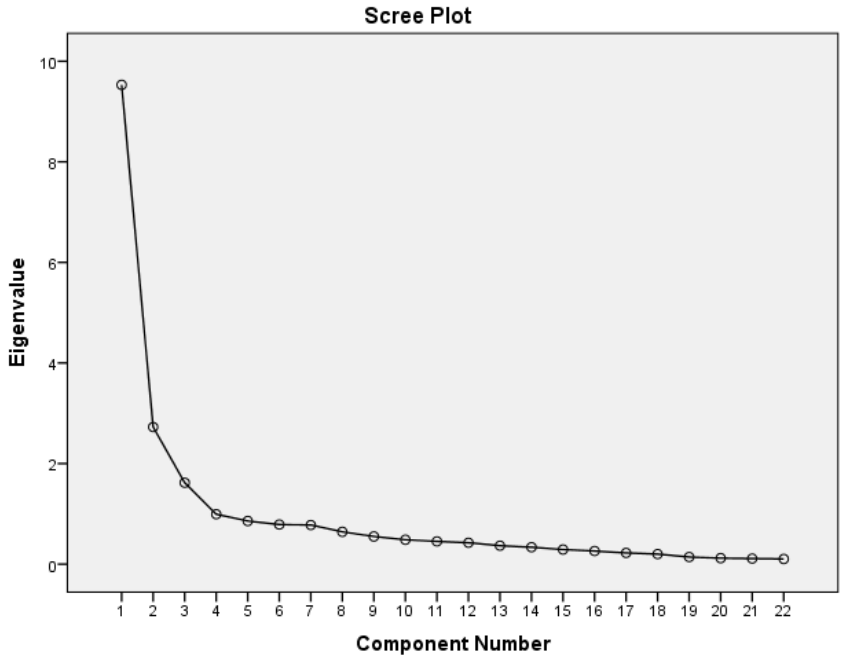

Figure 11 Scree test (E-business characteristics)

5.3.2 Social context exploratory factor analysis

Similarly, a correlation matrix is computed to examine if the sample data from social context is suitable for factor analysis. The result shows that all of the items are significantly correlated with each other at less than the 0.5 level, which suggests that they may constitute one or more factors.

In the quantitative survey, 3 measures (*Social influence*, *Social norms*, and *Guanxi network*), with 12 items in total, are designed to examine the social context. In this case, the number of factors is set as 3 (the designed number in the research model), 2 (the designed number minus 1) and 4 (the designed number plus 1), respectively, so as to conduct principle components analysis with orthogonal rotation being applied.

When the factor number is 2, the totally explained variance is 65.415% which exceeds the cut-off point of 60%. From the rotated component matrix, it can be observed that all items have high factor loadings that are greater than the conventional cut-off point of 0.50. The measure *Social norms* would need to be split, with items NOR1 and NOR3 joining *Social influence* and items NOR2 and NOR4 combining with those from *Guanxi networks*. Nevertheless, the

interpretability of the factors is rather poor with the extraction. The display of items is shown in the following table:

Components	Factor 1	INF1	INF2	INF3	INF4	INF5	NOR1	NOR3
	Factor 2	GUX1	GUX2	GUX3	NOR2	NOR4		

Table 26 The allocation of items for 2 factors (Social context)

If the factor number is set as 4, the totally explained variance will be 78.598% which exceeds the cut-off point of 60%. From the rotated component matrix, it can be observed that all items have high factor loadings that are greater than the conventional cut-off point of 0.50. The result indicates that item INF5 needs to be removed from *Social influence* to form a factor with NOR1, NOR2 and NOR3. The items of *Guanxi networks* would remain same. However, the result leaves Factor 4 with only one items which would be insufficient for the measure. The display of items is shown in the table below:

Components			
Factor 1	Factor 2	Factor 3	Factor 4
INF1	NOR1	GUX1	NOR3
INF2	NOR2	GUX2	
INF3	NOR4	GUX3	
INF4	INF5		

Table 27 The allocation of items for 4 factors (Social context)

Finally, if we set the factor number as 3, the totally explained variance is 72.804% which is well above 60%. Similarly, all items have high factor loadings of greater than the conventional cut-off point of 0.50, according to the rotated component matrix. The result of the analysis indicates the composition of the factors is highly similar to that of the proposed model with only item INF5 being transferred from *Social influence* to *Social norms*.

Variables	Component		
	1	2	3
INF3	.836	.258	.114
INF2	.765	.276	.160
INF1	.764	.232	.289
INF4	.726	.309	.293
NOR1	.316	.813	.153
NOR2	.186	.783	.272
NOR4	.292	.738	.403
NOR3	.372	.653	.251
INF5	.538	.585	.208
GUX3	.147	.192	.845
GUX1	.201	.259	.799
GUX2	.352	.329	.701

Table 28 Item loadings on orthogonally rotated first four principal components (Social context)

As social element is a relatively new element in e-business adoption context, it is interesting to notice that the majority of the items have been extracted in the similar way as which was suggested in the proposed model. The only exception is that item INF5 joins *Social norms* from Social influence to form a new factor. Since the items in a sense reflect the readiness of e-business adoption and application in terms of social norms and practicalities, the newly formed factor is named as *Social readiness*. Factor 1 and Factor 3 will retain their original names as little change has been made. The display of items is shown in the following table:

Components		
Social influence	Social readiness	Guanxi network
INF1	NOR1	GUX1
INF2	NOR2	GUX2
INF3	NOR3	GUX3
INF4	NOR4	
	INF5	

Table 29 The allocation of items for 3 factors (Social context)

The choice of 3 factors is then cross-checked with the scree test. As seen from the result of the scree plot, the first 3 factors basically lie before the point at which the eigenvalues tend to level off, the choice of retaining 3 factors is acceptable for this measure.

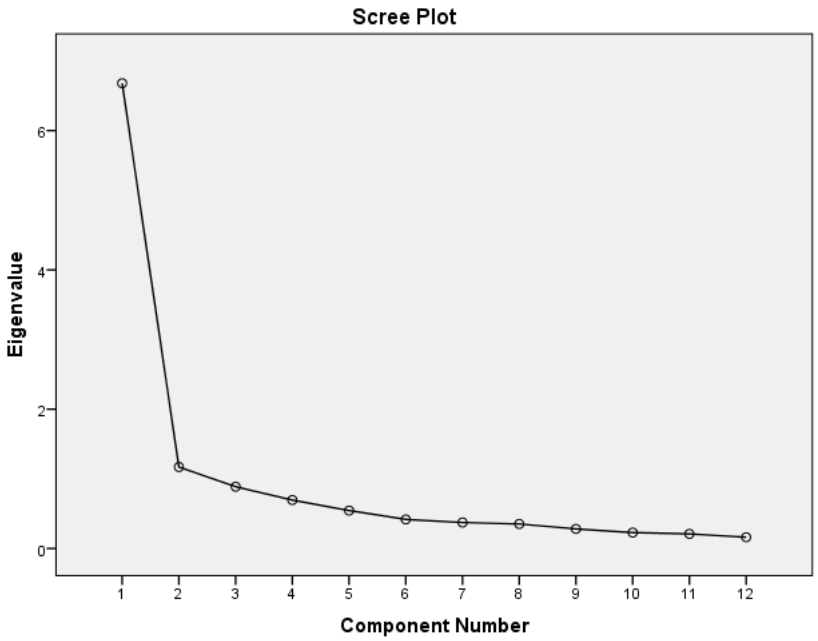

Figure 12 Scree test (Social context)

5.4 Reliability analysis

Cronbach's α is used to estimate internal reliability of the proposed model. The test shows that Cronbach's α value of *Perceived ease of use* is 0.896 which is higher than the conventionally accepted value of 0.70 (Bryman and Bell 2011, p.159; Feng and Mei, 2012), which means the measure has high internal reliability. The value of Cronbach's α would decrease if any item was deleted. Therefore, *Perceived ease of use* would retain the current 7 items.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Perceived ease of use	0.896	EAS1 EB is secure and low-risk	0.782	0.872
		EAS2 We have qualified IS/IT personnel	0.670	0.884
		EAS3 E-business service providers can meet all the requirements by SMEs	0.672	0.884
		EAS4 The current legal system is sufficient	0.759	0.874
		EAS5 Online transactions are safe	0.740	0.876
		TRO2 The result of adopting e-business can be easily demonstrated	0.593	0.892
		TRO3 There are successful competitors	0.682	0.883

Table 30 Reliability test of Perceived ease of use

Similarly, for *Perceived advantages*, the test of Cronbach's α shows a value of 0.921 which is higher than the conventionally accepted value of 0.70. It means the measure has high internal reliability. The value of Cronbach's α would decrease if any item was deleted. Therefore, *Perceived advantage* would retain the current 6 items.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Perceived advantages	0.921	ADV1 EB improves competitiveness	0.706	0.916
		ADV2 EB provides new business opportunities	0.845	0.897
		ADV3 EB allows for better advertising and marketing	0.839	0.898
		ADV4 EB enhances communications with customers and suppliers	0.792	0.905
		ADV5 EB creates better ways of managing and organising business	0.712	0.917
		ADV7 EB increases profitability	0.770	0.907

Table 31 Reliability test of Perceived advantages

Data from the following table show that Cronbach's α value for *Compatibility* is 0.848 which is higher than the conventionally accepted value of 0.70, which satisfies the internal reliability test. However, the value of Cronbach's α would slightly increase if item ADV6 was deleted.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Compatibility	0.848	COM1 EB is compatible with our enterprise culture	0.729	0.790
		COM2 EB is compatible with our preferred work practices	0.741	0.783
		COM3 EB is compatible with our customers	0.695	0.804
		ADV6 EB allows us to improve job performance	0.603	0.851

Table 32 Reliability test of Compatibility

After deleting ADV6, another reliability test shows that Cronbach's α value of *Compatibility* is 0.851 which is higher than the conventionally accepted value of

0.70, which means the internal reliability is high for the measure. But, in this case, the value of Cronbach's α would decrease if any item was deleted. Therefore, item ADV6 is deleted from the measure to maintain internal reliability.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Compatibility	0.851	COM1 EB is compatible with our enterprise culture	0.685	0.827
		COM2 EB is compatible with our preferred work practices	0.764	0.751
		COM3 EB is compatible with our customers	0.719	0.795

Table 33 Reliability test of Compatibility 2

When the test is run for *Cost*, it generates a Cronbach's α value of 0.730 which is higher than the accepted value of 0.70, which means the measure has high internal reliability. The value of Cronbach's α would decrease if any item was deleted. Therefore, *Cost* would retain the current 3 items.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Cost	0.730	COS1 The implementation cost is high	0.644	0.538
		COS2 The maintenance and support fees are high	0.480	0.725
		COS3 Investment costs are higher than ROI	0.547	0.656

Table 34 Reliability test of Cost

As the table shows, Cronbach's α value of *Social influence* is 0.871 which means the measure has high internal reliability. The value of Cronbach's α would decrease if any item was deleted. Therefore, *Social influence* would retain the current 4 items.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Social influence	0.871	INF1 Many competitors have already started using e-business	0.734	0.831
		INF2 Many trading partners demand the use of e-business in doing business with them	0.717	0.837
		INF3 We could lose many customers if we do not use e-business	0.748	0.827
		INF4 The government encourages and demands us to adopt e-business technologies	0.704	0.842

Table 35 Reliability test of Social influence

From this data we can see that Cronbach's α value of *Social readiness* is higher than the conventionally accepted value of 0.70, which passes the test for internal reliability. It is apparent from this table that the value of Cronbach's α would decrease if any item was deleted. Therefore, *Social readiness* would retain the current 5 items.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Social readiness	0.890	NOR1 The management is supportive of the use of e-business technologies in our operations	0.774	0.857
		NOR2 E-business is widely understood by the employers	0.710	0.871
		NOR3 E-business is suitable for the industrial sector	0.688	0.876
		NOR4 E-business is suitable for the area	0.802	0.850
		INF5 E-business service providers actively promotes e-business technologies and encourages us to adopt them	0.690	0.876

Table 36 Reliability test of Social readiness

As the Cronbach's α value of *Guanxi networks* is higher than the conventionally accepted value of 0.70, the measure shows high internal reliability. Evidence shows that the value of Cronbach's α would decrease if any item was deleted. Therefore, *Guanxi networks* would retain the current 3 items.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Guanxi networks	0.823	GUX1 E-market can be trusted at all times	0.700	0.734
		GUX2 Developing trust with trading partners does not require seeing and talking to them	0.689	0.747
		GUX3 Compared with traditional business models, E-business does not require *guanxi*	0.651	0.789

Table 37 Reliability test of *Guanxi* networks

The table indicates that Cronbach's α value of *Current adoption level* is 0.869, which means the measure has high internal reliability. However, the value of Cronbach's α would slightly increase if CAL6 was deleted.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Current adoption level	0.869	CAL1 We make use of Internet	0.739	0.841
		CAL2 We use e-mail	0.478	0.868
		CAL3 We use third-party platform	0.684	0.847
		CAL4 We use enterprise website	0.690	0.846
		CAL5 We promote our website	0.683	0.847
		CAL6 We use e-payment	0.367	0.884
		CAL7 We integrate e-commerce with internal IS	0.675	0.848
		CAL8 The number of business operations that require e-business	0.723	0.843

Table 38 Reliability test of Current adoption level

After deleting CAL6, a second reliability test shows that Cronbach's α value of *Current adoption level* is 0.884 which is higher than the conventionally accepted value of 0.70. What is interesting in this data is that the value of Cronbach's α would be even higher if another item CAL2 was deleted.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Current adoption level	0.884	CAL1 We make use of Internet	0.737	0.860
		CAL2 We use e-mail	0.517	0.885
		CAL3 We use third-party platform	0.693	0.865
		CAL4 We use enterprise website	0.722	0.861
		CAL5 We promote our website	0.701	0.865
		CAL7 We integrate e-commerce with internal IS	0.652	0.870
		CAL8 The number of business operations that require e-business	0.694	0.865

Table 39 Reliability test of Current adoption level 2

After deleting CAL2, another reliability test shows that Cronbach's α value of *Current adoption level* is 0.885 which is higher than the conventionally accepted value of 0.70, which means the measure has high internal reliability. Finally, the value of Cronbach's α would decrease if any item was deleted. Therefore, items CAL2 and CAL6 are deleted from the measure to maintain internal reliability.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Current adoption level	0.885	CAL1 We make use of Internet	0.705	0.864
		CAL3 We use third-party platform	0.681	0.868
		CAL4 We use enterprise website	0.706	0.863
		CAL5 We promote our website	0.713	0.863
		CAL7 We integrate e-commerce with internal IS	0.675	0.868
		CAL8 The number of business operations that require e-business	0.710	0.863

Table 40 Reliability test of Current adoption level 3

Last, evidence shows the measure *Future adoption intention* has high internal reliability, as the Cronbach's α value of 0.920 is way higher than the conventionally accepted value of 0.70. As expected, the value of Cronbach's α would decrease if any item was deleted. The measure *Future adoption intention* would retain the current 6 items at the moment.

Measure	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Future adoption intention	0.920	FAI1 The use of EB to communicate will be	0.727	0.911
		FAI2 The use of EB to promote the company will be	0.852	0.894
		FAI3 The use of online transactions will be	0.779	0.904
		FAI4 The use of E-payment will be	0.755	0.908
		FAI5 The use of EB for critical operations will be	0.784	0.903
		FAI6 The number of business operations that use EB will be	0.733	0.910

Table 41 Reliability test of Future adoption intention

5.5 Findings of inferential statistics

As most of the items are measured by five-point Likert scales, it is necessary to distinguish the difference between Likert-type items and Likert scales when data analysis techniques are concerned (Boone Jr. and Boone, 2012). Likert-type items are single questions with no attempt being made to combine the responses from the items into a composite scale. They are used to analyse unique and stand-alone questions with analytical techniques suitable for ordinal measurement scale, such as chi-square and Kendall's tau. A Likert scale consists of four or more Likert-type items that are combined into a single composite variable to provide a quantitative measure of a character. During the data analysis process, Likert scale items will be created by calculating the sum of the relevant Likert-type items. They can be analysed at the interval measurement level, which means more

advanced techniques that are appropriate for interval items can be applied, such as Pearson' r, t-test and regression.

The relationship between Current adoption level and Future adoption intention

The value of Person's r shows that there is a moderate relationship between *Current adoption level of e-business* and *Future adoption intention*. The relationship is statistically significant as the correlation is significant at the 0.01 level. The statistic suggests that SMEs with more sophisticated e-business adoption tend to have a more positive attitude towards their future usage of the innovation.

		Future adoption intention
Current adoption level of e-business	Pearson Correlation	.527**
	Sig. (2-tailed)	.000

Table 42 The relationship between Current and Future adoption levels

The relationships between Perceived characteristics of e-business and Current adoption level

The Pearson's r values reveal the relationships between two factors of perceived e-business characteristics and the current adoption level, respectively. As shown in the table below, both relationships are positive and significant. However, they differ in the strength of correlations. The results show that *Perceived ease of use* is moderately related to the current adoption level of e-business, with *Perceived advantage* playing a less prominent role in affecting SMEs' adoption decision.

		Perceived ease of use	Perceived advantage
Current adoption level of e-business	Pearson Correlation	.528**	.373**
	Sig. (2-tailed)	.000	.000

Table 43 The relationships between Perceived characteristics and Current adoption level

It would be inappropriate to use Pearson's r as the statistic to examine the correlation between *Current adoption level* and the other two factors (*Compatibility* and *Cost*), as these measures are comprised of less than three

items each, they cannot be combined to form Likert scales. In this case, all items should be individually treated as ordinal variables (Boone Jr. and Boone, 2012). Different analysis procedures can be used to examine the relationship between an interval variable and an ordinal variable. Because the interval variable (*Current adoption level*) can be relatively unambiguously identified as the dependent variable and the ordinal variables have few categories (Likert-type items), the Means procedure is the most appropriate technique to explore these relationships (Bryman and Cramer, 2011).

The following table shows the values of eta and eta squared of each pair of relationships and their associated values of F test and significant level. The findings indicate that all of the three items of *Compatibility* exhibit modest relationships with the current adoption level of e-business amongst SMEs. For instance, the compatibility of e-business with customers can account for over 25% of the variation in current adoption level.

	Eta	Eta Squared	F	Sig.
Current adoption level of e-business * EB is compatible with our enterprise culture	.462	.214	8.970	.000
Current adoption level of e-business * EB is compatible with our preferred work practices	.421	.177	7.093	.000
Current adoption level of e-business * EB is compatible with our customers	.504	.254	11.245	.000

Table 44 The relationships between Trialability and observability and Current adoption level

The table below shows the test results of the correlation between *Cost* and *Current adoption level*. The statistics indicate that there are significant relationships between implementation and maintenance costs of e-business and the current adoption level by SMEs. However, no significant relationship is found between 'Investment costs are higher than ROI' and 'Current adoption level of e-business'.

	Eta	Eta Squared	F	Sig.
Current adoption level of e-business * The implementation cost is high	.372	.138	3.923	.005
Current adoption level of e-business * The maintenance and support fees are high	.292	.085	3.067	.031
Current adoption level of e-business * Investment costs are higher than ROI	.298	.089	2.395	.056

Table 45 The relationships between Costs and Current adoption level

The relationships between Communication factors and Current adoption level

An examination of the frequency table reveals that interactive media (i.e. the Internet) remains the mostly used source to get information with 66% of respondents reporting they use it to gain e-business knowledge. Chambers of commerce and industrial associations are the second mostly used sources with 53.4% being reported. The findings also indicate that government agencies and personal contacts are the least likely information sources for SMEs to get information about e-business. However, contrary to expectations, the study does not find a significant relationship between 'Total number of information sources' and 'Current adoption level of e-business'.

		Total number of info sources
Current adoption level of e-business	Pearson Correlation	.112
	Sig. (2-tailed)	.260

Table 46 The relationships between Information sources and Current adoption level

The values of eta show that all of the three items have a significant relationship with the current adoption level of e-business. The item 'We actively communicate EB internally' has the strongest influence on e-adoption among them, as almost a quarter of variation of current adoption can be explained by it.

	Eta	Eta Squared	F	Sig.
Current adoption level of e-business * We actively communicate EB externally	.431	.185	5.575	.000
Current adoption level of e-business * We actively communicate EB internally	.488	.238	10.314	.000
Current adoption level of e-business * We actively seek for RD cooperation	.413	.171	6.803	.000

Table 47 The relationships between Communication channels and Current adoption level

The relationships between Social factors and Current adoption level

The statistic shows that both *Social influence* and *Social readiness* have a positive relationship with current e-business adoption. The relationships exhibit similar strength according to their values of Pearson's r.

		Social influence	Social readiness
Current adoption level of e-business	Pearson Correlation	.481**	.516**
	Sig. (2-tailed)	.000	.000

Table 48 The relationships between Social factors and Current adoption level

The results indicate that there is a statistically significant relationship between *Guanxi networks* and *Current adoption level*. In terms of the strength of the relationships, 'No need to see and talk to trading partners' exhibits modest influence on e-business adoption, while the other two are fairly low.

	Eta	Eta Squared	F	Sig.
Current adoption level of e-business * E-market can be trusted	.331	.110	3.015	.022
Current adoption level of e-business * No need to see and talk to trading partners	.465	.216	6.764	.000
Current adoption level of e-business * EB needs no guanxi	.371	.138	3.911	.005

Table 49 The relationships between *Guanxi* networks and Current adoption level

The relationships between Perceived characteristics and Future adoption intention

With regard to the relationships with *Future adoption intention*, the results show that both *Perceived ease of use* and *Perceived advantage* are moderately related to the future adoption plan of e-business.

		Perceived ease of use	Perceived advantage
Future adoption intention	Pearson Correlation	.426**	.439**
	Sig. (2-tailed)	.000	.000

Table 50 The relationships between Perceived characteristics and Future adoption intention

The following table shows the values of eta and eta squared of each pair and their associated values of F test and significant level. The results demonstrate that all of the three items have significant relationships with their future adoption intention of e-business. However, in contrast to current adoption level, 'EB is compatible with our customers' exhibits the least influence on their future e-business strategy.

	Eta	Eta Squared	F	Sig.
Future adoption intention * EB is compatible with our enterprise culture	.432	.186	7.565	.000
Future adoption intention * EB is compatible with our preferred work practices	.444	.197	8.108	.000
Future adoption intention * EB is compatible with our customers	.366	.134	5.105	.003

Table 51 The relationships between Compatibility and Future adoption intention

The table below shows the test results of the correlation between *Cost* and *Future adoption intention*. In contrast to *Current adoption level*, the statistics indicate that there are no significant relationships for implementation and maintenance costs of e-business. Conversely, a significant relationship is found between 'Investment costs are higher than ROI' and 'Future adoption intention of e-business'.

	Eta	Eta Squared	F	Sig.
Future adoption intention * The implementation cost is high	.257	.066	1.727	.150
Future adoption intention * The maintenance and support fees are high	.240	.058	2.014	.117
Future adoption intention * Investment costs are higher than ROI	.325	.106	2.896	.026

Table 52 The relationships between Costs and Future adoption intention

The relationships between Communication factors and Future adoption intention

Unlike *Current adoption level*, the statistic shows that there is a significant relationship between the number of information sources used to attain

information about e-business and the future adoption intention with the value of Pearson's r being 0.27.

		Total number of info sources
Future adoption intention	Pearson Correlation	.266**
	Sig. (2-tailed)	.007

Table 53 The relationship between Information sources and Future adoption intention

The values of eta show that all of the three items of *Communication channels* have a modest relationship with the future adoption plan of e-business. Similar to *Current adoption level*, the item 'We actively communicate e-business internally' has the strongest influence on e-adoption plan with almost 30% of the variation of future adoption intention being explained by it.

	Eta	Eta Squared	F	Sig.
Future adoption intention * We actively communicate EB externally	.458	.210	6.514	.000
Future adoption intention * We actively communicate EB internally	.544	.295	13.839	.000
Future adoption intention * We actively seek for RD cooperation	.470	.221	9.355	.000

Table 54 The relationships between Communication channels and Future adoption intention

The relationships between Social factors and Future adoption intention

The statistic shows that both *Social influence* and *Social readiness* have a positive relationship with e-business future adoption. Likewise, the relationships exhibit similar strength according to their values of Pearson's r.

		Social influence	Social readiness
Future adoption intention	Pearson Correlation	.506**	.579**
	Sig. (2-tailed)	.000	.000

Table 55 The relationships between Social factors and Future adoption intention

The values of eta show that all of the three items 'E-market can be trusted', 'There is no need to see and talk to trading partners' and 'E-business does not need *guanxi*' have a significant relationship with the future adoption plan of e-business. The item 'There is no need to see and talk to trading partners' shows the strongest influence on e-adoption plan with nearly a quarter of the variation of future adoption intention being explained by it.

	Eta	Eta Squared	F	Sig.
Future adoption intention * E-market can be trusted	.357	.128	3.583	.009
Future adoption intention * No need to see and talk to trading partners	.491	.241	7.770	.000
Future adoption intention * EB needs no guanxi	.442	.195	5.948	.000

Table 56 The relationships between Guanxi networks and Future adoption intention

The relationships between Social factors and Perceived characteristics of e-business

The test shows that *Social influence* has a significant relationship with *Perceived ease of use* and *Perceived advantage*, respectively, as the correlations are significant at the 0.01 level. The results suggest that the various social influences on SMEs are positively related to their perceived attitudes towards e-business.

Similarly, the statistics show that *Social readiness* has a significant relationship with *Perceived ease of use* and *Perceived advantage*, respectively, as the correlations are significant at the 0.01 level. The values of Person's r show that the relationships have differing strengths. The results suggest that higher level of readiness can lead to favoured attitudes towards e-business.

		Perceived ease of use	Perceived advantage
Social influence	Pearson Correlation	.677**	.438**
	Sig. (2-tailed)	.000	.000
Social readiness	Pearson Correlation	.613**	.450**
	Sig. (2-tailed)	.000	.000

Table 57 The relationships between Social factors and Perceived characteristics of e-business

Spearman's rho is used here to test the relationship between interval and ordinal variables. The test results show that all of the three items of *Compatibility* have significant relationships with SMEs' *Social influence* and *Social readiness*. The results suggest that both positive social influences on and social norms possessed by SMEs can lead to greater perceived compatibility of e-business.

			EB is compatible with our enterprise culture	EB is compatible with our preferred work practices	EB is compatible with our customers
Spearman's rho	Social influence	Correlation Coefficient	.486**	.427**	.398**
		Sig. (2-tailed)	.000	.000	.000
	Social readiness	Correlation Coefficient	.470**	.432**	.451**
		Sig. (2-tailed)	.000	.000	.000

Table 58 The relationships between Social factors and Compatibility

As all of the items of *Guanxi network* and *Compatibility* are ordinal in nature, Spearman's rho is used here to examine the relationships between the two factors. It is interesting to note that eight out of the nine relationships are statistically significant. The only exception is whether e-market can be trusted does not affect the perceived compatibility of e-business with normal work

practices. In a sense, the results indicate that if SMEs rely less on the traditional way of doing business and the norm of *guanxi*, e-business is more likely to be compatible with their businesses.

		EB is compatible with our enterprise culture	EB is compatible with our preferred work practices	EB is compatible with our customers
E-market can be trusted	Correlation Coefficient	.314**	.118	.196*
	Sig. (2-tailed)	.001	.234	.047
No need to see and talk to trading partners	Correlation Coefficient	.346**	.280**	.289**
	Sig. (2-tailed)	.000	.004	.003
EB needs no *guanxi*	Correlation Coefficient	.240*	.323**	.298**
	Sig. (2-tailed)	.015	.001	.002

Table 59 The relationships between *Guanxi* networks and Compatibility

The relationships between Social factors and Communication channels

Spearman's rho is used here to test the relationship between interval and ordinal variables. The test shows that both *Social influence* and *Social readiness* have a significant relationship with communication channels, as all of the correlations are significant at the 0.01 level. The values of rho show that the strengths of the relationships are moderate. The results suggest that both social influences on SMEs and social norms possessed by them are positively related to their willingness to communicate e-business knowledge.

			We actively communicate EB externally	We actively communicate EB internally	We actively seek for RD cooperation
Spearman's rho	Social influence	Correlation Coefficient	.641**	.568**	.573**
		Sig. (2-tailed)	.000	.000	.000
	Social readiness	Correlation Coefficient	.538**	.613**	.637**
		Sig. (2-tailed)	.000	.000	.000

Table 60 The relationships between Social factors and Communication channels

The relationships between Information sources and Perceived characteristics of e-business

The test shows mixed results for the relationships between *Information sources* and *Perceived characteristics* of e-business. The results indicate a significant positive correlation between *Information sources* and *Perceived advantages*. However, a greater diversity of information sources does not affect the difficulty degree of e-business perceived by SMEs.

		Perceived ease of use	Perceived advantage
Total number of info sources	Pearson Correlation	-.014	.251*
	Sig. (2-tailed)	.891	.011

Table 61 The relationships between Information sources and Perceived characteristics of e-business

When testing the relationships between information sources, and e-business compatibility and ICT cost, the number of information sources is treated as an ordinal variable. Spearman's rho is the technique used here for examining relationships between ordinal variables. The test results show that all of the relationships but one is not statistically significant. The only exception is that when a higher number of sources are used to know about e-business, it is less likely for SMEs to perceive that the implementation cost is expensive.

			Total number of info sources
Spearman's rho	EB is compatible with our enterprise culture	Correlation Coefficient	.141
		Sig. (2-tailed)	.155
	EB is compatible with our preferred work practices	Correlation Coefficient	.142
		Sig. (2-tailed)	.152
	EB is compatible with our customers	Correlation Coefficient	.147
		Sig. (2-tailed)	.138
	The implementation cost is high	Correlation Coefficient	-.198*
		Sig. (2-tailed)	.045
	The maintenance and support fees are high	Correlation Coefficient	-.113
		Sig. (2-tailed)	.254
	Investment costs are higher than ROI	Correlation Coefficient	-.140
		Sig. (2-tailed)	.157

Table 62 The relationships between Information sources and Perceived characteristics of e-business 2

The relationships between Information sources and Communication channels

No relationship was found between *Information sources* and *Communication channels*, as the statistics show that none of the correlations is significant at the 0.05 level. The result does not support the idea that SMEs using more sources to gather information on e-business tend to be more motivated to communicate e-business knowledge.

			Total number of info sources
Spearman's rho	We actively communicate EB externally	Correlation Coefficient	.108
		Sig. (2-tailed)	.276
	We actively communicate EB internally	Correlation Coefficient	.159
		Sig. (2-tailed)	.108
	We actively seek for RD cooperation	Correlation Coefficient	.083
		Sig. (2-tailed)	.402

Table 63 The relationships between Information sources and Communication channels

5.6 Discussions and implications of research findings

5.6.1 Demographic information of SMEs

This survey produces a background picture which corroborates the findings of a great deal of the previous report published by China's Ministry of Industry and Information Technology of China (MIIT) (2010). In terms of business size, a majority of the participating firms are micro or small in nature. Regarding business type, more than half conduct manufacturing activities, with some being engaged in trading activities or providing services. With regard to target market, the dominance of firms only conducting business in domestic market may have something to do with the region where the survey was conducted. In the light of the age and educational background of owners or managers of SMEs, the findings of the current study are consistent with those of MIIT (2010) that found a high proportion of business decision makers are well educated and the average age tends to be younger. Taken together, these results suggest that the sample drawn from the population can basically reflect the demographic background of SMEs in China.

5.6.2 E-business adoption level and future intention

A review of the current e-business adoption level indicates that SMEs in China generally have a high level in using the Internet and e-mail in their daily business. These results are encouraging as most of today's e-business technologies are Internet-based, and Internet usage is considered as the first step towards adopting e-business. It is not surprising to see that more sophisticated e-business applications tend to get lower adoption rate, which roughly coincides with the original DTI adoption ladder. For the basic Internet applications, little financial or marketing involvement is required. A greater understanding of e-business efficacy, however, will be required for more advanced adoption and application (Durkin *et al.*, 2007). It appears that SMEs have a moderate usage of enterprise websites, which is similar to the estimate suggested by the report published by China's Ministry of Commerce (MoC) (2013). Nevertheless, despite the fact that many businesses claim to have an enterprise website, the usage of it might be quite limited, since only a small proportion of firms actively promote their websites, such as using search engine optimisation (SEO). A possible explanation for this might be that most firms merely use their websites to display their products and/or services rather than to conduct online transactions and make or take online payments (MoC, 2013). This finding is consistent with a claim made by MIIT (2010) that the majority of China's SMEs are still at the early stage of adopting e-business. Durkin and his colleagues (2007) claim that businesses need a higher level of understanding of website efficacy in order to inform their strategic thinking. As suggested by Feng and Mei (2012), small businesses could strategically use third-party platforms to complement their own websites, since the various functionalities provided by those platforms can help small firms to look for business opportunities and improve their business operations in terms of logistics and payments.

When asked about their planned usage of different e-business applications in two years' time, most SMEs revealed that they would gradually increase their usage level. These results were very encouraging. However, it is also noted that SMEs have somewhat more conservative attitudes towards certain applications than

the others. For instance, the use of online transaction and e-payment attracts slightly more moderate attention from business owners or managers. In a sense, SMEs in China are still lack of awareness in conducting their selling and buying activities over the Internet.

It is not surprising to find that firms with more sophisticated e-business usage tend to have more positive attitudes towards their future usage of the technologies. More precisely, around 27% of the increase in future e-usage can be explained by the current usage level. For the early adopters, after using e-business for a period of time, they have recognised the usefulness of e-business and have experienced various benefits brought by the innovation (MIIT, 2010). Understandably, they plan to use e-business for more business operations and at a more advanced level in order to further increase their competitiveness.

5.6.3 Perceived characteristics and e-business adoption

It is logical to find that positive perception towards e-business technologies from SMEs' owners or managers can lead to a greater adoption rate. In terms of perceived advantage, firms intend to improve their overall competitiveness through adopting e-business. This can be achieved from two perspectives: financially, businesses can receive greater exposure on the Internet and in turn get more business opportunities and increase profits; organisationally, ICT can help a firm to be more effective and more efficient for various business operations with the aim to improve a firm's overall performance.

Likewise, when business owners or managers believe e-business is not difficult to use, they are then more likely to adopt the innovation. E-business has been generally regarded as too complicated (Lin, 2008) or unsuitable by many small businesses (MacGregor and Vrazalic 2005). The strengths of the relationships show that the perceived easiness of e-business plays a more important role than SMEs' perceived advantages when making adoption decisions. This finding has important implications for 'change agents', such as government agencies and service providers, developing their strategies, as equipping SMEs with technical know-how knowledge should complement increasing the SMEs' awareness of e-

business benefits in order to achieve better effectiveness (McGowan and Madey, 1998; Rogers, 2003). Regarding observability, the results are consistent with the findings that the ICT success observed by SMEs on other companies such as trading partners and competitors may increase the chance of adopting similar technologies by themselves (Chong, 2008).

Another important finding was that the compatibility of e-business seemed to be a concern by most SMEs. It is somewhat unanticipated to find that the technical compatibility of new ICT hardware and software is no longer a major concern by small businesses. What is more important is that the new practices which result from new technologies need to be compatible with the enterprise culture and must be accepted by employees and customers before the implementation can be justified (Alam, 2009).

It is unsurprising to see that the costs associated with e-business remain a major adoption barrier for many small firms. Actually, rapid development of technologies has significantly brought down the costs of ICT hardware and software over the last few years. It seems possible that these results are due to the lack of adequate awareness of the latest advancement and changing market by many small businesses. Another important finding was that no evidence of a significant relationship between return on investment and e-business usage was found. It can therefore be assumed that there is a lack of e-business strategy in place for most SMEs in China.

In general, the results are consistent with findings from previous studies (Alam, 2009; Chibelushi and Costello, 2009; Shiau *et al*., 2009; Tan *et al*., 2009b; Oliveira and Martins, 2010; Ghobakhloo *et al*., 2011; Ifinedo, 2011; Duan *et al*., 2012; Kannabiran and Dharmalingam, 2012)

5.6.4 Communication factors and e-business adoption

Contrary to expectations, this study did not find a significant relationship between the number of information sources used to gain e-business knowledge and the actual usage of the innovation. It is difficult to explain this result, but it

might be related to the nature rather than the amount of information received by SME decision makers.

The current adoption level is found to be significantly related to the variety of communication channels used to disseminate e-business information. This result is consistent with the findings reported by Chong (2008). It suggests that early e-business adopters and service providers could actively use promotional seminars, presentations, and on-site visits to communication the benefits of using e-business, with the aim to increase the awareness and knowledge of their trading partners and other firms. Also for SMEs, expanding the variety of their communication channels can help them improve confidence and gain relevant knowledge.

5.6.5 Social factors and e-business adoption

The results of the study show that social influence and social readiness are significantly related to SMEs' e-business adoption level. Social influence suggests that higher pressure placed on firms by the business environment can lead to greater adoption of e-business technologies. On one hand, it can be interpreted that demand from different stakeholders has accelerated the adoption rate of e-business among small firms. On the other, it implies that the usage of ICT has increasingly become a norm for many industries. With this increased awareness, firms are finding that the ignorance of e-business would compromise their competitiveness against their competitors.

It is interesting to note that perceived *guanxi* network still has its impacts on Internet-based business. Apparently, the traditional way of doing business cannot be disregarded even in e-economy era, as Chinese culture has significant impact on e-business adoption decision (Thatcher *et al.*, 2006). Because small firm owners and managers are engaged in complex networks and various interpersonal relationships, it implies that e-business adoption issues in China should be comprised of the complicated social phenomenon rather than just be treated as a business strategy.

5.6.6 Perceived characteristics and future adoption

It is reasonable to find that positive perception towards e-business technologies will result in further adoption of the innovation in the future. However, contrary to expectations, no association between ICT costs and future adoption intention was found in this study. This result may be explained by the fact that ICT hardware and software costs have gradually decreased over the last decade. The advancement of technologies, such as cloud computing, also contributes to the popularisation of Internet-based e-business among small businesses. Therefore, it can be expected that an increasing number of owners or managers of SMEs will not perceive the purchase and maintenance costs of ICT as a major barrier that hinders them from adopting e-business now.

Another interesting finding was that there was a significant relationship between return on investment and future e-business adoption plan. An important implication of this is the possibility that more SMEs have realised the financial gains brought by e-business and have started setting up formal e-business plans.

5.6.7 Communication factors and future adoption

Unlike current adoption levels, it is interesting to note that there is a significant association between the number of information sources used to attain knowledge and future intention of adopting e-business. This discrepancy implies that most SMEs are still at the early stage of the decision making process. Rogers (2003) has speculated that one needs to seek and process relevant information, and then to reduce uncertainty about the innovation before the adoption decision can be made. There could be several possible reasons for SMEs being sceptical about e-business, but the important implication for this finding is that more efforts on persuasion need to be made from government agencies and service providers to guide small businesses through from merely knowing about e-business to actual adoption of the innovation.

A further examination of the information sources reveals that interactive media (i.e. the Internet) remains the mostly used source to get information with nearly

66% of respondents reporting they use it to gain e-business knowledge, followed by chamber of commerce or industrial association being reported by over half of the participants. The results also show that personal contacts and government agencies are the least likely information sources for SMEs to seek for information about e-business. The findings are consistent with Rogers' (2003) prediction on the development of 'interactive communication channel'. There are several implications for this result. From the SMEs' perspective, it appears that small business owners or managers tend to adopt an interactive approach to gain e-business knowledge. In other words, SMEs' e-adoption intention is driven by their demand. When the demand for e-business arises, they will actively look for advices and assistance from the Internet and relevant institutions. For policy makers and service providers, as the Internet has the characteristics of both mass media and interpersonal channels (Rogers, 2003), they can wisely use the channel to promote the relevant services they provide and convince more firms to adopt e-business through online communities.

5.6.8 Social factors and future adoption

The findings confirm that all of the social factors are associated with SMEs' future e-business adoption plan. Similar to current adoption level, SMEs' will constantly receive adoption pressure from their immediate environment. As suggested by a study published by Tan *et al.* (2009), e-business is no longer a choice but a must for SMEs operating in different sectors. In order to adopt the technology successfully, it is necessary for the management and employees to have a better understanding of the innovation and for the service providers to meet the needs of small businesses. Similarly, given the existing legal system and business culture in China, it is anticipated that *guanxi* will still play its part at least in the foreseeable future. Whether its influence will decrease in a longer term remains to be seen.

5.6.9 Social factors and perceived characteristics/communication channels

It is interesting to find that social factors have significant impacts on SMEs' perceived characteristics of e-business and how they communicate the

innovation, though few previous studies have examined the relationship between these elements. If we look back Rogers' (2003) five-stage decision making model, the various social factors such as *social influence* and *social readiness* can be roughly regarded as the knowledge forming process. That is to say, business owners or managers either actively or passively obtain information and knowledge about e-business from their social systems. The information received from different social systems can help them form their attitudes, either positive or negative, towards e-business technologies. In other words, forming a firm's perception towards e-business can be more or less seen as the persuasion stage. This stage is crucial as SMEs' preliminary decision to adopt or reject e-business is made based upon their perceived e-business characteristics. As suggested by Chong (2008), e-business initiators, such as early adopters, vendors and consultants, could actively communicate the benefits of e-business through different channels in order to influence SMEs and persuade them to adopt e-business. Therefore, a good relationship between e-business service providers and SMEs is the key to advancing the development of e-economy (Ifinedo. 2011).

5.6.10 Information sources and perceived characteristics/communication channels

The analysis has shown mixed results of the relationships between information sources, and SMEs' perceived characteristics and communication channels. It is somewhat surprising to see that the diversity of information sources has little impact on a firm's perceived characteristics of e-business and the way they communicate the innovation. If SMEs use more sources to gain information about e-business, the only impact it has is that it is likely for them to know more about the potential advantages brought by the technology. The reason for this is not clear but it may have something to do with the content and pattern rather than the amount of communication. A possible explanation is that SMEs tend to seek for outsourcing as their main IT solution (Bordonaba-Juste *et al.*, 2012). As outsourcing is a strategy that can help SMEs to overcome their lack of IT expertise and to resolve compatibility issues, perceived easiness and compatibility of e-business are no longer the major concerns for most small firms.

CHAPTER 6 QUALITATIVE DATA ANALYSIS

The purpose of the previous chapter was to test the series of research propositions generated from literature review relating to what factors have impacts on SMEs' e-business adoption decision. The objective of this chapter is to further examine the relationships between different elements in a more exploratory nature to seek for how and why the relevant elements influence the SMEs' current e-business adoption level and their relevant future intention.

This chapter begins by a brief description of the research process of the qualitative stage with the background information of the research participants being provided. It will then go on to presenting the main themes and sub-themes generated from the analysis of the transcriptions and interview notes. Finally, discussions of each theme generated will be presented with a fuller explanation being provided.

6.1 Interview process

In total 20 semi-structured interviews were conducted. Interviews of being typically between 30 minutes and one hour were held with either owners or senior managers of each firm. During the interviews, an interview schedule was used to ensure that the main issues were addressed as comprehensively as possible. The permission to record the interview was sought with most interviewees agreeing to be recorded. For those interviewees who did not agree recording, notes were made as an alternative means to record the interview. The interviews were conducted and transcribed in Chinese language. The transcriptions and interview notes were analysed in the original language with NVivo10 to avoid the loss in translation. After data analysis, the quotes were translated into English language accordingly for presenting purposes.

As all interview participants were guaranteed anonymity and confidentiality before the interviews took place, the names of the participating companies and interviewees will be kept undisclosed when presenting the results. A profile of

the companies, the size of business and the industrial sector in which they are engaged are provided in the table below.

Firms	Firm size	Business type	Industry	Age of interviewees
1	Medium	Service	Training	31-40
2	Micro	Trading	Hardware wholesale	<=30
3	Small	Trading Service	ICT retail	41-50
4	Small	Service	Training	41-50
5	Medium	Service	Training	41-50
6	Medium	Manufacturing Trading	Customised furniture	31-40
7	Medium	Service	Pre-school education	<=30
8	Micro	Trading Service	Antique	41-50
9	Medium	Service	Business service	31-40
10	Micro	Service	Business service	>50
11	Small	Trading Service	ICT retail	31-40
12	Micro	Trading Service	ICT retail	31-40
13	Medium	Trading	Agricultural products	31-40
14	Micro	Service	Restaurant	31-40
15	Small	Service	Chained restaurants	31-40
16	Micro	Trading	Maternal supplies	31-40
17	Micro	Trading	Wholesale	31-40
18	Medium	Service	Training	41-50
19	Small	Manufacturing Trading	Cloth manufacturing and wholesale	>50
20	Micro	Service	Tourism	<=30

Table 64 Background information of the interview participants

In order to better understand the results from the quantitative analysis stage, the interview schedule was based on the broad themes proposed for the questionnaire survey. During the interview, the participants were given the flexibility to respond to these general themes to assist in gaining deeper insights

into those issues. Through the examination and analysis of the qualitative data, the following sub-themes have been identified:

A - The current use of e-business	A1 Marketing/Publicity
	A2 Facilitating business operations and improving internal administration
	A3 'Face'
B - Future use of e-business	B1 Increasing usage in the future
	B2 Reducing or maintaining usage
C - Perception of e-business characteristics	C1 Costs on hardware and software
	C2 ICT expertise
	C3 Compatibility/Industry
D - Social Factors	D1 *Guanxi*
	D2 Influence from stakeholders
	D3 Age

Table 65 Coding and sub-codes

6.2 Discussion of results

6.2.1 The purposes of using e-business technologies

In response to the question regarding the purposes of using e-business, a few themed answers emerged. Marketing appeared to be the prevailing reason for e-business usage, with a number of other advantages being identified. The results are significant as perceived advantages can be an enabler in advancing IT adoption (Kannabiran and Dharmalingam, 2012).

Marketing and publicity

The respondents revealed a range of purposes for adopting e-business technologies in their businesses. The results confirm that China's SMEs are still at a low level of e-business usage, as most enterprise websites exhibit a lack of online transaction functionalities, and for most companies the usage of ICT in supporting business activities is fairly limited (MIIT, 2010; MoC, 2013; CNNIC,

2014). According to a previous report (MIIT 2010), marketing is one of the most used business activities by China's small firms when they utilise e-business technologies. The qualitative results revealed that, for most businesses, getting more exposure on the market is the primary reason for them to adopt e-business.

'Our company has a website. The website displays our own products, product profiles, technical support and solutions. We put our products on the webpages in order to have more people to explore our catalogue. Almost all of our products are put on display. The trading is mainly conducted via telephone or face-to-face. Online transaction is rare. We used to trade on Taobao and we had a member of staff responsible for it … it's basically how we operate our website.' (Small ICT hardware trading company)

'We mainly use our website for two things, the prime one is publicity… the website has been undergone renovation … the new design will look more appealing, but the functionalities will still be limited … currently we only have online enquiries, we don't have online enrolment or online payment functions. Payments still need to be made offline. The functionality of our website is not good enough, we can only do basic digital marketing … our marketing department is responsible for this …' (Small training company)

'The company's website is fairly basic. It is mainly used for marketing by displaying product pictures. We have an online forum for customers that shows images and procedures of our promotional events. However, the website recognition is quite poor. We also utilise other means such as e-mail, MSN and enterprise microblog and third-party platforms (to conduct marketing activities) … We have been running our website for 4 years … we pay for SEO (to promote company website) … Our work is not very effective, because our website is not good enough …' (Customised furniture manufacturer and retailer)

Some respondents indicated an awareness of the benefits of adoption, however, the adoption decision was reversed due to insufficient understanding and implementation. Among those non- or low level adopters, one respondent

revealed that they tried to use third-party platforms to construct their website and to look for potential customers:

'We used Alibaba to build a website … We tried (to display our products online and to look for customers), but it didn't work well. For this industrial sector, I can only say that a company website can make people aware of your company, but that's it. It seems the website didn't help our business. We sell hardware and industrial parts … We wanted to look for customers, but the effect was not good. Though there is still a website out there, we barely maintain it now.' (Family-owned hardware trading business)

The collected qualitative data are in line with the findings that suggest online marketing is the main reason for SMEs in China to adopt e-business, and among various marketing channels, search engine marketing, instant messaging services and third-party platforms are the most popular choices (MIIT, 2010; MoC, 2013; CNNIC, 2014). This result may be explained by the facts that marketing is one of the most essential business activities regardless of size or industry, and establishing online presence requires little IT expertise and know-how knowledge.

Facilitating business operations and improving internal administration

A medium-sized training institution has used the Internet to diversify their training services. By combining with their traditional business model, e-business has helped them reduce operating costs and materialise online transactions:

'When the courses start, we will use the Internet as a means and a channel to distribute learning materials, that is to say e-learning … We have a variety of modes to deliver our courses: in-class, online classes and combined courses … the core modules are delivered in class, other selected modules are delivered over the Internet. The two modes have their respective advantages. Online classes are very convenient … At least online delivery can reduce operating costs, very cost-effective … customers can also pay training fees and buy our books online …' (Training institution)

A few cases have revealed the recognition that e-business can create better ways of managing and organising businesses and in turn improve job performance (Tan *et al.*, 2010; Ifinedo, 2011):

'We use CRM and OA systems to manage our organisation and to streamline the management processes. The systems have standardised our management processes by making it more transparent and efficient … We also utilise a telephone marketing system … the system can record the daily work completed by each individual … it's more convenient for our managers to monitor their work … It's more systematic … job performance has been significantly improved through this way.' (Training institution)

'We use a specialised software for accounting management; we also have a computerised system to manage our stock control, sales/ordering, financial and customer information. We have integrated the systems (for better information sharing and management)' (IT trading company)

The present findings seem to be consistent with other research which found that SMEs could be benefited by e-business implementation in reducing inventory, improved customer service and improved communication (Kale *et al.*, 2010).

Face

It is interesting to note that having 'face' has been mentioned by a respondent as the main reason to construct their company website, given that the notion of 'face' has rarely appeared in e-business literature. It is difficult to explain this result, but it might be related to the Chinese notion of 'face' - *mianzi* which is one of the predominant cultural characteristics associated with inter-personal relationships in China. Since reputation is regarded as an important dimension of the so-called 'face work' in Chinese culture, businesses can position themselves as 'impresser' to give a good image in the eyes of Chinese people (Leung and Chan, 2003). The senior manager of a small training company indicated that there were concerns about the reputation of the company when making the decision to build a website:

'… another thing is about *face*. People would think it's unacceptable if a training institution doesn't have a website … they want to find us on Baidu … But actually our website is not functional … For example, XXX (name of a competitor)'s website is very good, but ours is very traditional … If a customer asks about our website, we need to at least show something (to them) … You can have a look at the website, it's not actually related to e-business … (E-business) is only a limited way to publicise ourselves. It may not affect our business if we don't use e-business, but we might not look good without it! … Personally I think e-business is akin to a "decoration" which shows a lack of actual usage … the website doesn't have what people really need … We used to use Office Automation system for daily office work, which is about *face* too. I found many companies including big ones use OA system for so-called online administration, online management *etc*., but the actual use is limited, thus we already stopped using it.' (Small training company)

In order to attain 'face', the visible success which matches well-established expectation in Chinese society is required (Leung and Chan, 2003; Lin *et al.*, 2013). The cultural characteristic can be extended to business context and can be influential in relationship building decision making in business (Peter *et al.*, 2006). In this case, China's culture of face value, *mianzi*, plays a key role in having a website and using e-business technologies. Although the website has little value for their business, having online presence can yield more *mianzi* in front of potential customers, since this sort of activity is visible in public and in turn can contribute to face.

6.2.2 Future adoption intention of e-business

Research on innovation adoption issues by Brand and Huizingh (2008) has indicated that the current adoption level has significant effect on further adoption intention. However, tests of this proposition may require longitudinal data. Examination of the responses revealed two sub-themes regarding future usage of e-business. On one hand, over half of those interviewed felt that taking up e-business was a prerequisite rather than a choice to a success business. On

the other, the rest of the respondents saw minimum value in developing their e-business strategy and improving technological capabilities.

Increasing usage in the future

In response to the questions regarding future intention, several respondents showed optimism towards the future use of e-business in their companies. Among them, there were feelings that e-business adoption would be 'the trend of the times' and increased usage would be inevitable. This view can be demonstrated by quotes from two companies involved in providing legal trainings. Despite the overall low take-up rate in the industry, the senior manager of one training company acknowledged the potential benefits brought by e-business:

'… the usage of e-business will definitely increase in the next couple of years. It is an inevitable phenomenon. The reason why people are willing to adopt a new way to work is because they can feel the improvement of job performance … (E-business) can help people to improve efficiency and make daily work more convenient. From this point of view, people are willing to choose the new way … also using the electronic platform to conduct marketing activities is the trend of times. We need to understand what customers think and what they need, we also need to know what channels people use to get to know us and how they choose us. Hence we need to use e-business to achieve these objectives.' (Legal training company)

The owner of the other medium-sized company indicated that new technology could change their business model. He also revealed that further usage of Internet Technology would be closely related to the effectiveness of the implementation at each stage. This implies the applicability of decision making stage models proposed in the Literature Review.

'(We will) definitely increase the usage. We will further adopt Internet Technology if we can see the effectiveness. There are two models … but we are neither of them, we need to see the effectiveness. We will follow our plan step by step, and we need to make sure each step is effective, otherwise there must

be something wrong … As a private company, we need to make sure our business model is profitable. If we can't make money from the model, it must be wrong … Because IT helps us make money, we will invest more on it; otherwise we would stop using it. It doesn't matter if e-business is good or bad, it just needs to be suitable for our model … (In the future) e-business must help us either increase profits or reduce operating costs, in turn more investments will be made on it. In the end, ideally, when our e-learning model is good enough to make people feel they don't need to physically come our training classes, the proportion (of e-learning) will get bigger and bigger …' (Legal training company)

The positive attitudes towards the future of e-business are not merely shared by those who have benefited from it. For a customised furniture manufacturer and retailer, the manager interviewed admitted the lack of e-business usage in their current business operations, and revealed that e-business plans had been made in order to increase sales revenue. At the technical level, they intend to add more functionality to their existing website to facilitate the sales processes:

'Our website doesn't have online payment facilities. All payments need to be made offline now. (However) we will add the facilities in the near future. We plan to add online payment facilities to receive the payments of deposits; in other words, (customers) just pay a small amount of down-payment or deposit via the Internet. As the amount is relatively small, it can reduce customers' hesitations, and it's beneficial to both parties … it can facilitate the whole ordering procedure.' (Customised furniture manufacturer and retailer)

At a more strategic level, through working with business partners, the company plans to develop an e-business model that is viable and more profitable:

'We will definitely increase our online sales in the next couple of years. Despite having our own website, the company doesn't have enough resources to significantly improve it. Therefore, we need to work with e-commerce platforms to implement online payment and to increase sales revenue. We have already been co-operating with two e-malls, and we are going to team up with XXX (name of an e-mall) … so using the platforms of e-malls is how we increase our exposure

on the Internet … Many of our business partners have realised that they need to change their e-business model to stay profitable. We hold meetings with them from time to time to discuss future plans and models in order to make our model viable and more profitable … What we need to do next is to change the current "price war" model to a "real" e-commerce model … In terms of the internal information system, we are considering of using CRM … we are negotiating with a service supplier at the moment …' (Customised furniture manufacturer and retailer)

Examination of the qualitative data supports previous research into this area which links the knowledge level and formed attitude towards e-business with the implementation and further adoption intention (Rogers, 2003; Yu and Tao, 2009). Those owners or managers with profound understanding of e-business are likely to form a favoured attitude which in turn would affect their adoption intention. Some participants expressed the belief that e-business success was a matter of how to apply the technology to their business or industry in an appropriate way rather than the technology itself. It is not sufficient to just have technical knowledge of the IT without knowing how to integrate it into a company's longer-term business strategy. Like the case illustrated above, if there is a belief in e-business, businesses will adapt their e-strategy rather than overturning the whole adoption decision when effectiveness is not visible. In many cases, those companies equipped with both technological and business competencies are better prepared to exploit the opportunities brought by e-business.

Maintaining or reducing usage in the future

Almost half of those interviewed suggested that they had no intention to increase their future usage of ICT. However, contrary to expectations, the majority of those respondents revealed that they had experiences of using e-business in the past rather than being completely novel to the innovation. Nonetheless, due to the lack of helpfulness to their businesses, they have chosen to reduce the usage level or stop using it at all. In order to attract more customers, a family-owned trading company has developed a website through the platform provided by an

industry-leading e-commerce service provider. The website does not offer transaction facilities and is merely used as an informational portal by providing catalogues and details of their products:

'We used to use Alibaba's platform to build a website. We tried to put product information on it and to look for potential customers. (But) for this industrial sector, I can say a website can only make people aware of our company (on the Internet), it doesn't seem that it can help our business much … thus we barely update it … We gained most of our customers or suppliers from friends or attending expositions … I don't think e-commerce is useful to us … We will keep the current usage level in the near future.' (Family-owned hardware trading business)

A small training company specialised in preparing candidates for the National Judicial Examination tried to utilise the advances of Internet Technology to diversify its business model and generate extra revenues. However, the project has been fully halted due to poor implementation:

'We tried to deliver interactive online training sessions over the Internet, but it didn't work well. In many regions of China, the business model was severely affected by the speed of broadband. The model lasted for just over a year, then we had to stop it, as the project was not as effective as we expected.' (Small training company)

Compared with the previous e-business research that only investigated e-business adoption issues at a single time-point, these findings revealed a fuller picture of small businesses' decision making pattern. It implies that the engagement with e-business technologies is not a sequential and progressive process as it is suggested by DTI e-adoption ladder. Decision makers constantly evaluate the contributions made by the new technologies to their businesses and adjust their usage level accordingly. It is not uncommon to see that, due to insufficient effectiveness and poor experience at the implementation stage, businesses might choose to discontinue their usage even an adoption decision has been made (Rogers, 2003). The finding corroborates that idea of Brand and

Huizingh (2008), who claim that SMEs' e-commerce adoption intention is profoundly affected by their past experience and current adoption level.

6.2.3 Perception of e-business characteristics

A few themes that emerged from the examination of SMEs' perception of e-business are examined below.

Costs on hardware and software

Unsurprisingly, the findings of the study indicate that ICT start-up costs still pose as a major barrier to e-business adoption for many small businesses (Fillis *et al.*, 2004). It can be illustrated by the following quote from a retailer:

'We always wanted to improve the functionalities of our website, but we still have not done it due to the implementation costs … Those e-business service providers that meet our requirements charge too much.' (Customised furniture manufacturer and retailer)

One participant indicated that the overly expensive prices of software on China's market had left them with no choice but to purchase significantly cheaper pirate copies:

'I think the costs (on ICT) are quite high. First, we outsource our server, thus we need to pay a lot of money to hire a server each year. Second, in terms of software, a piece of corporate software would cost us at least ¥20-50k. For example, we need to upgrade our CRM system from time to time, which means each upgrade will incur extra fees … We hope corporate software dealers will consider the buying power of consumers. I can give you a simple example: we wanted to purchase an office software the other day, we found a licenced copy of that software would cost around ¥3k. However, a pirate version on the market would cost us only ¥200 which would be only 1/15 of the price of a genuine copy … In the end we decided to buy the pirate copy because we found the functions of the two are of no much difference. I think most people would make the same decision with regard to this due to the huge price difference on Chinese

market … I hope the authorities can show some empathy for consumers when they regulate the market … I think the high costs of ICT is a major issue as cost control is crucial to a business.' (Training institution)

There were also concerns over return on investment when referring to e-business costs, as the following quotes from two trading companies illustrate:

'The service fees charged by those e-business service providers are too high for us. If we use the services, I'm afraid the return would be less than the investment …' (Family-owned trading business)

'The fees for Search Engine Optimisation are too high … Our business has been running for 10 years and we tried to use SEO to promote our business on Baidu for the past 4 to 5 years. We had to stop it from last year, as the return on investment was disproportionate … We could get great profits in the past but we are struggling to cover the costs. The market is getting highly competitive now … As more and more companies have established their online presence, we have been gradually losing our market share.' (Small ICT Equipment trading company)

A number of financial costs ranging from purchasing or renting hardware and software to fees charged by e-business service providers have been identified, which supports the notion that e-business costs still serve as a major barrier to many small firms (MacGregor and Vrazalic, 2005; Alam, 2009; Shiau *et al*., 2009; Tan *et al*., 2009b).

ICT expertise

Despite the recognition of the need to adopt e-business, a small number of those interviewed suggested that the lack of e-business competencies had prevented them from making the most of the innovation. The owner of a medium-sized service company revealed that the Internet had been utilised in their business for a while until the sudden departure of their IT team:

'We tried to use the Internet to do business for a few years … but our technical team left 2 years ago … At the moment we don't have a technical team to help us

to implement e-business. We don't' have the IT background, we can't use the traditional way to conduct business activities over the Internet. Internet commerce has its own philosophy which needs to be implemented with technical expertise … What we need most is those who have profound understanding of Internet commerce. This is more important than IT technical competencies.' (Medium-sized legal training company)

IT expertise has been identified as a main aspect that influences the use of e-business by previous research (Bordonaba-Juste *et al.*, 2012). For some small businesses, they choose to outsource their IT work to local service providers as the main strategy to counterbalance their lack of internal qualified IT personnel:

'As we don't have a specialised technical team, the construction of our website is not satisfactory. We have to rely on outsourcing, but the services provided by those contractors can't quite meet our requirements … The deficiency of those IT outsourcing companies is they can't help us to integrate the internal information systems. We purchased our design software and manufacturing monitoring system from other countries. These systems are independent and cannot be connected to or integrated with the system provided by local service providers. Theirs systems are fairly basic and cannot be customised to meet our requirements … Most service providers are small-sized and are lack of R&D competencies themselves, thus we can only use what they can provide.' (Customised furniture manufacturer)

This finding is consistent with that of Alam (2009) who found technical compatibility was an essential factor for Internet adoption and usage. It also confirms the importance of access and quality of ICT consulting services (Scupola, 2009). If companies do not have the access to required infrastructure and Internet expertise, it is unlikely for them to make the utmost of e-business.

Compatibility / Industry

Whether a firm chooses to adopt ICT or not depends on the degree to which the innovation is compatible with its existing values, past experiences and needs

(Rogers, 2003, Tan *et al.*, 2009a). Approximately half of those who responded felt that e-business was not compatible with their industrial practices, which can be demonstrated by the following quotes:

'The business model is limited by the speed of broadband in China. The actual speed of Internet connection in this country cannot meet our requirements.' (Legal training company)

'An important thing is that e-commerce is not a solution for all types of furniture. The e-commerce model is more suitable for modern panel furniture than the tradition furniture which we sell. For traditional Chinese-style furniture, you cannot tell if the engraving details or structure is good or not from merely pictures on the Internet, that's why traditional furniture retailers seldom do e-commerce.' (Customised furniture retailer)

The exploratory evidence has reconfirmed the importance of perceived industrial compatibility among SMEs decision makers, and supports the notion that the degree of e-business adoption depends on the customers' requirements and the industry's overall business practices (Sophonthummapharn, 2009).

6.2.4 Social factors

Guanxi

In China, personal network *guanxi* hinders many firms' e-business adoption (Tan *et al.*, 2007). As a critical component in China's business and social life, *guanxi* is valued by a B2B ICT equipment supplier in the Internet era:

'… *guanxi* is much more important (than e-commerce). We got most of our customers and business partners through *guanxi* or existing contacts. The proportion of customers from the Internet is rather small … For example, we supply ICT equipment to government agencies, and we have to rely on our contacts there to establish business relationships. Since the procurement departments of those agencies have high employee turnovers, we would usually

lose the customer if our contact leaves the post one day …' (ICT hardware and service provider)

This pro-*guanxi* view is shared by two service companies that mainly deal with business customers. Both of them treat *guanxi* as an invaluable resource that cannot be replaced by values created by advanced technology. It seems possible that these results are due to the less transparent pattern of B2B transactions. Because of the lack of trust and insufficient information sharing in China's business environment, some people still rely on their trusted contacts to develop business in the digital era.

However, Davison and Ou (2008) made the claim that there had been radical changes on how business can be conducted in China notably in the B2B domain due to the increasing influence of online intermediaries. This view is echoed by the owner of a small trading company:

'… I think, comparing with the traditional business model, doing business on the Internet should rely less on *guanxi*. I think prices and services are more important (for e-commerce).' (Small trading company)

The results also showed that *guanxi* was less relevant to the retail sector, or more precisely B2C model, compared with other business sectors:

'*Guanxi* is not relevant to us, because our customers are individuals. What we do is retailing, so *guanxi* is irrelevant to our relationships with customers. Regarding procurement, we source our materials from abroad … as our suppliers are foreign companies, we don't need *guanxi* to do business with them … The only area we need *guanxi* probably is when we open new stores in shopping malls … As our e-commerce model is independent of our physical stores, I can say that it doesn't affect any part of existing *guanxi* …' (Furniture retailer)

It is interesting to note that the qualitative results revealed diverse attitudes towards the impact of e-business on the traditional, *guanxi*-facilitated mode of business transactions. There are several possible explanations for these results. First, e-business appears to have little impact on existing *guanxi* network for

those engaging in B2B transaction models. For those companies, gaining and retaining customers are still mainly conducted with the traditional business philosophy. Building a trust-based transaction relationship would be needed if they wanted to shift to doing business online (Li and Xie, 2011). Second, the traditional way of developing business via *guanxi* seems inapplicable for those involving in doing business with overseas companies. It may have something to do with the fact that small businesses tend to possess less social capital in overseas markets. Coupled with bigger supplier and customer pressure from foreign stakeholders, the results might be related to MIIT's (2010) findings that SMEs tend to have higher e-business uptake when they explore overseas market.

Influence from stakeholders

The results from the qualitative data analysis indicate that small firms' e-business adoption levels can be influenced by various stakeholders, from their customers to suppliers, but those influences may not always lead to a higher degree of adoption. In Chong's (2008) study of e-commerce success of SMEs, she found that less pressure from customers might result in higher satisfaction level of SMEs over their e-commerce system. As revealed by a respondent, their e-commerce usage level is determined by the customers' demand:

'… for the upholstery sector, the value Chinese people hold matters. For valuable goods, Chinese customers want to "see" them before making any purchase. The customers will go to the physical store (to buy our products) in the end. They don't trust online transactions (when buying furniture). Unless for things like chairs or coffee tables, people might be willing to purchase them online, as they are of relatively low value and are unlikely to be customised. However, for expensive furniture, they must see the real objects. We manufacture customised furniture, which makes it even more difficult (to conduct e-commerce) … We could communicate a few issues, such as design, with customers via the Internet, but they still want to visit our stores in person. This is Chinese customers' shopping habit. Online transaction is not enough for them, as they need to physically feel the products by comparing the design and quality. All in all,

conducting e-commerce is extremely difficult for us!' (Customised furniture manufacturer and retailer)

As the following quote from the senior manager of a training company suggested, customers can be very influential, so that businesses might even have to reverse their e-business adoption decision:

'We tried to deliver training sessions via the Internet by working with specialist companies … an investment company invested on the project for us … we delivered live training courses online which even had interactive functionalities … But it didn't work, so (we had to shut it down) … Because the customers have been in Chinese education system for long time, they demand face-to-face and in-class learning experience. As far as I know, our major competitors face similar problems.' (Small training company)

These results confirmed the claim made by some researchers (Chong, 2008; Ghobakhloo *et al.*, 2011) that customer and supplier pressure would make significant contribution to the adoption of Internet-based e-commerce.

Furthermore, the study suggested that small firms targeting overseas markets were more proficient in e-business than those that merely focus on domestic market. For instance, one of the respondents, a medium-sized service company, has developed a bilingual website for its both domestic and overseas customers. Although the two language versions have similar functionalities, the company has admitted that 'the website has much more significant value for developing foreign market, as Chinese customers seldom browse our website, and tend to approach us through their contacts instead'. Similarly, a manufacturing company admitted that the long term cooperation with their European suppliers had made a profound impact on their e-business uptake.

This finding corroborates the ideas of Harrigan *et al.* (2009) who suggested that those firms serving international markets tended to place greater emphasis on e-business. The results are also in agreement with the findings from MIIT's (2010) report which showed those Chinese SMEs engaging with foreign stakeholders

generally have a higher level of e-usage. However, caution needs to be taken due to different business contexts in each country, hence the findings might not be transferable to other economies.

Age

It is interesting to note that previous research has identified a variety of demographic factors that have an impact on SMEs' willingness to adopt e-business, but few have considered the age of the management and employees as a determining characteristic. Among those empirically tested factors, the most relevant ones are SME owners or managers' education level (Chibelushi and Costello, 2009), CEO's innovativeness (Ghobakhloo *et al.*, 2011), and employees' IT expertise and attitude (Scupola, 2009; Bordonaba-Juste *et al.*, 2012).

When referring to the attitude of the management to e-adoption within the organisation, the senior manager of a furniture company mentioned that age played an inevitably important part in forming their favourable attitude towards e-business:

'… the adoption decision of most new systems is made by our owners. Our owners and managers really value the importance of e-business to our business operations, and our usage level is closely related to senior management support. The company is relatively young as a whole, with most owners and managers being in their 40s … that is to say, we are willing to accept new knowledge and ideas …' (Furniture retailer)

This finding supports the idea of the need for management support (Doom, *et al.*, 2010; Kale *et al.*, 2010; Duan *et al.*, 2012), but further reveals that the age structure of management may have an inherent influence on their e-adoption support level.

In response to the question regarding employee support and understanding, almost all of those interviewed indicated that a new system or work practice can be easily understood and implemented due to the age advantage of their young workers.

‘Over 90% of our employees are young and have a university degree, so they don’t have any problem to accept new technologies. For instance, we used to do our examination and approval works on PC, but we are trying to conduct the work on mobile devices now. I believe we can make the transitional period less than a month, as the majority of our workers are less than 30 years old … it’s not a complicated task for them … ’ (Service company)

‘In our company, people are quite familiar with the Internet due to our age structure. People also desire for modern ways to manage our company, thus we didn’t encounter problems when implementing the new ICT system. Companies in this industrial sector are mainly comprised of young people … I think age is directly related to people’s capabilities of accepting new stuff. I’m not saying older workers cannot perceive the advantages brought by new technology, it just usually takes them longer time to accept and use it … We should have subjective initiatives to accept new stuff, otherwise we won’t be able to survive in the highly competitive environment …’ (Training company)

This finding corroborates the ideas of Chuang *et al.* (2009), who suggested that the compositions of age and education had a significant positive influence on the extent of IT adoption in SME. This result may be explained by the fact that younger people tend to have better IT knowledge and have received higher level of education. Therefore, it is reasonable to say that firms with higher proportion of young employees are more innovative and are more likely to adopt new ways to work.

6.2.5 Interpretations based on quantitative results

By comparing the results of qualitative analysis with the findings from quantitative stage, it can be seen that a more rounded picture has been revealed. First, the relationship between perceived ICT costs and e-business adoption is by no means a straightforward one and the inconsistency of answers from the participants may be explained by a number of reasons. The rather contradictory result may be related to the relatively irregular ICT market in China. As revealed by one participant, business software cost is generally perceived high for small

businesses but many of them choose to purchase pirate copies as the opportunist alternative to adopt certain business applications. Another possible explanation is that the perception of ICT costs is affected by the participant's knowledge level on technology advancement. For those business decision makers with little IT background and awareness, for instance, they are less likely to recognise the decreases of ICT price level as a result of the increasing popularity and maturity of cloud-based computing.

Second, the findings of qualitative analysis reveal a much more diverse landscape than what the quantitative analysis initially suggests in terms of *guanxi*'s impact on e-business. This discrepancy seems has something to do with the industrial sector a business is engaged in and which part of supply chain they refer to. However, these data must be interpreted with caution because no efforts were made to segregate industries during the data collection and analysis process in this study.

Third, the participants of qualitative interview explicitly express that certain demographic characteristics are closely related to a company's organisational knowledge level on e-business, which in turn affects their adoption motivation and implementation rate. It is therefore likely that such connections exist between the educational level of top management and adoption initiatives. It also suggests that the average age of a SME's employees can affect how effective and efficient a new business application can be implemented within the organisation.

6.3 Conclusion of qualitative analysis

Based on the framework from quantitative analysis, the qualitative stage sets out to examine how and why the various factors affect e-business adoption among SMEs in China. Returning to the hypotheses posed at the beginning of this study, it is now legitimate to state that SMEs' perceived characteristics of e-business, social factors and time element play an important part in affecting owners or managers' adoption decision. This study has shown that e-business is not only

used by small businesses for better marketing effectiveness and more efficient daily operations, it is also used as a way to gain 'face'. It is also shown that SMEs' future adoption intention is profoundly related to their current or past usage experience. The engagement with e-business technologies is not a sequential and progressive process, as SMEs constantly assess their business performance and adjust their adoption level accordingly. The most obvious finding to emerge from this stage is that ICT costs, technical know-how and industrial compatibility are perceived as the biggest concerns when implementing e-business. With regard to social factors, the evidence from qualitative data suggests that the traditional Chinese value of *guanxi* has varying degrees of influence on difference business sectors. The findings have also suggested that the influences from stakeholders and employees with different demographic background can make several noteworthy contributions to e-business adoption level.

CHAPTER 7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The prime aim of the current study was to examine the factors, from businesses' perspective, that affect e-business adoption among China's SMEs. Returning to the objectives identified at the beginning of this study, the first one was to assess the existing e-adoption adoption theories and models and examine their applicability for SMEs in China. Based on the review of existent literature, it was concluded that Rogers' DOI theory has the greatest potential to provide a comprehensive framework to explain e-business adoption in SMEs, because DOI aims to explain the social and relational aspects of innovation diffusion and how this occurs over time rather than just focusing on e-business technology itself.

In order to achieve the second objective, this study has developed a conceptual model that drew upon DOI theory and e-business adoption literature to examine the influences of perceived characteristics, communication factors, social context and time element, from businesses' perspective, on e-business systems adoption level. The model treats each element individually, with perceived characteristics, communication factors and social factors all being related to a firm's e-business adoption issues. A firm's e-adoption level is assessed at two time-points, which means this conceptual model is proposed to examine if SMEs' perceived characteristics of e-business, communication factors, and social networks are related to their current e-business adoption level and future adoption intention respectively. The empirical evidence from this study confirms that DOI theory is applicable to e-business adoption issues for SMEs in China, with all of the four proposed elements (innovation, communication, social system and time) being found to have their relevance.

With regard to the third objective, the following major findings have been revealed. It has been recognised by business owner/managers that Internet-based e-business could provide the catalyst for the positive changes needed by SMEs in China, whereas the actual adoption level and the purposes of using such

technologies vary significantly from business to business. The findings reveal that the usage of e-business is mainly limited to marketing activities by most small businesses, which indicates a constrained level of awareness and understanding of the efficacy of e-business technologies. It is also shown that SMEs' current usage and past experience with e-business have direct influence on their future adoption plan.

The most obvious finding of this study is that perceived advantages, ease of use and compatibility of e-business technologies have wide-scale impacts on SMEs' current adoption level and future usage plan. However, interestingly, perceived costs of implementing e-business revealed a more diverse picture. It was shown that small firms would not view ICT costs as a major adoption barrier in the future, while most small businesses are still currently concerned about the implementation and maintenance costs. The contrasting results may be due to the combination of the advancement of technology and improved awareness and understanding of e-business efficacy among SME decision makers.

Another major finding was that although information sources used by SMEs to gain e-business information and knowledge had little influence on their current adoption, they would have positive effects on small firms' future adoption intention. In relation to Rogers' (2003) decision making model, the result indicates that China's SMEs are still sceptical about e-business and need to seek further information to reduce uncertainty about the innovation before adoption decision can be made.

The relevance of social factors is clearly supported by the current findings. The results of this investigation show that influences from various stakeholders and e-readiness of China's business environment have significant impacts on SMEs' e-adoption regardless of time. One of the most significant findings to emerge from this study is that the Chinese notion of *guanxi* is still observed in today's Internet era. A further investigation reveals that the traditional way of developing business via *guanxi* is particularly important for those firms engaging in B2B

transaction model, whereas it seems less relevant for those in retail sector or involving in doing business with overseas stakeholders.

Taken together, the results of the quantitative analysis stage suggest that the proposed research model can be applied to study e-business adoption issues among SMEs in China, with findings from the qualitative stage further exploring, from businesses' perspective, the role of e-business and how the innovation develops and sustains them. However, caution should be taken before applying the perceived characteristics and the communication elements as they might be only relevant to certain specific decision making stages.

7.2 Significance and implications of the findings

The formal and widely used conceptualisations of e-business adoption models have been challenged by China's unique business environment and complex social culture. This research contributes to e-business literature by adding empirical evidence to the Chinese context. By doing this, this study reviewed the most commonly used theories in the subject area and proposed a research model based on DOI. This study particularly offers empirical support to findings and observations regarding the social factors that influence the acceptance of Internet-based e-business amongst SMEs in China. The pattern of the relationships that has been identified in the model therefore assists in our understanding of the impacting factors of e-business adoption. The methods used for this study may be applied or adapted to other e-business adoption studies elsewhere in the world with similar culture and ICT development.

For practice, this study's findings raise the need to re-examine the support provided by the relevant 'change agents', such as government agencies and service providers. Policy makers and e-business vendors need to understand the reasons why some of the SMEs in the country lag behind in adoption of e-business related technologies. The findings of this study indicate that SMEs' decision makers are not ignorant about the potential benefits of e-business for their firms. However, whether there is sufficient and appropriate support and

how the support should be delivered are crucial when encouraging the acceptance of the innovation in their settings.

7.3 Limitations of the current study / Recommendations for further work

A number of caveats need to be noted regarding the present study. First, the data were collected from just one specific region in China, while different regions of the country have different Internet penetration rates that may affect how firms perceive e-business. In order to examine if regional divide exists, comparative study can be conducted in the future with a research designed to collect data from two areas with contrasting development of ICT infrastructure.

Secondly, no attempt was made to control for industry type in this study. The research model could be examined in a few chosen or specific industries to test for generalisability, particularly among those with different business models.

The third limitation of the study has to do with the cross-sectional nature of the data. Due to the limited resources of this research, the study was designed to collect data from a single time-point. It would be insightful to conduct longitudinal studies so as to investigate into the change of e-business perception and the actual usage level over a period of time.

Last but not least, data collection methods used in this study (i.e. self-completion questionnaire and semi-structured interview) imply the subjective nature of the measurement of e-business adoption level. The main weakness of this approach is that certain influential adoption factors cannot be addressed. For example, infrastructure readiness, which is crucial for an organisation's e-transformation, can hardly be measured or validated with the chosen research methods. A number of factors, such as external driving forces and peer pressure, are only measured in a subjective manner, as they are not the focus of this study. Other research methods, such as case study, can be employed in the future to complement other components of e-business implementation and evaluation.

The exploratory nature of the research has helped identify associations between differing variables from which more confirmatory or causally directional hypotheses can be generated for future studies. It would also be interesting to enquire further into the question whether SMEs' demographic background has differing impacts on their e-business adoption intention and implementation. Progress towards the formulation of a more comprehensive causal model may be achieved in the future, where analytical techniques such as structural equation modelling may be applied. A number of additional adoption factors, which are not the focus of the study, can also be considered in revising or constructing future conception models.

APPENDIXES

Appendix A. Item coding

Measures	Codes	Items
Current e-business adoption level	CAL1	We make use of Internet
	CAL2	We use e-mail
	CAL3	We use third-party platform
	CAL4	We use enterprise website
	CAL5	We promote our website
	CAL6	We use e-payment
	CAL7	We integrate e-commerce with internal IS
	CAL8	The number of business operations that require e-business
E-business Characteristics		
Perceived advantages	ADV1	E-business improves competitiveness
	ADV2	E-business provides new business opportunities
	ADV3	E-business allows for better advertising and marketing
	ADV4	E-business enhances communications with customers and suppliers
	ADV5	E-business creates better ways of managing and organising business
	ADV6	E-business improves job performance
	ADV7	E-business increases profitability
Compatibility	COM1	E-business is compatible with enterprise culture
	COM2	E-business is compatible with preferred work practice
	COM3	E-business is compatible with customers
	COM4	E-business is compatible with existing infrastructure and information system
Perceived ease of use	EAS1	E-business technologies are secure and low-risk
	EAS2	We have information system / e-business expert(s)
	EAS3	E-business service providers can meet all the requirements by SMEs
	EAS4	The current legal system for e-business is sufficient
	EAS5	Online transactions are safe
Trialability and observability	TRO1	We can try e-business applications with limited resources
	TRO2	The result of adopting e-business can be easily demonstrated

	TRO3	There are successful competitors in the industry who have adopted e-business
Cost	COS1	The cost of e-business implementation is high
	COS2	The maintenance and support fees for e-business applications are high
	COS3	The e-business investment costs are greater than expected return on investment
Communications Factors		
Communication channels	CHA1	We actively communicate e-business information through promotional seminars, presentations or demonstrations
	CHA2	We actively use on-the-job training to communicate the benefits of e-business with existing employees
	CHA3	We actively seek for cooperation with R&D institutions on e-business development
Social Context		
Social influence	INF1	Many competitors have already started using e-business
	INF2	Many trading partners demand the use of e-business in doing business with them
	INF3	We could lose many customers if we do not use e-business
	INF4	The government encourages and demands us to adopt e-business technologies
	INF5	E-business service providers actively promotes e-business technologies and encourages us to adopt them
Social norms	NOR1	The management is supportive of the use of e-business technologies in our operations
	NOR2	E-business is widely understood by the employers
	NOR3	E-business is suitable for the industrial sector
	NOR4	E-business is suitable for the area
Guanxi network	GUX1	E-market can be trusted at all times
	GUX2	Developing trust with trading partners does not require seeing and talking to them
	GUX3	Compared with traditional business models, E-business does not require *guanxi*
Future e-business adoption intention	FAI1	The use of EB to communicate
	FAI2	The use of EB to promote the company
	FAI3	The use of online transactions
	FAI4	The use of E-payment
	FAI5	The use of EB for critical operations
	FAI6	The number of business operations that use EB

Appendix B. Survey questionnaire

SME E-business Adoption Questionnaire

www.diaochapai.com/survey/15ead303-5ec4-444e-93c1-5a32dbe1651f

Section A. Background Information

A.1 Which industrial sector is your enterprise in?*

Data collected from A.1 will be used to classify your enterprise according to Chinese SME criteria (2011)

http://www.gov.cn/zwgk/2011-07/04/content_1898747.htm

A.1.1 What is the number of employees in your enterprise?*

A.1.2 What is the annual turnover of your enterprise?*

A.1.3 What is the total assets of your enterprise?*

A.2 Which province (autonomous region, municipality) is your enterprise located?*

A.3 What is the business type of your enterprise? (You may select more than one)*

A.4 What is the trading type of your enterprise?*

A.5 What is your age?*

A.6 What is your educational background?*

Section B. Current E-business Adoption Level

B. Please select the current e-business adoption level of your enterprise*

	Very low or no	Low	Moderate	High	Very high
B.1 We make use of Internet					
B.2 We use e-mail to communicate with customers and trading partners					
B.3 We use third-party platform(s) / website(s)					
B.4 We use enterprise website(s) to display and promote our products and/or services					
B.5 We promote our website (e.g. SEO)					

	Very low or no	Low	Moderate	High	Very high
B.6 We use e-payment for our transactions					
B.7 We integrate e-commerce with our internal information system					
B.8 The number of business operations and activities that require e-business technologies is __?					

Section C. E-business Characteristics

In your opinion, to what extend do you agree or disagree with the following statements:

C.1 Perceived Advantage *

	Strongly disagree	Disagree	Neither	Agree	Strongly agree
C.1.1 E-business improves our competitiveness					
C.1.2 E-business provides us new business opportunities					
C.1.3 E-business allows for better advertising and marketing					
A.1.4 E-business enhances communications with customers and suppliers					
C.1.5 E-business creats better ways of managing and organising our business					
C.1.6 E-business allows us to improve our job performance					
C.1.7 E-business increases our profitability					

C.2 Compatibility *

	Strongly disagree	Disagree	Neither	Agree	Strongly agree
C.2.1 E-business is compatible with our enterprise culture					
C.2.2 E-business is compatible with our preferred work practice					
C.2.3 E-business is compatible with our customers					
C.2.4 E-business is compatible with our existing infrastructure and information system					

C.3 Perceived Ease of Use *

	Strongly disagree	Disagree	Neither	Agree	Strongly Agree
C.3.1 E-business technologies are secure and low-risk					
C.3.2 Our enterprise has information system / e-business expert(s)					
C.3.3 E-business service providers can meet all the requirements by SMEs					
C.3.4 The current legal system for e-business is sufficient					
C.3.5 Online transactions are safe					

C.4 Trilability and Observability *

	Strongly disagree	Disagree	Neither	Agree	Strongly agree
C.4.1 We can try e-business applications with limited resources					
C.4.2 The result of adopting e-business can be easily demonstrated					
C.4.3 There are successful competitors in the industry who have adopted e-business					

C.5 Costs *

	Strongly disagree	Disagree	Neither	Agree	Strongly agree
C.5.1 The cost of e-business implementation is high for us					
C.5.2 The maintenance and support fees for e-business applications are high for us					
C.5.3 The e-business investment costs are greater than expected return on investment					

D. Information Sources and Communication Channels

D.1 Which sources do you currently use to gather information about e-business issues relevant to your business? (Please select all relevant sources) *

D.2 Communication Channels *

In your opinion, to what extend do you agree or disagree with the following statements:

	Strongly disagree	Disagree	Neither	Agree	Strongly agree
D.2.1 We actively communicate e-business information through promotional seminars, presentations or demonstrations					
D.2.2 We actively use on-the-job training to communicate the benefits of e-business with existing employees					
D.2.3 We actively seek for cooperation with R&D institutions on e-business development					

E. Social Networks

In your opinion, to what extend do you agree or disagree with the following statements:

E.1 Social Influence *

	Strongly disagree	Disagree	Neither	Agree	Strongly agree
E.1.1 Many of our competitors have already started using e-business					
E.1.2 Many of our trading partners are demanding the use of e-business in doing business with them					
E.1.3 We could lose many customers if we do not use e-business					
E.1.4 The government is encouraging and demanding us to adopt e-business technologies					
E.1.5 E-business service providers are actively promoting e-business technologies and are encouraging us to adopt them					

E.2 Social Norms *

	Strongly disagree	Disagree	Neither	Agree	Strongly Agree
E.2.1 The management is supportive of the use of e-business technologies in our operations					
E.2.2 E-business is widely understood by the employees					
E.2.3 E-business is suitable for the industrial sector					
E.2.4 E-business is suitable for the area					

E.3 Guanxi Network *

	Strongly disagree	Disagree	Neither	Agree	Strongly Agree
E.3.1 E-market can be trusted at all times					
E.3.2 Developing trust with trading partners does not require seeing and talking to them					
E.3.3 Compared with traditional business models, E-business does not require guanxi					

F. Future E-business Adoption Intention

Please select the option that you most agree with. In 2 years...*

	Much lower	Slightly lower	About the same	Slightly higher	Much higher
F.1 the usage of e-business to communicate both internally and externally will be...					
F.2 the usage of e-business to promote our enterprise will be...					
F.3 the usage of online transactions will be...					
F.4 the usage of e-payment will be...					
F.5 the usage of e-business for our critical operations will be...					
F.6 the number of business operations and activities that use e-business technologies will be...					

Thanks for your precious time! Please use the following space if you have any comments or suggestions regarding the questionnaire or e-business in general:

Please provide your contact details below If you are interested in the results of the survey. We will keep you informed about the research progress and send a copy of the research report to you.

Company Name

Contact Person

Title

Telephone

E-mail

Appendix C. Survey questionnaire (original Chinese version)

中小企业电子商务及企业信息化调查问卷

www.diaochapai.com/survey/981d176b-62ad-4739-8f24-faccc88ae41e

第一部分 企业基本信息

A.1 贵企业所属行业：*

A.1 所收集信息用来参照 中小企业划型标准（2011）

http://www.gov.cn/zwgk/2011-07/04/content_1898747.htm

A.1.1 贵企业员工数为：*

A.1.2 贵企业年营业收入为：*

A.1.3 贵企业资产规模为（以注册资本为准）：*

A.2 贵企业所属省份（自治区、直辖市）为：*

A.3 贵企业经营类型为：（可多选）*

A.4 贵企业贸易类型为：*

A.5 您的年龄为：*

A.6 您的教育背景为：*

第二部分 当前企业信息化及电子商务发展状况

B. 请您根据贵企业当前电子商务采纳程度，选择相应的选项*

	很低或无	较低	一般	较高	很高
B.1 本企业使用互联网（Internet）进行业务					
B.2 使用电子邮件同客户或贸易伙伴联系					
B.3 加入第三方综合平台或行业网站					
B.4 利用企业网站进行企业宣传,发布产品及服务信息					
B.5 网站推广(包括竞价排名等)					
B.6 网上支付					
B.7 实现电子商务与内部信息化建设的集成					
B.8 本企业需要使用电子商务技术的业务环节数量					

第三部分 电子商务特点

在多大程度上，您同意以下观点

C.1 关于电子商务的感知优势 *

	非常不同意	不同意	一般	同意	非常同意
C.1.1 电子商务可以提高企业竞争力					
C.1.2 电子商务可以带来新的商机					
C.1.3 电子商务可以促进市场营销					
C.1.4 电子商务可以加强同客户及供应商的沟通和联络					
C.1.5 电子商务可以改善组织内的交流和管理水平					
C.1.6 电子商务可以提高员工的劳动生产率					
C.1.7 电子商务可以提高公司利润					

C.2 关于电子商务的兼容性 *

	非常不同意	不同意	一般	同意	非常同意
C.2.1 电子商务适合企业的文化					
C.2.2 电子商务适合企业倾向的工作方式					
C.2.3 电子商务适合企业的客户					
C.2.4 电子商务适合企业现有的硬件设施及信息系统					

C.3 关于电子商务的感知易用性 *

	非常不同意	不同意	一般	同意	非常同意
C.3.1 电子商务的相关技术已经较为成熟、风险小					
C.3.2 企业内部具有信息系统和电子商务专家					
C.3.3 电子商务服务商可以满足中小企业开展电子商务的所有需求					
C.3.4 当前具有完善的电子商务法律法规					
C.3.5 当前电子商务交易是安全的					

C.4 电子商务可试用性及效果可现性 *

	非常不同意	不同意	一般	同意	非常同意
C.4.1 在有限资源下, 本企业可试用电子商务技术					
C.4.2 采纳电子商务的效果显而易见					
C.4.3 行业内已经出现了实施电子商务非常成功的竞争者					

C.5 电子商务技术采纳成本 *

	非常不同意	不同意	一般	同意	非常同意
C.5.1 实施电子商务技术的费用较高					
C.5.2 维护电子商务技术的费用较高					
C.5.3 电子商务技术的投资成本大于预期的投资回报					

第四部分 企业信息及沟通渠道

D.1 您目前采用以下哪些渠道收集相关的电子商务及企业信息化信息？（可多选） *

D.2 企业沟通渠道 *

在多大程度上，您同意以下观点

	非常不同意	不同意	一般	同意	非常同意
D.2.1 本企业积极通过各种展会,讲座及培训交流有关电子商务的信息					
D.2.2 本企业积极着手现有人员的相关电子商务技术的培训					
D.2.3 本企业积极同有关研发机构进行电子商务项目方面的合作					

第五部分 企业社交

在多大程度上，您同意以下观点

E.1 社会影响 *

	非常不同意	不同意	一般	同意	非常同意
E.1.1 行业内很多竞争对手正在使用电子商务					
E.1.2 本企业的很多贸易伙伴要求我们使用电子商务同他们进行业务					

	非常不同意	不同意	一般	同意	非常同意
E.1.3 如果不使用电子商务，将会失去很多客户					
E.1.4 政府主管部门鼓励并要求中小企业采纳电子商务技术进行业务					
E.1.5 电子商务服务商积极宣传电子商务及企业信息化技术并鼓励中小企业采纳这些技术					

E.2 社会准则 *

	非常不同意	不同意	一般	同意	非常同意
E.2.1 企业管理层重视电子商务的实施					
E.2.2 电子商务在本企业员工中得到广泛理解					
E.2.3 本企业所处行业适合开展电子商务					
E.2.4 本企业所在地区方便开展电子商务					

E.3 企业关系网络 *

	非常不同意	不同意	一般	同意	非常同意
E.3.1 网络市场完全值得信赖					
E.3.2 同未亲眼见过的合作商也可以建立相互信任关系					
E.3.3 相对传统商务模式，电子商务无需依靠关系					

第六部分 电子商务未来发展意向

F. 请您根据贵企业未来2年电子商务的发展意向，选择相应的选项 *

	明显减少	稍微减少	差不多	稍微增加	明显增加
F.1 使用电子商务对内对外联络将...					
F.2 使用电子商务进行企业宣传与推广将...					
F.3 使用电子商务进行网上交易将...					
F.4 使用电子支付将...					
F.5 企业内部信息化程度将...					
F.6 使用电子商务的业务环节数量将...					

感谢您的宝贵时间！针对本调查问卷和中小企业电子商务发展问题，欢迎您提出意见和建议：

如您希望对本次调研有更深入的了解并希望获得一份调研结果，请留下您的联系方式：

公司名称

联系人姓名

联系人职位

联系电话

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