

# **The Creation of Competitive Advantage in SMEs through E-Business**

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degree of Doctor of Philosophy in the Faculty  
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# Declaration

"I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text".

Suzana Pavic

July 2010



*“Information technology and business are becoming inextricably interwoven. I don't think anybody can talk meaningfully about one without the talking about the other.”*

**Bill Gates**

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# Abstract

Open markets and the rapid development of the Internet have given shape to the competitive pressures faced by the UK's Small and Medium Sized Enterprises (SMEs) and, consequently, created the grounds for this study. Extensive research shows that, although SMEs are indeed adopting the Internet, most of them are slow to take up electronic business (e-business) as the basis for business communications and transactions. This is because many SMEs are not equipped with, or supported by, the appropriate guidelines and business models to allow them to take advantage of the developing digital economy and e-business. The lack of this kind of support makes it difficult for SMEs to use e-business as a means to gain competitive advantage, locally, nationally or globally. What is more, the constraints of appropriate technological resources and inadequate knowledge among key personnel at the same time inhibit the operational efficiency and innovation of SMEs. This limits the competitive advantage that e-business could bring to their businesses.

The research presented in this study has a twofold aim. The first, which is the contribution this study makes to the field of Management Studies, is to promote a better understanding of e-business and its role in SMEs. The second, which has the more pragmatic aim of contributing to SMEs, is to find a way of enhancing their business competitiveness via the use of e-business. It builds on previous work suggesting that traditional business strategies, which create competitive advantage, have to be changed in order to facilitate the adoption, implementation and use of e-business technology. An examination of the transition of SMEs from an 'old' traditional business strategy to a 'new' e-business strategy is at the heart of this study.

The study was conducted using the 'mixed methodology' of both qualitative and quantitative data as its primary tool. As a starting point, a range of academic and practitioner literature relating to IT, e-business, and different business models, was reviewed. This review and accompanying analysis were followed by nine longitudinal case studies and a national survey which were used to collect primary data from UK SMEs. This combination of micro-level longitudinal studies with macro-level national surveys provides the core data for the findings made in this study.

Overall, the findings point to a paradoxical conclusion: on the one hand, SMEs use IT and the Internet in order to enhance their business competitiveness. However, on the other, the attitude of the owners and the knowledge shown at the managerial level was often the very obstacle to using IT. In other words, while the 'hard' of technology is available, the 'soft' of attitudes and knowledge often is not. This gap between the existence of technology and the absence of the appropriate attitudes and knowledge pose a number of potential challenges for SMEs in the creation of competitive advantage through e-business.

To overcome these challenges, the findings were deployed in order to develop an e-business model named the “Competitive Advantage Through E-business” (CATE-b). This is the major innovation of this study in terms of applying the fruits of my research in order not only to make a contribution to knowledge, but also to solve the practical problems faced by business practitioners. This model is meant to serve the heuristic purpose of acting as a guide to help SMEs to comprehend an e-business vision, formulate strategy, identify e-business application areas, put together a portfolio, and design a plan for e-business implementation. In short, the long-term goal of this study is to help SMEs to enhance their local, national or global competitiveness through applying CATE-b, with the hope that new technology can become a force for creating competitive advantage.

## Publications associated with this thesis

- Pavic, S., Koh, S. C. L., Simpson, M. And Padmore, J. (2007), "Could E-Business Create Competitive Advantage in UK SMES?", *Benchmarking: An International Journal*, Vol. 14, No. 3, pp. 320–351.
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- Pavic, S., Simpson, M. and Koh, C. S. L. (2004a), "The use of e-business to create a competitive advantage in SMEs". *In a proceedings of The 2<sup>nd</sup> International Workshop on Supply Chain Management & Information Systems (SCMIS)*, 7<sup>th</sup> – 9<sup>th</sup> July 2004. Hong Kong.
- Pavic, S., Simpson, M. and Koh, C. S. L. (2004b), "An exploratory study into the creation of competitive advantage in SMEs using e-business". *In a proceedings of The 2<sup>nd</sup> International Conference on Manufacturing Research (ICMR)*, 7<sup>th</sup> – 9<sup>th</sup> September 2004, Sheffield Hallam University, Sheffield, UK.
- Pavic, S., Simpson, M. and Koh, C. S. L. (2004c), "E-business in SMEs: An exploratory study", *In a proceedings of The 27th Institute for Small Business Affairs National Conference (ISBA) – Entrepreneurship and SME Development*, 2<sup>nd</sup> – 4<sup>th</sup> November 2004, University of Teesside, Newcastle-Gateshead, UK.

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## Glossary of terms

ADSL	Asymmetric Digital Subscriber Line (ADSL) is a form of DSL, a data communications technology that enables faster data transmission over copper telephone lines than a conventional voice band modem can provide.
Apple Inc	Formerly Apple Computer, Inc., is an American multinational corporation with a focus on designing and manufacturing consumer electronics and closely related software products
ARPA	Advanced Research Project Agency
B2B	Business-to-business
B2C	Business-to-customers
Bandwidth	It is signal processing – Measure of the width of a range of frequencies, measured in hertz
BBN	Bolt, Barenek and Newman
Broadband connections	A broadband connection provides high-speed Internet access over a standard phone line. The advantage of a broadband connection over the older dialup service, is that Broadband is considerably faster, and is 'always-on', meaning that once you're logged on, your PC is online until the PC is turned off again.
CA	Competitive Advantage
CRM	Customer Relation Management
CSC	Computer Sciences Corporation
Dial-up connections	The most common type of Internet connection available from Internet Service Providers (ISP), they are also the slowest and (usually) the most inexpensive.
DoD	Department of Defense (USA)
DSL	Digital Subscriber Line
EDI	Electronic Data Information
ERP	Enterprise Resource Planning
GDP	The gross domestic product is one of the measures of national income and output for a given country's economy. GDP is defined as the total market value of all final goods and services produced within the country in a given period of time (usually a calendar year). It is also considered the sum of value added at every stage of production (the intermediate stages) of all final goods and services produced within a country in a given period of time, and it is given a money value.

ICT	Information and Communication Technology
IS	Information System
ISDN	Integrated Services Digital Network
IT	Information Technology
JIT	Just in Time
KM	Knowledge Management
LAN	Local-area Network
Microsoft Corporation	An American multinational computer technology corporation. It develops, manufactures, licenses, and supports a wide range of software products for computing devices.
MIT	Massachusetts Institute of Technology
MRP	Material Requirements Planning
MRP II	Manufacturing Resource Planning
NPD	New Product Development
NVivo 8	The software for analysing qualitative data
POP	Point of Presence
RFID	Radio Frequency Identification
SCM	Supply Chain Management
SDSL	Symmetric Digital Subscriber Line
SMEs	Small and Medium-Sized Enterprises
SPSS	Statistical Package for Social Scientists
Sputnik	The world's first artificial satellite launched 4 October 1957
SRM	Supply Relationship Management
TCP/IP	Transmission Control Protocol/Internet Protocol
WAN	Wide-area Network
WNC	Wireless network connection

# Chapter 1

## 1 Introduction

The dynamic developments of information and communication technology (ICT) during the late 1990s and early 2000s have resulted in major reforms of the traditional business environment and the way businesses work. Leading this transformation is the continuous spread of the Internet.

It all began in 1982 when this 'defining symbol' of the 21<sup>st</sup> century was born on the crossroads of the computer and telecommunications (Sherman, 2003:27). The Internet is a global network that consists of millions of computers around the world that can be connected with each other through its own-technology. Today, almost all businesses and publicly funded institutions, including the government and its departments, as well as private individuals, have an opportunity to communicate online (Naughton, 2000; Zittrain, 2009). To appreciate the speed of the growth in Internet users around the world, the most recent statistics indicate that the numbers had grown by almost 400% between 2000–2009 (WIUS, 2010). This has, by far, exceeded earlier predictions by Mentzas and Halaris (1999), who estimated that by 2010 the number of Internet users around the world would reach one billion. The latest statistics by WIUS (2010) demonstrate just how much actual numbers have outstripped predictions: the number reached 1.8 billion by 31 December 2009 (WIUS, 2010).

The speed and wide scope of Internet use since 1982 became a force for change in the global business environment, creating new business economies (Lambert, 2002) and altering considerably the world's economies (Rayport and Jaworski, 2001). It is already offering enterprises the ability of direct contact and electronic transactions with a global client base, often resulting in dramatic cost decreases and impacting severely on the way enterprises try to achieve competitive advantage. This is recorded as the most turbulent business environment in history and is now dominated by the powerful influences of globalisation, the knowledge and information revolution, and structural changes in organisations (Booz Allen Hamilton, 2002).

These global economic changes were also made possible by the development of the worldwide web (WWW) in the 1990s which was enabled by the Internet. Now both are listed among the most important and profound creations of humankind (Deitel et al., 2001). The Internet and WWW together made trading easier and quicker, and have enabled the development of electronic commerce (e-commerce) which quickly became a useful tool for large organisations (Coltman et al., 2001). By the late 1990s this rapid development of the Internet and the WWW

brought about another change in the business environment, namely, the arrival of the 'digital economy'. This neologism is based on electronic goods and services produced by electronic business (e-business) and traded through e-commerce (Walters et al., 2002).

The digital economy initiated an e-business revolution (Coltman et al., 2001) at the end of the 20<sup>th</sup> century, but this was not without its challenges. Although, in 1999, the speed in the growth of Internet users was on an unimaginable scale, in just two years, 1999–2001, the world went from seeming to be on the verge of a revolution to pessimism as developments did not proceed as many had predicted. This transition is epitomised in the image of people called 'netizens' who, while using and supporting web transactions, showed a 'viral lack of confidence' in the online economy (Coltman et al., 2001:58). However, by 2002 it was clear that the hyperbole of the 1990s was overblown and that the pessimism of 2001 was also an overreaction. Despite all predictions, Internet usage continues to grow from strength to strength to throughout the world (WIUS, 2010) and, in contrast to the dot.coms, many traditional firms have found viable applications for Internet technology (Coltman et al., 2001).

Due to this new digital environment and the e-business revolution, some of the old structures of business organisations have been challenged and their concepts revisited and revised. The forces driving these changes are those that occurred in the 1990s when, together with the Internet, fragmentation of the market initiated a flexible response to customer expectations (Davidov and Malone, 1992). This was followed by considerable social, economic and technological changes in the early 2000s, in which new disciplines such as knowledge management (KM), technology management, relationship management, e-commerce and e-business have become realities (Walters et al., 2002). Following that development, Walters et al. (2002) suggested that new organisations are likely to evolve to become more customer driven and consumer managed. It appears that the new virtual organisations will, unlike their predecessors, appear less discrete in their day-to-day common activities (Walters et al., 2002). This has resulted in the new challenge posed by the business revolution which indicates that, if corporations are to remain competitive, they must achieve mastery of information and relationships in the new virtual economy. This way, an integrated and coordinated approach towards knowledge management and e-business becomes essential.

In recognition of the significance the Internet, the WWW and the digital economy have had on businesses in the past two decades; organisations that seek to be successful in the future need to strive for the implementation of a successful e-business strategy. However, this is not always the case. In reality, there is an overall belief in the business world that companies are not taking full advantage of the new communication technology and this is affecting every type of organisation as each attempts to improve its efficiency and stay competitive (Rodgers et al., 2002). This is in particular, the case in the small business market in the UK. Research shows

that, although UK SMEs are rapidly adopting the Internet, they are slow to adopt e-business as the basis for business communication and transaction (DTI, 2003, 2007). Because of SMEs' importance (99.9% of all businesses) their performance plays a vital role in the economic growth of the UK. Therefore, improving their competitive advantage is essential to individual firms and to the UK economy as a whole.

Competitive advantage and the performance of SMEs, however, depend on the business models adopted by companies and the environment in which they operate. Since most organisations are in business to outperform their competitors, SMEs need to adopt new communication technologies and in particular, e-business, in order to reinforce their existing competitive advantage and make a profit in new markets (DTI, 2003). To help organisations in dealing with the changes caused by the rapid development of the Internet, a new e-business model offers a potential way forward. True, a number of business models have been developed in the past. Many researchers have come to the conclusion, however, that these models are over complicated and too complex for SMEs. Small businesses that do not own computers and have no online connection require a simple e-business model (Yorkshire Forward, 2006). This has not yet been achieved in any meaningful way (Porter, 2003).

In an attempt to provide a solution tailored to the needs of small businesses, Chapter 8 offers a conceptual understanding of the development and implementation of an e-business strategy focusing not only on the UK SMEs' willingness, but also on their ability to adapt to changes in the business environment created by e-business and the Internet. In this situation, the existing models for strategy and planning need to be reinvigorated and enabled by a new e-business model. Such a new model would potentially offer the basis for the creation of competitive advantage in UK SMEs and has consequently provided the grounds for this study.

## 1.1 Contribution to knowledge

A review of the relevant literature identified a range of empirical studies related to SMEs, development of the Internet and e-business. But the review also highlighted the slow process of adaptation to changes of SMEs in the business environment dominated by the digital economy. These studies mainly focused on identifying the drivers and barriers to adopting ICT and e-business, SMEs' distinctive features that impact on owners/managers decision-making processes and the creation of numerous business models suitable mostly for large organisations. Surprisingly, little research has been focused on how SMEs, which do not own computers and have no online connections, can create competitive advantage through e-business. Therefore, it is important to develop a new e-business model that will potentially offer a basis for the creation of competitive advantage in UK SMEs.

To sum up: the research at the heart of the present study is original in that it investigates the factors underlying the need for such a model by SMEs owners/managers. More specifically, this study is significant in that it adds to the understanding of the diversity of SMEs and their slow adaptation to changes in the business environment initiated by the digital economy. Given the situation faced by SMEs, this study aims to provide a tool for them that will improve business performance, formulate an efficient and incremental way for implementing an Internet and e-business strategy and, as a result, create competitive advantage for them. In short, this study aims to make a contribution to the impact agenda as well as making an original contribution to knowledge by providing practical advice for SMEs seeking to bolster their competitiveness by the use of e-business.

## 1.2 Significance of the study

Understanding the business practices of SMEs and their resistance to the implementation of new techniques initiated by the fast development of the Internet and e-business exerts significant impact on improving their managerial practices and overall business performance. To help owners/managers of UK SMEs to improve their business practices and create competitive advantage by using e-business, this study offers a new e-business model, namely 'Competitive Advantage Through E-business (CATE-b). This model is meant to serve the heuristic purpose of acting as a guide to help SMEs to (1) comprehend an e-business vision; (2) formulate strategy; (3) identify e-business application areas; (4) put together a portfolio; and (5) design a plan for e-business implementation. In short, the long-term goal of this study is to help SMEs to enhance their local, national or global competitiveness through applying the CATE-b model developed on the basis of the research carried out for this study, with the hope that new technology can become a force for creating competitive advantage.

## 1.3 Scope of the study

The research for this study was conducted using a range of academic and practitioner literature as well as longitudinal case studies and surveys, the latter being particularly important as primary tools of investigation. This combination of micro-level longitudinal studies with macro-level of regional and national surveys provides the core data for the findings made in this study and emphasises the need for e-business practices to be more widely accepted in the future by owners/managers of UK SMEs.



## 1.4 Aims of the study

The overall aim of this study is to explore new ways of creating competitive advantage through e-business in SMEs. Three main areas of focus have been identified:

1. Evaluate the need for e-business applications in SMEs by identifying how those applications could benefit an organisation in delivering better, faster and more efficient and reliable services to their customers and suppliers.
2. Evaluate the implications of e-business for managers.
3. Compare and assess the efforts made in e-business implementation by developing a new model to assist in creating competitive advantage by using e-business applications (the CATE-b model).

## 1.5 Objectives of the study

The following are the key objectives of this study:

1. Examine the level of Information and Communication Technology (ICT) used in SMEs.
2. Investigate the degree of awareness amongst SMEs of the opportunities available to them for developing their employees, their business strategies and their attitudes viz-à-viz the range of initiatives and options, and the degree of take-up, on the use of e-business.
3. Analyse how the use of e-business can achieve organisational success and improve organisational effectiveness and speed within an e-business environment.
4. Evaluate the need for a new e-business model and e-business applications by comparing the efforts against the benefits.
5. Develop a new 'Competitive Advantage Through E-business' (CATE-b) model for SMEs to facilitate organisational effectiveness in the new era of the digital economy.

## 1.6 Research questions

Broadly speaking, this study evaluates the need for e-business in SMEs as a tool for improving their competitive advantage by:

1. Identifying e-business benefits to the organisation.

2. Addressing the issues specifically related to competitive advantage, strategic management, e-business applications, and e-business elements such as the Internet, intranet and extranet.
3. Creating an e-business model that will enable the integration of the Internet as a core competence.

In addition, this research examines the implications for SMEs when implementing e-business. The e-business model aims to achieve organisational success and improve organisational effectiveness within an e-business environment. In addition to the broad research questions, the specific research questions to be addressed and the gaps in knowledge to be filled were identified through a literature review (Pavic et al., 2004a, b, c, d, 2007). These are as follow:

1. How is ICT impacting on SMEs across a range of size, location, age and sector groups?
2. What evidence is there that technology in general and e-business in particular really improve the performance of SMEs, and how can this be measured?
3. What role does managerial leadership and other 'softer' human resource issues play in the introduction of technology?
4. How and why are SMEs changing in their use of ICT?
5. How are SMEs using ICT currently, and how do they plan to use it in the future?
6. What are the most important factors influencing ICT use in SMEs?
7. What role does IT infrastructure play in the SMEs interface?

## 1.7 Propositions of the study

Based on research questions sixteen propositions (P) have been developed as follows:

***P<sub>1a</sub>***. Financial resources of owners/managers in SMEs are positively related to purchasing of more advanced IT and the Internet and as a result are affecting firms' superiority.

***P<sub>1b</sub>***. Knowledge by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.

***P<sub>1c</sub>***. Skills by owners/managers are positively related to investment in more advanced IT and the Internet and as a result are affecting firms' superiority.

*P<sub>2a</sub>*. Focus on service by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.

*P<sub>2b</sub>*. Information by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.

*P<sub>3a</sub>*. Perceived benefits related to opportunities inside and outside the organisation by SMEs' owners/managers is positively related to investment in more advanced IT and the Internet.

*P<sub>3b</sub>*. Focus on large market share is positively related to investment in more advanced IT and the Internet.

*P<sub>4a</sub>*. Ability of owners/managers to see opportunities arising from the fast development of IT and the Internet when dealing with forces from 'horizontal' competition (threat of substitute products, threat of established rivals, and threat of new entries) is positively related to investment in more advanced IT and the Internet.

*P<sub>4b</sub>*. Ability of owners/managers to see opportunities arising from the fast developments of IT and the Internet when dealing with forces from 'vertical' competition (bargaining power of suppliers and bargaining power of customers) is positively related to investment in more advanced IT and the Internet.

*P<sub>5a</sub>*. Interest in UK Government initiatives related to support in SMEs is positively related to investment in more advanced IT and the Internet technology.

*P<sub>5b</sub>*. Awareness of Government initiatives related to the e-business advice is positively related to investment in more advanced IT and the Internet technology.

*P<sub>5c</sub>*. Trust when seeking e-business advice or support is positively related to investments in more advanced IT and the Internet technology.

*P<sub>6a</sub>*. IT and Internet infrastructure are positively related to a successful e-business strategy.

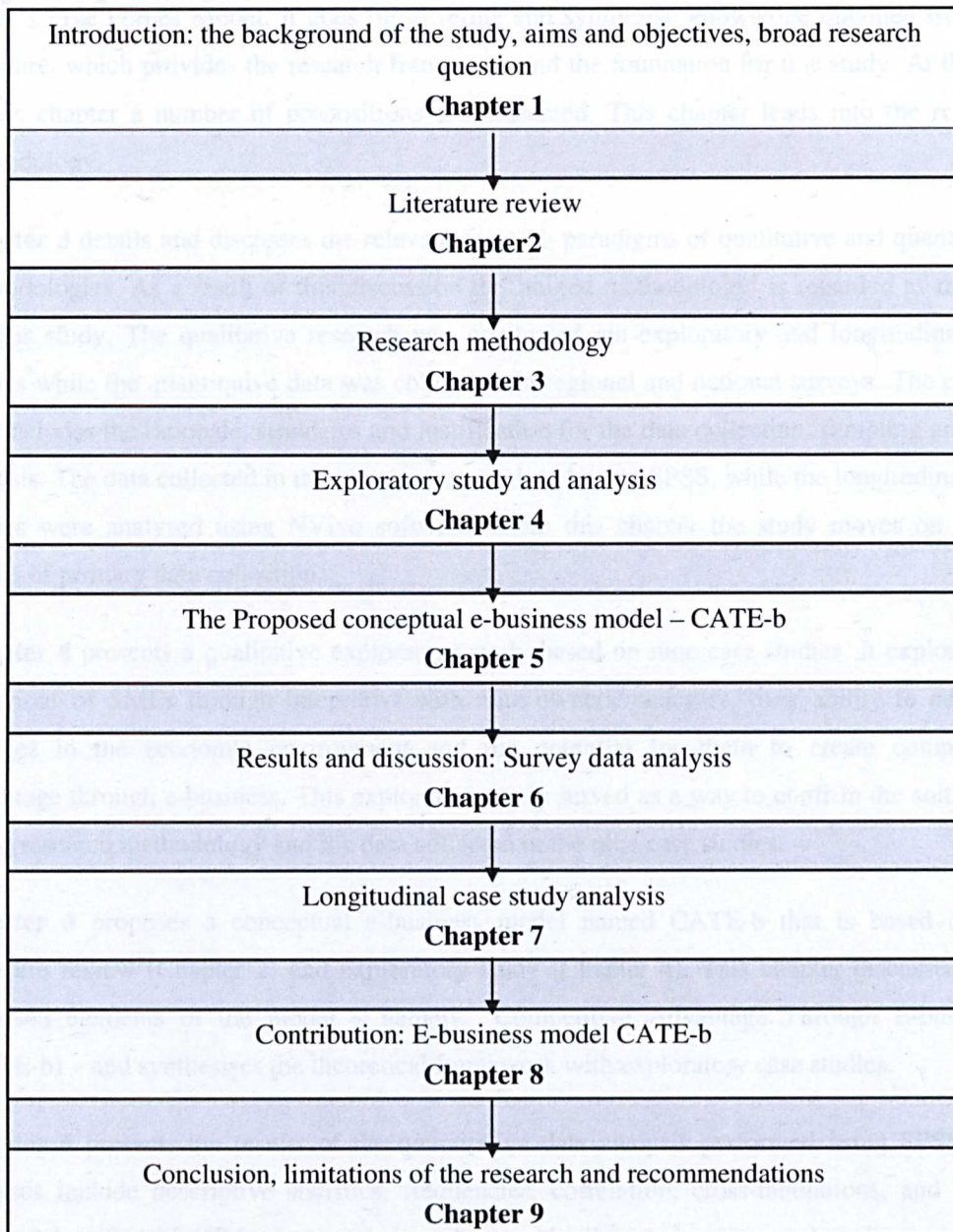
*P<sub>6b</sub>*. IT and Internet infrastructure are positively related to changing business strategies.

*P<sub>6c</sub>*. IT and Internet infrastructure are positively related to the internal integration of SMEs.

*P<sub>6d</sub>*. IT and Internet infrastructure are positively related to the external integration of SMEs.

## 1.8 Thesis outline

This thesis is presented in nine chapters (see Figure 1.1)



**Figure 1.1: Structure of the thesis**

**Chapter 1** provides an introduction to the issues this research is designed to address. In particular it meets the aims and objectives of the research and explores the background information of Internet developments and SMEs in the UK, illustrating why there is a need for such a study. The introduction also sets the scene and feeds into the next chapter in which literature is reviewed and propositions identified.

**Chapter 2** critically examines and reviews all the relevant literature on SMEs, their competitiveness in the UK business market, ICT development and the ways e-business can be embedded in the UK SMEs to create competitive advantage. The study continues with a critical analysis of relevant theories and focuses on the classical approach to competitive advantage and Porter's Five Forces Model. It goes on to refine and synthesise knowledge obtained from the literature, which provides the research framework and the foundation for this study. At the end of this chapter a number of propositions are presented. This chapter leads into the research methodology.

**Chapter 3** details and discusses the relevant research paradigms of qualitative and quantitative methodologies. As a result of this discussion the 'mixed methodology' is regarded as the best for this study. The qualitative research was conducted via exploratory and longitudinal case studies while the quantitative data was collected via regional and national surveys. The chapter also includes the rationale, strategies and justification for the data collection, sampling and data analysis. The data collected in the survey were analysed using SPSS, while the longitudinal case studies were analysed using NVivo software. From this chapter the study moves on to the details of primary data collection.

**Chapter 4** presents a qualitative exploratory study based on nine case studies. It explores the behaviour of SMEs through interviews with nine owners/managers, their ability to adapt to changes in the economic environment and the potential for them to create competitive advantage through e-business. This exploratory study served as a way to confirm the suitability of the research methodology and the data collected in the nine case studies.

**Chapter 5** proposes a conceptual e-business model named CATE-b that is based on the literature review (Chapter 2) and exploratory study (Chapter 4). This chapter discusses three proposed elements of the model – namely, 'Competitive Advantage Through E-business' (CATE-b) – and synthesises the theoretical framework with exploratory case studies.

**Chapter 6** presents the results of the quantitative data analysis performed using SPSS. The analyses include descriptive statistics, frequencies, correlation, cross-tabulations, and paired sample t-test analysis. This chapter also synthesises the literature review and exploratory study and, tests the proposed model against the propositions outlined in Chapter 2.

**Chapter 7** reports on the findings of the qualitative longitudinal studies through nine case studies analysis over a period of five years. In addition, this chapter combines the findings from the statistical data analysis in Chapter 6 and tests the proposed CATE-b model against the propositions outlined in Chapter 2.

**Chapter 8** proposes a new CATE-b model. Chapter 8 is based on a synthesis of the issues arising from the literature review, survey questionnaire and interview results. This chapter debates the evolution of the CATE-b model and provides the practical implications of the findings.

**Chapter 9** provides the overall conclusion of the research, which includes the key contribution of this work to the body of knowledge and its limitations. It ends with a number of recommendations regarding the future studies and the use of the CATE-b model.

## 1.9 Summary

This chapter provided an introduction and the background to the issues that the present research is designed to address. The last decade of the 20<sup>th</sup> century experienced dramatic developments of ICT and the Internet is forcing changes in the business environment (Lambert, 2002). Due to the new e-economy environment, old structures of business organisations have been challenged and their concepts revisited and revised. Consequently, these technological developments have created fertile grounds for SMEs to improve their competitiveness.

This chapter also included the development of the main research questions and objectives which were based on the research aim. Finally, the scope of research study, an overview of its methodology, propositions based on research questions and the overall structure of the thesis were presented (Figure 1.1). The next chapter presents a review of the literature on issues related to the competitiveness of SMEs and their level of ICT use.

# Chapter 2

## 2 Literature review

The literature review firstly defines SMEs. It critically discusses different characteristics of SMEs around the world and singles out the most suitable definition of an SME for this study. The review then analyses evidence of external support offered by the UK government and critiques the level of application and willingness of SMEs to take up this support. This is concluded by identifying distinctive features of SMEs and their impact on the business success of the enterprise.

The literature review continues with a theoretical overview of competitive advantage. This takes on board different theories and schools of strategic management and different views that theoretically underpin how companies create competitive advantage. The review further discusses a traditional business approach identified by Michael Porter (1979) and accepts the theoretical framework of Porter's Five Forces Model (Porter, 1979) as a base for this study.

The previous discussion leads us to the third part, the development of e-business and its application by SMEs. This part provides a historical overview and development of the Internet and identifies the importance of technological advances in the business environment. E-business and its relation to SMEs are defined here together with identifying the drivers and barriers of using ICT and e-business by SMEs in the UK. This part is concluded with a critical discussion of the impact technology has on SMEs in the UK. The last part of the review covers business models by critically examining the existing business models, identifying pertinent research gaps and outlining propositions to be tested in this thesis.

### 2.1 Defining SMEs

SMEs play a vital role in the UK economy providing new ideas, products, services and jobs. The latest figures from the Office for National Statistics (ONS, 2010) identify that SMEs are the UK's biggest employer with nearly 4.8 million businesses, employing 13.7 million people and accounting for 50% of the UK's Gross Domestic Product (GDP). Despite their overall importance, SMEs are hard to define and the sizes used in definitions differ around the world.

As in the UK, SMEs dominate the world and their characteristics reflect on the economic, cultural and social dimensions of a country (OECD, 2004). More than 95% of businesses in

most countries are small with less than 100 employees and in most countries SMEs contribute to more than half of the GDP and employ more than half of all working population (OECD, 2004).

Despite this huge importance of SMEs it is very difficult to find a unified approach to define all SMEs. This is because many different practices are used to identify their characteristics across various countries. For the purpose of this study, the researcher identified two most frequently used terms for defining SMEs, the legal and statistical. For many countries a legal definition is based on employment figures, turnover of companies and degree of independence, while a statistical definition is based solely on the number of employees or the combination of the number of employees and turnover (OECD, 2004).

For example, some European Union (EU) countries use a simplified legal definition based on employment and turnover, like Hungary and Moldova. Other EU countries do not have a commonly accepted legal definition. This is the case for the Netherlands and Spain. Similarly, in New Zealand there is no common legal definition. Turnover is used by some official bodies, taxes on employee salaries and wages by other state administrations. In Brazil, different criteria and thresholds are used for different legal, fiscal and international trade purposes pertinent to SMEs (OECD, 2004).

However, some countries tend not to make a distinction between legal and statistical definitions (Canada, Greece, Portugal, Mexico, Slovak Republic) while others base their threshold on the number of employees as is the case in the UK (OECD, 2004; European Commission, 2003).

Furthermore, Denmark, France, Norway and Switzerland use a statistical, rather than legal definition. In Japan, the regular workforce, together with capital or investment, determines the size class; however, the thresholds vary for different activity classifications. This is also the case in South Korea, where SMEs are classified by the number of permanent workers, capital and sales. In the United States (US) the number of employees is used to identify small businesses in most sectors (Ayyagari et al., 2007). However, a number of countries do not differentiate statistics collected on SMEs from other statistics; this is the case in Denmark, Germany, New Zealand and the US (OECD, 2004).

In addition, Norway, France and Finland use a European Commission (2003) definition, based on the number of employees together with independence criteria. Independent criteria being annual turnover or balance sheet (OECD, 2004).

To make things even more complex, the size threshold of an SME varies also according to the sector of economic activity. For instance in Australia, employment is used as a criterion for identifying size classes in all sectors but agriculture. Also, Australia is considering introducing alternative or additional criteria for non-employing businesses. In the agricultural sector, size



classes are defined using the estimated value of agricultural operations, which evaluation is based on physical production criteria and sales value (Ayyagari et al., 2007).

Studies by the OECD (2004) and Ayyagari et al. (2007) clearly identify that the diversity and richness of SME characteristics, political strategies and economic conditions are unlikely to ever yield a commonly used and accepted definition of SMEs. However difficult it is to classify SMEs it is apparent that SMEs are mostly limited by their size. For that purpose Table 2.1 summarises that diversity and provides an overview of how different countries in different parts of the world characterise the size of their SMEs.

**Table 2.1: Official global country definitions of SMEs by number of employees**

Source: Ayyagari, et al., 2007

Size\* expressed as number of employees

Country		Size*		
Asia	North Asia	Japan Korea Rep. Kazakhstan Russian Fed. Kyrgyz Rep. Tajikistan		
	Southeast Asia	Indonesia Philippines Singapore Taiwan Thailand Vietnam Brunei		
Europe	Western Europe	UK France Netherlands Belgium Germany Italy Ireland Denmark Norway Austria Switzerland Portugal Spain Greece Finland Iceland Luxemburg Sweden		
		The Baltic States	Estonia Latvia	
		Eastern Europe	Other Former Soviet States	Belarus Ukraine Georgia Azerbaijan
			Central Europe	Czech Rep. Hungary Poland Slovakia

Country		Size*	
	South-eastern Europe	Albania 500 Bulgaria 250 Croatia 250 FYR Macedonia 250 Romania 250 Slovenia 500 Turkey 200	
Australasia	Australia	250	
	New Zealand	100	
Africa	Kenya	200	
	Nicaragua	100	
	Nigeria	200	
	South Africa	100	
	Zambia	200	
	Zimbabwe	200	
	Burundi	100	
	Cameroon	200	
	Côte d'Ivoire	200	
	Tanzania	200	
America	North America	Canada	500
		USA	500
		Mexico	250
	Central America	Brazil	250
		Argentina	200
		Ecuador	200
		Guatemala	200
	South America	Chile	200
		Columbia	200
		El Salvador	150
		Honduras	150
		Costa Rica	100
		Panama	200
Peru		200	

Table 2.1 provides an overview of SMEs over five continents and it is clear that their size vary substantially from country to country. In Western Europe alone, the size of SMEs is defined by number of employees ranges between 100–500 employees while in the UK they are defined as firms employing up to 250 people. Given that there are so many different ways to describe SMEs this study accepts the following two definitions of UK SMEs:

*“A small firm is an independent business, managed by its owner or part-owners and having a small market share”.*

Bolton Committee Report (1971)

*“A micro, small and medium sized enterprise needs to satisfy the number of employees and an independent criterion of ownership, and either the annual turnover or balance sheet”*

EU definitions (2003) in  
(European Commission, 2003 with effect from 2005)

This is because SMEs are seen as the backbone of both the UK and European economy, and the proper definition of these enterprises makes it easier to identify their needs and develop efficient



policies to compensate for the specific problems linked to their size. These two definitions are summarised and presented in Table 2.2.

**Table 2.2: Defining SMEs**

Definitions	Criterion	Micro	Small	Medium	Large
<b>DTI definition</b>					
<b>DTI</b>	<b>Size</b> (no. of employees)	0–9 employees	10–49 employees	50–249 employees	250+
<b>Government - Companies Act 1985 - section 248</b>	<b>Turnover</b> (annual)	Up to £2.8m		Up to £11.2m	n/a
<b>European definition</b>					
<b>EU - European Commission 2003</b>	<b>Max turnover</b> (annual)	€2m	€10m	€45m	n/a
	<b>Max balance sheet total</b> (annual)	€2m	€10m	€43m	n/a
<b>Independent criteria</b>	<b>Max % owned by one, or jointly by several enterprise(s) not satisfying the same criteria</b>	–	25%	25%	n/a
<b>Overall importance</b>					
<b>Importance for UK economy</b>	<b>Share</b> (of UK businesses)	94.7% (72.8% with 0 employees)	4.6%	0.6%	0.1%
		99.9%			
	<b>Employment</b>	24.6%	19.1%	11.9%	44.4%
		55.6%			

Table 2.2 exhibits that in the UK alone, SMEs are seen as the major support of the economy, consisting of 99.9% of all the UK businesses (ONS, 2010) and their performance plays a vital role in the economic growth of society.

In addition to the definition of SMEs, Table 2.3 summarises the overall UK business population in terms of number of employees and number of businesses in each size category. This table emphasises the importance of micro and small organisations and their impact on the total business population in the UK.



**Table 2.3: Business population in the UK**

Source: BERR (2006), ONS (2010)

Number of employees	Number of businesses		Total	
<b>0 Sole traders</b>	3,270,105	<b>4.65m</b>	72%	<b>98%</b>
<b>1-19</b>	1,382,290		26%	
<b>20-49</b>	75,575	<b>0.2m</b>		<b>2%</b>
<b>50-199</b>	30,045			
<b>200-249</b>	1,810			
<b>250-499</b>	3,700			
<b>500+</b>	4,415			
Total 13.7m	<b>Total 4.8m</b>		UK population 62,784,510 (2010 est)	GDP £1.6 trillion (2010 est)
				Turnover 3.3 trillion

Since the publication of the Bolton Report in 1971 the contribution of SMEs to growth, job creation, innovation and promotion of enterprise has been widely recognised (Jones and Tilley, 2003). Therefore, the following section examines more closely the support offered by the UK Government to SMEs.

### 2.1.1 UK Government and SMEs

Since SMEs are important in terms of their overall share of GDP it is important to build upon their effectiveness. Therefore, improving on their competitive advantage is essential to individual firms and to the UK economy as a whole. Since the 21<sup>st</sup> century has seen rapid advances in technology, the UK Government saw this as a viable opportunity for owner/managers of SMEs to adopt a new strategy and use e-business as means of creating a competitive advantage for their firms.

In recognition of the significance that ICT and the Internet have for the future performance of the economy, the UK Government set itself a target at the end of the 20<sup>th</sup> century of becoming the best environment in the world to do electronic commerce (e-commerce) and electronic business (e-business). This information was publicly announced in 1998 by the DTI (DTI White Paper, 1998). In order to fulfil the set targets, the UK was one of the first countries in the world to liberalise telecommunications (DoH, 2000). This is partly because the UK Government believed that the Internet is a 'good' thing for all and especially for SMEs (Martin and Matlay, 2001) which, interestingly, in many ways contradicts the views of owners/managers of SMEs (Iacovou et al., 1995; Kirbi and Turner 1993; Thong and Yap, 1995). Therefore all government policies have been created on the basis of that belief. While Martin and Matlay (2001) contend that such wide-ranging beliefs over the Internet have yet to be supported by any empirical

evidence, the UK government had ambitions to make the UK a leader within the G8 group of countries (Canada, France, Germany, Japan, Italy, Russia, United Kingdom and United States) as far as developing SMEs and their use of technology is concerned. To achieve its ambition and get UK businesses online with the added aim of increasing the e-business readiness of SMEs, the UK Government spent £67m on a comprehensive programme at the turn of the century (DTI, 2003). The government's intention was to create an environment within the UK that is the most favourable in the world for electronic trading. However, it seems that UK government did not communicate that information to SMEs owners/managers correctly. Despite the investment by the UK Government to push SMEs to the forefront of the G8, the most recent research by DTI (2007) and ONS (2008) shows that there are no major changes. In terms of business Internet access for instance, the UK is still the second most expensive of the G8 group of countries (DTI, 2003 and ONS, 2008). This is despite the fact that the cost of Internet technologies has decreased dramatically over the past decade (DTI, 2003; Oftel, 2003 and ONS, 2008). In fact owners/managers still believe that the cost of setting up the Internet infrastructure within SMEs is high and the information that this new technology would improve their business efficiency, communication and transactions is failing to get through to them (Martin and Matlay, 2001; Riefa, 2008).

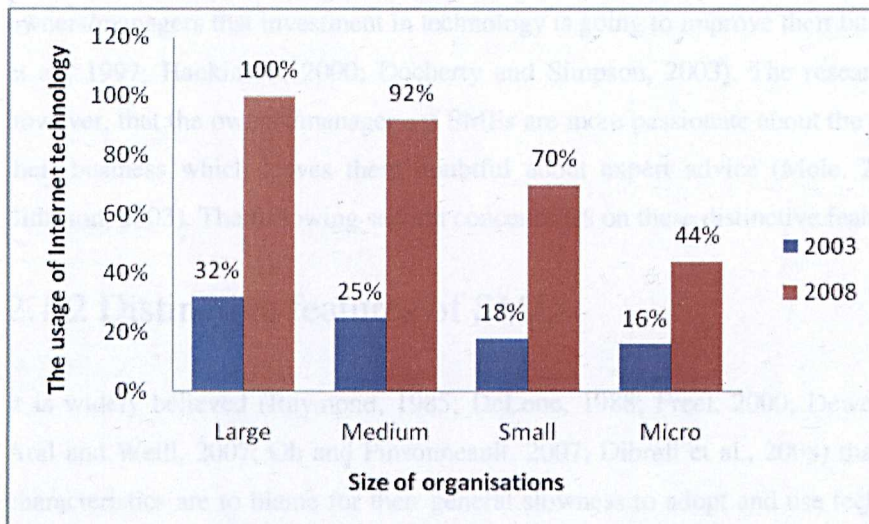
Furthermore, as SMEs make up to 99.9% of the UK economy they are seen as a key source of new jobs as well as fertile breeding ground for entrepreneurship and new business ideas in the UK (European Commission, 2002:1; DTI, 2007). However UK entrepreneurship has been fairly static over the last few years and the UK remains fourth in the G8 group of countries in terms of the number of on-line businesses and their use of technology to support their businesses (DTI, 2007; Riefa, 2008; ONS, 2008; WIUS, 2008). The United States, Japan and Germany are still ahead; however, the UK comes second (after Germany) in the European Union countries (WIUS, 2008).

Apart from investing a vast amount of financial resources into developing technological capabilities of SMEs, the UK government is renowned for offering support to owners/managers through various initiatives. As the UK government is aware that it is not possible to create a knowledge economy without a knowledge society, in the last 20 years of the 20<sup>th</sup> century alone, it had created approximately 200 initiatives to support the improved competitiveness of SMEs and to improve the skills of their workforce (Gavron et al., 1998:59). These supporting initiatives mostly occurred between the 1970s and the mid 1990s and cost taxpayers around £632m (Gavron et al., 1998). Yet the take-up rate of these offers by owners/managers has been low (Jones and Tilley, 2003). Even support programmes such as training and business health checks have rarely achieved more than 10% take-up, and often take-up is much lower (Curran and Storey, 2002). This shows that with no rigorous approach to assessing various government



policies, there is generally low effectiveness of SME support. This has been a fundamental weakness in this area of public support. Consequently, there is a general belief that these new government initiatives for developing SMEs' technological capabilities and therefore improving their competitiveness have little influence upon SMEs.

By 2005 it was evident that many businesses did not go through an e-commerce stage before engaging in e-business (ONS, 2008). With rapid development of Internet technology it became apparent that many companies will never trade financially online, i.e. use e-commerce, but will instead communicate and exchange data by using e-business mechanisms, which connects organisations internally and externally via the Internet (DTI, 2007). This once again made the UK government eager to bring SMEs up to speed regarding e-business. However, the online take-up rate was still very slow and the figures released in 2008 by the Office for National Statistics indicated that small businesses are still not engaging with online technologies and consequently do not meet the Government targets. To better understand the most recent situation in the UK SMEs, Figure 2.1 indicates the usage of Internet technology among the business population in the UK between 2003–2008.



**Figure 2.1: Online trading in UK business market**

Source: SBS (2003), Dynamic Markets (2007) and ONS (2008)

Figure 2.1 shows that there was a dramatic increase in doing business on-line in general. However, the biggest increase of 68% is still within the large organisations (250+ employees) who adopted on-line business fully. This is followed by medium sized organisations (50–249 employees) that also show a substantial increase of 67%. The lower increase of 52% by small organisations (1–49 employees) is noted. These figures indicate that the gap between organisations is widening. In the period between 2003 and 2008 large organisations focused on technological improvements more and adopted on-line business fully while micro companies (0

employees) are lagging behind. Therefore, a special concern is still with these micro businesses as the figures show that they are still a long way behind their larger counterparts with only 28% increase between 2003 and 2008 (DTI, 2003; Dynamic Markets, 2007; NSO, 2007; ONS, 2008).

Because of this concern, the UK government conducted interviews in 2006 with 600 small businesses and entrepreneurs from all sections of the community (DfES, 2006). The initiative was to find out what drives enterprises' growth and productivity. Based on this research and drawing on international evidence, the government developed and launched a new Enterprise Strategy in 2008 (BERR, 2008) This time the strategy was not to make UK businesses trade online but to make the UK the most enterprising economy in the world and the best place to start and grow a business. The strategy was designed to (1) unlock the nation's entrepreneurial talents; (2) to boost enterprise skills and knowledge; (3) to help new and existing businesses get funding to start up and grow; and (4) to ease the burden of regulation, particularly on small firms which feel its impact the most (BERR, 2008).

With this up-to-date initiative the challenge for the government is still to convince SME owners/managers that investment in technology is going to improve their businesses (Hankinson et al., 1997; Hankinson, 2000; Docherty and Simpson, 2003). The research so far indicates, however, that the owners/managers of SMEs are more passionate about the distinctive nature of their business which leaves them doubtful about expert advice (Mole, 2002; Docherty and Simpson, 2003). The following section concentrates on these distinctive features of SMEs.

### 2.1.2 Distinctive features of SMEs

It is widely believed (Raymond, 1985; DeLone, 1988; Freel, 2000; Dewett and Jones, 2001; Aral and Weill, 2007; Oh and Pinsonneault, 2007; Dibrell et al., 2008) that SMEs' distinctive characteristics are to blame for their general slowness to adopt and use technology as a tool to support their businesses. For that and many other reasons there have been numerous studies carried out in order to isolate these distinctive features in SMEs (Chappell et al., 2002; Kalakota and Robinson, 2001; Doherty and Simpson, 2003; Kartiwi and MacGregor, 2007; MacGregor and Vrazalic, 2005; Welsh and White, 1981; Sarosa and Zowghi, 2003; Dibrell et al., 2008). Although most studies emphasise size as the major distinguishing factor (Wynarczyk et al., 1993), SMEs have a number of other distinctive characteristics that set them apart from their larger counterparts as discussed in this section and presented in Table 2.4–Table 2.6. Firstly, Table 2.4 outlines the distinctive features related to resources and capabilities of a company. This is followed by Table 2.5 in which SMEs' core business environment is examined and Table 2.6 in which value creation is summarised.



Back in 1967, Brigham and Smith found that SMEs tended to be more prone to risk than larger organisations and based their investigation on 'poor capabilities' of employees in SMEs (Bringham and Smith, 1967:15). This view was later supported by Walker (1975) and DeLone (1988). In addition, Cochran (1981) found that SMEs tended to be subject to higher failure rates, while Rotch (1987) suggested that SMEs had inadequate records of transactions. Welsh and White (1981), in a comparison of SMEs with their larger counterparts, found that SMEs suffered from a lack of trained staff, had a short-range management perspective and suffer from 'resource poverty' (Welsh and White, 1981:28) which suggests why they are so reluctant to invest in their information systems (see Table 2.4).

**Table 2.4: Features distinctive to SMEs: Resources and Capabilities**

<b>Resources</b>	<b>Reported by</b>
SMEs face difficulties obtaining finance and other resources, and as a result have fewer resources	Cragg and King (1993); Welsh and White (1981); Gaskill and Gibbs (1994); Reynolds et al. (1994); Blili and Reymond (1993); Ettlle (1983); March (1981); Lynn et al. (1999); Fink (1998); Thong (1999); Taran (2006)
SMEs are more reluctant to spend on information technology and therefore have limited use of technology	Walczuch et al. (2000); Dennis (2000); MacGregor and Bunker (1996); Poon and Swatman (1997); Abell and Limm (1996); Hitt et al. (1991); Woo (1987); FSB (2002); Yorkshire Forward (2006)
SMEs have a lack of technical knowledge and specialist staff and provide little IT training for staff	Martin and Matlay (2001); Barry and Milner (2002); Cragg and King (1993); Bunker and MacGregor (2000); Reynolds et al. (1994); Welsh and White (1981); Blili and Raymond (1993); Bharadway (2000); Taran (2006); Kotey and Folker, (2007); Balestrin et al. (2008); Dibrell et al. (2008)
<b>Capabilities</b>	<b>Reported by</b>
SMEs have small and centralised management with a short-range perspective	Bunker and MacGregor (2000); Welsh and White (1981)
SMEs have poor management skills	Blili and Raymond (1993); Bharadway (2000); Poon and Swatman (1997); Dibrell et al. (2008)
SMEs exhibit a strong desire for independence and avoid ventures which impinge on their independence	Dennis (2000); Reynolds et al. (1994)
SMEs owners often withhold information from colleagues	Dennis (2000)
The decision-making process in SMEs is intuitive, rather than based on detailed planning and exhaustive study	Baker et al. (1993); Reynolds et al. (1994); Bunker and MacGregor (2000)
The SME owner(s) has/have a strong influence in the decision-making processes	Reynolds et al. (1994); Bunker and MacGregor (2000)
Intrusion of family values and concerns in decision-making processes	Dennis (2000); Bunker and MacGregor (2000); Reynolds et al. (1994); Kotey and Folker (2007)
SMEs have informal and inadequate planning and record keeping processes	Reynolds et al. (1994); Tetteh and Burn (2001); Miller and Besser (2000); Markland (1974); Rotch (1987)



These early suggestions have been supported by more recent studies (summarised in Table 2.4) that have discovered that most SMEs lack technological expertise (Barry and Milner, 2002; Dibrell et al., 2008), most experience shortage of sufficient capital to undertake technical enhancements (Gaskill et al., 1993; Raymond, 2001; Taran, 2006), most SMEs suffer from inadequate organisational planning (Tetteh and Burn, 2001; Miller and Besser, 2000; Balestrin et al., 2008) and many SMEs differ from their larger counterparts in the extent of the product/service range available to customer (Reynolds et al., 1994).

Furthermore, a number of studies (Reynolds et al., 1994; Murphy, 1996; Bunker and MacGregor, 2000; Balestrin et al., 2008) have examined SMEs' core business and how business environment impacts on differences in management style between large businesses and SMEs (see Table 2.5).

**Table 2.5: Features distinctive to SMEs: Core business and business environment**

<b>Core business (product/service)</b>	<b>Reported by</b>
SMEs have a limited share of the market (often confined towards a niche market) and therefore rely heavily on few customers	Hadjimionolis (1999); Lawrence (1997); Quayle (2002); Reynolds et al. (1994); Lynn et al. (1999); FSB, (2002); DTI, (2003)
SMEs have narrow product/service range	Bunker and MacGregor (2000); Reynolds et al. (1994)
SMEs are product oriented, while large businesses are more customer oriented	Reynolds et al. (1994); Bunker and MacGregor (2000); MacGregor et al. (1998)
SMEs are not interested in large shares of the market	Reynolds et al. (1994); MacGregor et al., (1998)
SMEs are unable to compete with their larger counterparts	Lawrence (1997); Verdu-Jover et al. (2006)
<b>Business environment</b>	<b>Reported by</b>
SMEs have lower control over their external environment than larger businesses, and therefore face more uncertainty	Westhead and Storey (1996); Hill and Stewart (2000); Sarosa and Zowghi (2003)
SMEs face more risks than large businesses because the failure rates of SMEs are higher	Brigham and Smith (1967), DeLone (1988); Cochran (1981); Carter and Van Auken, (2006)
SMEs are more reluctant to take risks	Brigham and Smith (1967); Walker (1975); DeLone (1988); Walczuch et al. (2000); Dennis (2000)
SMEs size and structure influence their speed and they can respond to changes in environment faster	Carrier (1994); d'Amboise and Muldowney (1988); Katz (1970); Hitt et al. (1991); Woo (1987)
SMEs do not take advantages and do not respond fast enough to the Government initiatives	DTI (2003), DTI (2007)

Among others, the studies of Hadjimionolis (1999), Quayle (2002) and DTI (2003) have indicated that the core business of SMEs is limited mainly by focusing on a niche market with only few customers. This results in a narrow product range (Bunker and MacGregor, 2000) and customer oriented strategies (Reynolds et al., 1994; Bunker and MacGregor, 2000). This is followed by studies of Reynolds et al. (1994) and Balestrin et al. (2008) in which it was



identified that SMEs tend to have a small management team (often one or two individuals) and as a consequence they are strongly influenced by the owner's personal idiosyncrasies.

Other researchers also identified that SMEs have little control over their business environment (Westhead and Storey, 1996; Hill and Stewart, 2000) and they have a strong desire to remain independent (Dennis, 2000; Drakopolou-Dodd et al., 2002). In addition, various studies recognised that many SMEs' distinctive features are also in value creation (see Table 2.6).

**Table 2.6: Features distinctive to SMEs: Value creation**

Possible value creation	Reported by
Marketing	Freel (2000); Hoffman and Novak (1996); Verity and Hof (1994); Simpson et al. (2006)
Government - use external assistance to improve business	Drew (2003); Utomo and Dodgson (2001)
Competitors - used as a tool to create competitive advantage	Earl (1989); Galliers and Sutherland (1999); Turban et al. (2002)
Market research	Hart and Tzokas, (1999); Stokes and Wilson (2006); Rialp and Rialp (2007); McLoone (2008); Mutula (2010)
Marketing strategy	Huang and Brown (1999); Hoffman and Novak (1996); Verity and Hof (1994)
New Product Development (NDP)	O'Brien, (1998); Zyl (2008); O'Dwyer et al. (2009)
Technologies	Freel (2000); DeLone (1988); Reymond (1985); Dewett and Jones, (2001); Aral and Weill, (2007); Oh and Pinsonneault (2007); Dibrell et al. (2008)
Manufacturing and operations strategy	Freel (2000); Karagouni et al. (2008)

This is particularly seen in the area of marketing (Freel, 2000; Simpson, et al., 2006), market research (Hart and Tzokas, 1999) and marketing strategy (Huang and Brown, 1999; Hoffman and Novak, 1996). Moreover, many studies identified great opportunities in the area of technology and suggested that larger studies are needed to verify these assumptions (Freel, 2000; DeLone, 1998; Dibrell et al., 2008). Although many studies (Hadjimonolis, 1999; Quayle, 2002; and DTI, 2003) recognise that a restricted niche market has a negative impact on the success of SMEs, technology is seen as a great opportunity for owners/managers in which marketing strategies can be enhanced and SMEs could potentially reach a wider global population (Freel, 2000; Aral and Weill, 2007; Dibrell et al., 2008). However, some sceptics have indicated that since SMEs are not interested in reaching the wider markets, owners/managers are less likely to employ Internet technology to expand their market share (Reynolds et al., 1994; MacGregor et al., 1998).

### 2.1.3 New research developments

Due to advances in Internet technology in the 21<sup>st</sup> century, some recent studies have noticed changes in SMEs behaviour with regard to their resources and capabilities. In particular, resource-based network relationships and owners/managers' knowledge that enable internationalisation are seen as the most advanced (Prashantham, 2008; Naldi, 2009). Studies by Kuivalainen et al. (2010), Kraaijenbrink et al. (2010) and Wu (2010) reviewed 125 empirical studies of the resource based views and dynamic capabilities of small firms under environmental volatility. These studies claim that firms that possess adequate resources and dynamic capabilities can effectively enhance their competitive advantage, despite facing highly volatile environments. However, these studies also suggested that small firms are still lacking the IT integration in which internationalisation and innovation would be enabled.

Overall, many of the distinctive features of SMEs are seen as an opportunity for them to develop competitive advantage. The following section critically discusses the theory of competitive advantage in which a traditional business approach is compared with the new digital approach. This is then critically evaluated in the context of SMEs with the aim of identifying the best way of integrating the technology and traditional business approach and taking it forward into the new era of an electronic business.

## 2.2 Competitive advantage in SMEs

The term "competitive advantage" is one of the most enduring themes in the business strategy literature and has well established theories (Porter, 1985, 1986; Ansoff, 1965; Barney, 1991). Porter (1995:16) points out that the idea of competitive advantage underpins many business books. He defines it (Porter, 1985:3) as the

*"...value a firm is able to create for its buyers that exceeds the firm's cost of creating it".*

In addition, Ansoff's definition (1965:99) suggests that competitive advantage

*"...seeks to identify particular properties of individual product markets which will give the firm a strong competitive position".*

As both definitions suggest, competitive advantage can be seen as a result of strategies adopted by a firm with the purpose of providing value to customers resulting in an advantageous position for competing over a period of time. Therefore, a competitive advantage enables the firm to create superior value for its customer and superior profits for itself. This is also known

as “positional advantage” since differentiation and costs describe the firm’s position in the industry as a leader in either cost or differentiation (Porter 1985; Ansoff, 1991).

## 2.2.1 Organisational strategies

This study takes “the classical approach” to the organisational strategies, as associated with authors such as Igor Ansoff (1965, 1991) and Michael Porter (1980, 1985). For them strategy is a rational process of deliberate calculation and analysis, designed to maximise long-term advantage. If the effort is taken to gather the information and apply the appropriate techniques, both the outside world and the organisation itself can be shaped according to the plans of top management. For the classicists such as Ansoff, Barney and Porter, good planning and an appropriate strategy is what it takes for organisations to deal with challenges in the internal and external business environment. As a result, these strategies and set objective decisions made by management make the difference between long-run success and failure (Whittington, 1993).

It is widely believed that competitive advantage results from the formulation and execution of effective strategies. Porter (1996:64) argues that a strategy is a

*“...deliberate selection of a different set of activities to deliver a unique mix of value”.*

He claims that this selection of activities creates a competitive advantage (Porter, 1980). Furthermore, Ansoff (1965) suggests that organisational managers need to create strategies that consider multiple business environmental factors. These factors would represent the actions that need to be taken for facing a particular environment that cannot be replicated (Ansoff, 1965). However, it is not only particular environmental demands (Bourgeois, 1980) but also the firm’s own resources and capabilities that make a firm’s strategy unique and different from others (Veliyath and Fitzgerald, 2000). Strategies provide SMEs with the adequate framework for determining their objectives, decisions, and actions. Thus, a key aspect for SMEs is their strategy formulation and implementation because it “*reflects the short and long-term ability to respond to the challenges and opportunities offered by the business environment*” (Knight, 2000:13).

Although strategies of small firms are often criticised for not having formal written statements, their strategies can be easily identified by looking “*at firms’ patterns of behaviour and resource allocation*” (Schindehutte and Morris, 2001). However, small firms need to make long-term plans and respond to dynamic environments to avoid stagnation of their business and loss of competitiveness (Schindehutte and Morris, 2001). According to Yang (2009), some of the measures that SMEs adopt to improve their competitiveness and economic efficiency, include:

- Focusing on niche markets;
- Concentrating their activities in fragmented industries;
- Exploiting the advantage of their size, as with output flexibility;
- Concentrate in operations along the supply chain and the functioning of logistic planning systems;
- Internationalisation, mainly by finding foreign markets for export.

However, other authors such as Lim et al. (1999) suggest that SMEs should promote competitive advantage based on valuable resources and capabilities. If these complement traditional strategies, then low cost, specialisation and innovation altogether become a strong source of competitive advantage.

To sum up, in this classical approach there are broadly two types of competitive strategy, positioning advantage and/or resource-based advantage. If the firm takes the 'positioning advantage', promoted by Porter (1980) as well as Miles and Snow (1978); it is believed that differentiation and low cost are alternative but equally viable strategy orientations across environmental contexts. For Dess and Beard (1984) and Hambrick (1983) however, those firms which are facing significant environmental changes may improve their chances of survival and subsequent high performance by changing their strategy in ways that fit more appropriately with new environmental circumstances. Still, some others suggest that the nature of the market environment is a critical factor for strategic viability (Dess and Beard, 1984 and Hambrick, 1983).

It has also been argued that a low cost orientation is most appropriate in stable and predictable environments (Hambrick, 1983; Miller, 1988; Kim and Lim, 1988). This is because the continuous adjustments needed to cope with a constantly changing and unpredictable environment would likely threaten efforts at efficiency and cost control and would therefore result in severe diseconomies for firms pursuing a low cost strategy (Miller, 1988). Whereas a low cost strategy relies heavily on an ability to improve the operational efficiencies in a firm's value chain, a differentiation strategy focuses on the customer and on providing products or services that are distinct from those offered by competitors. As early as the late 1960s, Lawrence and Lorsch (1967) contended that consistent emphasis on the customers' needs is of paramount importance when environmental uncertainty is high. In aiming at uniqueness, differentiation – based on either a quality image or innovation – is generally assumed to be most appropriate in dynamic and uncertain environments in which products, services, and practices change quickly (Hambrick, 1983; Miller, 1988; Kim and Lim, 1988).

If, on the other hand, the firm takes a “resource-based” view as promoted by Barney (1991); the firm will utilise its resources and capabilities to create a competitive advantage that ultimately results in superior value creation. Indeed, Grant (1991) and Peteraf (1993) believe that the internal potential of the firm has foundations in its resources and capabilities upon which strategies are built aiming to produce and sustain a competitive advantage. The resources and capabilities can represent physical and intangible assets that determine the efficiency and effectiveness of a firm's performance (Collis and Montgomery, 1995). In this way, each firm has a source of competitive advantage (Amit and Schoemaker, 1993; Peteraf, 1993; Porter, 1985; Spanos and Spyros, 2001).

Barney (1991) further argues that only those resources that contribute to improving efficiency, effectiveness, exploit opportunities or neutralise threats in the environment are valuable resources. So, valuable assets contribute to a successful strategy and are adequate for the structure of the industry (Spanos and Spyros, 2001). Time and space determine a firm's ability to acquire and exploit resources (Barney, 1991) and these are available for specific industries and/or for specific periods of time (Collis and Montgomery, 1995). Resources are sometimes valuable in combination with other assets, thus, they should not be considered in isolation (Collis and Montgomery, 1995). These assets and competencies can be found embedded in policies, activities (Chakravarthy, 1982; Drucker, 1994) and strategies (Calori et al., 2000).

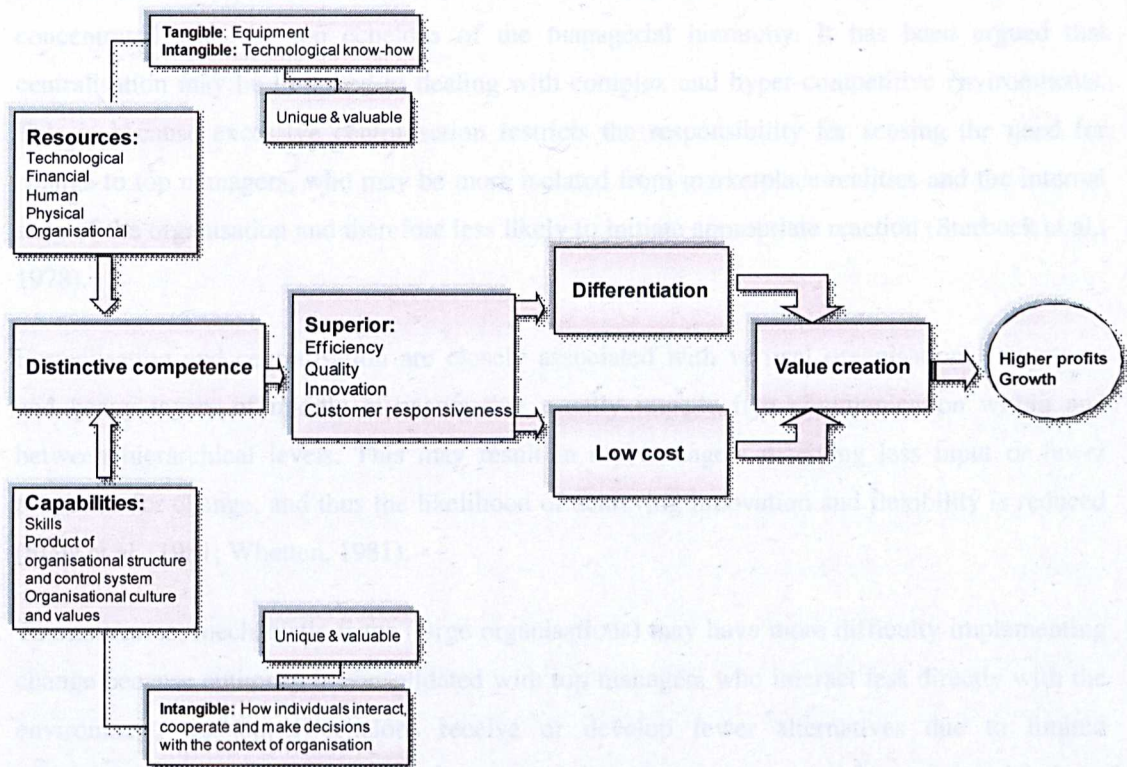
Furthermore, assessment of resources and capabilities assessment should be carried out in relation to emerging and potential change in the business environment (Reed and Defillippi, 1990). This is because changes may require a redefinition of a firm's resources enabling various combinations in their development for creating advantages (Agmon and Drobnick, 1994; Drucker, 1994; Srivastava et al., 2001). A company's ability to compete can be threatened by incongruence among their resources, its strategy and its hypercompetitive arena to compete in (Veliyath and Fitzgerald, 2000). However, when firms lack these resources it is important for them to establish and maintain network relationships which in return would enable them to obtain missing resources (Coviello and Munro, 1995; Johnsen and Johnsen, 1999). This however, may require an integration of tangible and intangible assets as well as owners/managers of SMEs learning to manage new forms of collaboration and integration in the competitive arena (Srivastava et al., 2001). This collaboration considers relationships with other firms, competitors, suppliers, distributors and others broadening the scope for mutual benefits (Porter, 1985; Herrera-Bernal et al., 2002). These benefits may include economies of scale and greater market strength (Jones, 2003).

Overall, resource-based theory (Barney, 1991; Grant, 1991) complements the industry analysis framework supported by Porter (1980) because a firm's performance is determined by industry and firm-level influences (Amit and Schoemaker, 1993; Peteraf, 1993). The use of both theories



offers the potential to take into account the sources of competitive advantage by looking into the internal and external insights of the firm (Amit and Schoemaker, 1993). That is, the resource-based theory provides an analysis of the strengths and weaknesses of the firm while the industry analysis sheds light on the opportunities and threats (Spanos and Spyros, 2001). Additionally, Amit and Schoemaker (1993) suggest that the strategic assets of a firm can be found embedded in the firm's industry and within itself.

Figure 2.2 combines the resource-based and positioning theories to illustrate the concept of competitive advantage.



**Figure 2.2: A model of competitive advantage grounded by resource based and positioning theories**

Source: Hill and Jones (1998)

## 2.2.2 Organisational structure

Organisational structure provides the context for strategic choices to be formulated. It also constitutes the vehicle by which these choices are effectively implemented (Grant, 1996a). It has long been held in the management literature that firms resembling a mechanistic (as opposed to organic) structure are less equipped to deal with disruptive environmental change. This is because the combination of formalisation, centralisation, and tall vertical hierarchy that are characteristic of a mechanistic structure reduces the firm's capacity for innovation and

flexibility (Burns and Stalker, 1961). A tall vertical hierarchical structure is also associated with the classical approach to competitive advantage and large organisations.

Formalisation refers to the degree by which decision-making and operational routines are governed by rules, regulations, and standard operating procedures. Increased reliance on these may reduce a firm's adaptive capabilities in that it restricts its repertoire of responses to those solutions that have both worked in the past and are codified in standard operating procedures (Barker and Mone, 1998).

Centralisation concerns the extent to which authority and responsibility for adaptation is concentrated with the top echelons of the managerial hierarchy. It has been argued that centralisation may be ill-suited to dealing with complex and hyper-competitive environments. This is because excessive centralisation restricts the responsibility for sensing the need for change to top managers, who may be more isolated from marketplace realities and the internal state of the organisation and therefore less likely to initiate appropriate reaction (Starbuck et al., 1978).

Formalisation and centralisation are closely associated with vertical organisational structures and heavy layers of middle managers that usually impede free communication within and between hierarchical levels. This may result in top managers receiving less input or fewer proposals for change, and thus the likelihood of achieving innovation and flexibility is reduced (Staw et al., 1981; Whetten, 1981).

To summarise, mechanistic firms (large organisations) may have more difficulty implementing change because authority is consolidated with top managers who interact less directly with the environment, the upper echelons receive or develop fewer alternatives due to limited communication, and formalisation of procedures blocks the generation of innovative solutions. Because of these shortcomings, firms in the 21<sup>st</sup> century are tending to move towards organic (smaller organisations) structural arrangements, that is, towards flatter, less formal, forward looking, small and more autonomous structures (Whittington et al., 1999; Whittington 2006). This flatter organisational structure and the size of organisations are seen as better suited for rapid change resulting in implementation of ICT and the Internet technology.

### 2.2.2.1 Changes in organisational structure

If structure provides the skeleton, management processes then correspond to the nervous system of an organisation. As Whittington et al. (1999) convincingly argue the flexibility and knowledge required in the new competitive landscape demands intensive interaction among organizational members. ICT and Internet-related technologies are seen as particularly useful



and relevant tools, since it is generally acknowledged that modern technologies enable and drive dramatic changes in the operation of organisations (Grant, 1998; Whittington et al., 1999).

ICT and the Internet related technology have the potential of dramatically enhancing coordination and control abilities throughout the firm (Grant, 1998). Coordination of activities is positively influenced by the capacity of ICT to make the distance and time elements of the required information flows increasingly irrelevant (Scott Morton, 1995). Moreover, ICT enables a wide availability of organisational and market data that can be a crucial input for rapid and informed decision-making at all levels. The 'control dimension', on the other hand, and more specifically, the measurement and its interpretation against organisational targets, can also be influenced fundamentally by the increasing availability of ICT (Scott Morton, 1995).

Investments in ICT, however, need to be accompanied by a corresponding emphasis on human resources because controlling and coordinating ultimately translates into influencing an individual's behaviour. Human resources are considered by many as a central element in the making of new forms of organising (Ghoshal and Bartlett, 1988; and Whittington and Mayer, 1997), and more generally, one of the most important determinants of sustainable competitive advantage. This is mainly reflected in the emerging knowledge-based view of the firm (Grant, 1996a, 1996b) where the knowledge embodied in the skills and tacit know-how of employees is seen to constitute a critical dimension of an organisation's competencies (Hall, 1992; Leonard-Barton, 1995). Within this context, competing in the new environment demands implementation of a culture that promotes continuous learning and employee empowerment, i.e. motivation, creativity, and networking, among others (Hitt et al., 1998). It is essential, for example, that employees are 'multi-skilled' and 'multi-functional' to take full advantage of the opportunities stemming from ICT adoption. They need to be equipped with appropriate analytical abilities and knowledge, and to be capable of efficiently organising activities within an ever-changing and flexible business environment. Moreover, they need to assume initiatives and exercise leadership to explore innovative ideas. Finally, employees need to feel comfortable in an environment characterised by the need for extensive teamwork and horizontal, flatter communication (Prashantham, 2008; Naldi, 2009).

#### 2.2.2.2 The role of the owner/manager in SMEs

In this horizontal organisational structure the role of owner/manager in SMEs is very important. Their profile exerts great influence on various issues within the firm as well as determining the firm's performance to a large extent (Das, 1994; De Toni and Nassimbeni, 2001; Jennings and Beaver, 1997; Knight, 2000; Schindehutte and Morris, 2001; Venkataraman and Van de Ven, 1998). Entrepreneurial attitudes are seen as very important too (Fröhlich and Pichler, 1998) and

in turn they tend to produce a determined culture, strategic direction and the core focus of the firm (Van Gelderen et al., 2000).

The characteristics of the owners/managers may promote or discourage attitudes towards innovation and the implementation of novel ideas (Das, 1994; De Toni and Nassimbeni, 2001; Knight, 2000) and adaptation to change (Starr and Fondas, 1992). According to Hrebiniak and Joyce (1985), an entrepreneur's decisions determine entrepreneurial success. Competitive actions from all participants in a market or industry and their interactions may transform the ground on which competition occurs (Calori et al., 2000). From a firm's perspective, these changes should not be seen as only external. The owner/manager can adopt proactive initiatives that shape the ground on which the business is conducted in a favourable way. Thus, business success is determined by such things as: identification of opportunities, development of strategies, assembly of resources and initiatives of the owner/manager (Caprioni et al., 1994). An appropriate fit to new circumstances results from the owner/manager's ability and efforts to read and interpret environmental patterns and adapt to them. This ability is not restricted to the owner/manager but also to his/her team and their ability to learn (Levinthal, 1991; Venkataraman and Van de Ven, 1998). For this reason, the owner/manager should have and exploit a variety of competencies such as organisation and social skills, commitment and intellectual ability (Levinthal, 1991). This portfolio of competencies may impact on advancing strategies because it would be possible to develop an entrepreneurial strategy repertoire to deal with different issues in the business environment or to face it proactively (Morris and Paul, 1987). Strategy implementation skills are interrelated with the strategy content and the competitive environment that the firm faces (Spanos and Spyros, 2001).

A key aspect that helps SMEs to be successful in their ever-changing environment is the possession of an entrepreneurial orientation. This is essential because it manifests SMEs' commitment to achieve their strategic objectives by a particular system of values, risk-seeking, and innovation. As a consequence, entrepreneurial orientation may produce certain advantages because it is related to opportunity or creation (Knight, 2000).

### 2.2.3 Five Forces Model

The business environment of SMEs is very important because they are more vulnerable to external influences due to their size. This vulnerability is partly manifested in small firms' inability to control the business environment in comparison with the power that larger firms have (Buzzell and Gale, 1987; Venkataraman and Van de Ven, 1998). The environment can be defined as:

*“...sources of events and changing trends which create opportunities and threats for individual firm”.*

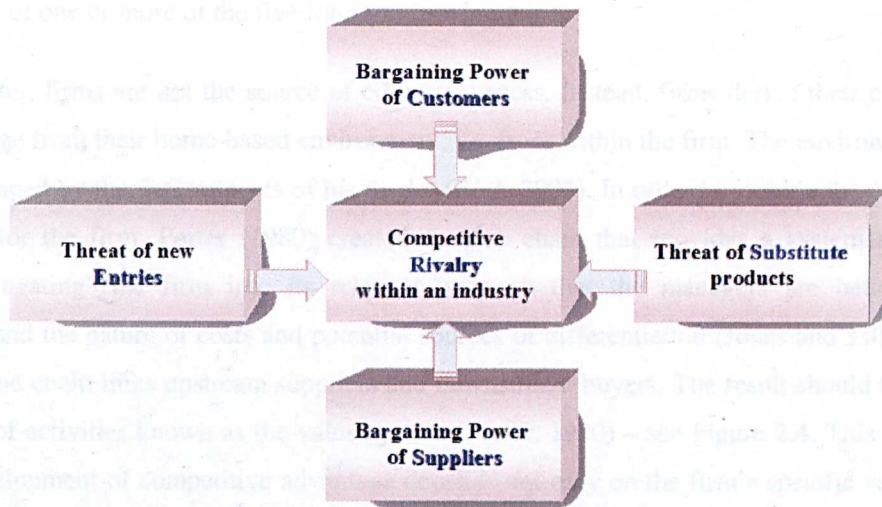
Lentz et al. (2002:1)

This involves two levels: the micro and macro level and both exert a great influence on a firm's performance. The micro level represents the immediate factors that surround the daily life of SMEs. It includes all those actors with whom the firm shares relationship and which in turn have an impact upon it. Some examples of these are suppliers, customers, distributors, government institutions and competitors (Bourgeois, 1980; Porter, 1980). The macro-level corresponds to factors indicating trends or changes in the social, political, technological, demographic, cultural and economic areas (Aaby and Slater, 1989; Bourgeois, 1980).

New environments modify the position of SMEs; forcing them to be flexible and adaptive in their business environments (Jennings and Beaver, 1997; Jones, 2003), thereby, shaping the ground in which firms' competitive strategy is set (Lee et al., 1999; Porter, 1980). The capability of SMEs to adapt to changes implies their ability to overcome any mismatch that occurs due to (1) inadequate strategies; (2) the failure to incorporate the firm's resources and capabilities adequately into the strategy; or (3) inability to adjust to demands of the business environment (Chakravarthy, 1982).

Business environmental changes may provide both opportunities and threats. A firm's response to the threats depends on two main issues. The first is how well the SMEs perform environmental scanning in order to gather and process valuable information that enhances decision-making and strategy formulation (Calof, 1993; Lee et al., 1999; Hart and Milstein, 1999; Schindehutte and Morris, 2001; Westhead et al., 2001 and 2005). In addition, continuous scanning obliges the entrepreneur to be creative in thinking and envisioning future scenarios (Srivastava et al., 2001) enabling evaluation of the fitness of the firm to meet the demands of various strategies (Bourgeois, 1980; Chakravarthy, 1982; Drucker, 1994; Collis and Montgomery, 1995; Hannon and Atherton, 1998; Hibbert, 2000; Howard, 2003). All these may be influenced by an entrepreneur's ability to differentiate between what is the real and what is his/her perceived business environment (Bourgeois, 1980). Secondly, the entrepreneur's ability to interpret the environment since, specifically in SMEs, intuition appears to be important in environmental monitoring and decision-making. The perception in entrepreneurs may magnify the beneficial or detrimental power of environmental stimuli (Venkataraman and Van de Ven, 1998).

The task facing managers in an organisation is to analyse the competitive forces in an industry's environment in order to identify the opportunities and threats confronting a company (Blili and Raymond, 1993). To meet these demands, Porter developed a framework that helps managers in this analysis namely, the 'Five Forces Model' – see Figure 2.3 (Porter, 1979).



**Figure 2.3: Porter's Five Forces Model**

Source: Adapted from *Harvard Business Review*. An exhibit from "How competitive forces shape strategy" by Michael E. Porter (March–April 1979).

This model outlines five forces that determine the competitive intensity and therefore attractiveness of a market. Attractiveness in this context refers to the overall profitability of the industry. An 'unattractive' industry is one where the combination of forces acts to drive down overall profitability. A 'very unattractive' industry would be one approaching 'pure competition'. Porter (1979) referred to these forces as the micro-environment. The micro-environment consists of those forces close to a company that affect its ability to serve its customers and make a profit. A change in any of the forces normally requires a company to re-assess the marketplace. The overall industry attractiveness does not imply that every firm operating in the industry will return the same profitability. Firms are able to apply their uniqueness in terms of resource, business model or network to achieve a profit above the industry average (Porter, 1979).

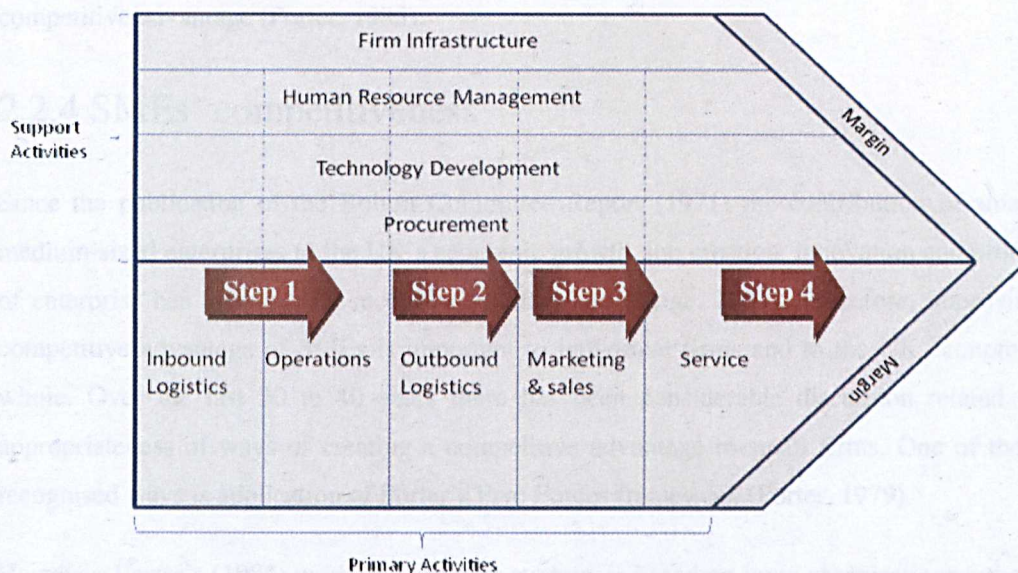
Porter's Five Forces Model includes three forces from 'horizontal' competition: threat of substitute products, the threat of established rivals, and the threat of new entrants; and two forces from 'vertical' competition: the bargaining power of suppliers, and the bargaining power of customers. Porter (1979) argues that the stronger each of these forces is the more limited is the ability of established companies to raise prices and earn greater profits. Within Porter's framework, for example, a strong competitive force can be regarded as a threat since it depresses profit. On the other hand, a weak competitive force can be viewed as an opportunity, as it allows a company to earn greater profits. The strength of the five forces may change over time as industry conditions change. The task facing managers is to recognise how changes in the five forces give rise to new opportunities and threats and to formulate appropriate strategic



responses. In addition, it is possible for a company, through its choice of strategy, to alter the strength of one or more of the five forces to its advantage.

For Porter, firms are not the source of competitiveness. Instead, firms derive their competitive advantage from their home-based environment, i.e. from within the firm. The environment is, in turn, shaped by the determinants of his model (Best, 2001). In order to provide the competitive source for the firm, Porter (1980) created a value chain that provides a systematic way of 'disaggregating' the firm into its relevant units so that the managers are better able to understand the nature of costs and potential sources of differentiation (Jones and Tilley, 2003). The value chain links upstream suppliers and downstream buyers. The result should be a larger stream of activities known as the value system (Porter, 1980) – see Figure 2.4. This is because the development of competitive advantage depends not only on the firm's specific value chain, but also on the value system of which the firm is a part (Porter, 1980).

In the traditional value chain, managers concentrate on being effective by involving the firm's 'primary activities' directly in competing in any industry. Inbound logistics associates with receiving, storing and disseminating inputs such as material handling and inventory control. This is then followed by 'operations', 'outbound logistics', 'marketing' and 'service'. In other words, Figure 2.4 shows that primary activities are seen as R&D (Step 1) that is involved in putting well-understood products (Step 2) on the market (Step 3) and offering service to buyers (Step 4). These four steps form primary activities in a traditional value chain (Hill and Jones, 1998).



**Figure 2.4: Traditional value chain**

Source: Adapted from Michael Porter (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, p37, Figure 2-2.

Supporting activities, on the other hand, provide an input that allows primary activities to take place (Porter, 1985). They include the firm's functional controls in which the transmission of physical materials/goods is logistically taken through the value chain, from procurement through production and on distribution. The efficiency in which this is carried out can significantly lower cost, thereby creating value. In addition, a company's infrastructure includes organisational structure, control systems and culture. Since people are an inevitable part of an organisation they are seen as creators of even more value. The human resource function ensures that the company has the right mix of skilled people to perform its value creation activities effectively. It is also the job of the human resource function to ensure that people are adequately trained, motivated, and compensated to perform their value creation tasks (Hill and Jones, 1998; Lipczynski and Wilson, 2004). Technology development is seen as know-how as well as an activity that can group a firm's efforts to improve their R&D and to sustain the entire chain by connecting supporting and primary activities (Porter, 1985).

To summarise, competitive advantage is the result of the strategies adopted by a firm with the purpose to add value for customers. This consequently positions a firm advantageously and enables it to compete over a period of time. The overall argument is that a company has a 'competitive advantage' when its profit rate is higher than the average for its industry, and it has a 'sustained competitive advantage' when it is able to maintain this profit rate over a number of years. In that respect, to gain a competitive advantage, the basic condition which must be satisfied is that the amount of value customers place on the company's goods or services must exceed the cost of production. In other words, the concept of value creation lies at the heart of competitive advantage (Porter, 1985).

## 2.2.4 SMEs' competitiveness

Since the publication of the Bolton Committee Report (1971) the contribution of small and medium-sized enterprises to the UK's economic growth, job creation, innovation and promotion of enterprise has been widely recognised (Tilley and Tonge, 2003). Therefore, improving the competitive advantage of SMEs is important to individual firms and to the UK economy as a whole. Over the last 30 to 40 years there has been considerable discussion related to the appropriateness of ways of creating a competitive advantage in small firms. One of the most recognised ways is application of Porter's Five Forces framework (Porter, 1979).

However, Porter's (1985) work on corporate strategy is based on large organisations rather than SMEs and therefore it can be argued that SMEs are unlikely to have sophisticated divisionalised structures to create competitive advantage (Lynn et al., 1999; Federation for Small Businesses, 2002; DTI, 2003). As a result, SMEs generally occupy niche markets which larger firms do not



consider as significant areas of business activity (Hadjimonolis, 1999; Lawrence, 1997; Quayle, 2002; Reynolds et al., 1994; Lynn et al., 1999; FSB, 2002; DTI, 2003).

Large firms on the other hand, have traditionally commanded a competitive advantage in the marketplace by being able to use their financial strength to perform large-scale market research studies, to design and implement wide-reaching advertising campaigns and to establish computer and information systems to communicate with their staff and suppliers (Lynn et al., 1999). Large firms also enjoy advantages such as economies of scale, experience, brand name recognition and market powers that typically elude SMEs (Hambrick et al., 1982; Woo and Cooper, 1981, 1982).

In contrast to large organisations, the ability of SMEs to gain a competitive advantage is related to issues of marketing, market research, marketing strategy, new product development, technologies and processes, and the manufacturing and operations strategy adopted (Freel, 2000; Hart and Tzokas, 1999; Huang and Brown, 1999; O'Brien, 1998; Simpson et al., 2006; Oh and Pinsonneault, 2007; Dibrell et al., 2008; O'Dwyer et al., 2009). A summary of the differences between SMEs and their larger counterparts is presented in Table 2.7.

**Table 2.7: Differences between large organisations and SMEs in creating competitive advantage**

Differences Between SMEs and large organisations in creating competitive advantage	Reported by	
Marketing	Freel (2000); Simpson et al. (2006)	SMEs
Market research	Hart and Tzokas, (1999), Stokes and Wilson (2006); Rialp and Rialp (2007); O'Dwyer et al. (2009)	
Marketing strategy	Huang and Brown (1999); Stokes and Wilson (2006); Rialp and Rialp (2007); Gilmore et al. (2007); O'Dwyer et al. (2009)	
New Product Development (NDP)	O'Brien (1998); Zyl (2008); O'Dwyer et al. (2009)	
Technologies	Freel (2000); Oh and Pinsonneault (2007); Dibrell et al. (2008)	
Manufacturing and operations strategy	Freel (2000); Karagouni et al. (2008); Gurau, (2008)	
Large-scale market research studies	Lynn et al. (1999); Canavesio and Martinez, (2007); Forrester Research (2009)	Large Organisations
Design and implementation of wide-reaching advertising campaigns	Lynn et al. (1999); Canavesio and Martinez, (2007); Gilmore et al. (2007) Gurau, (2008)	
Computers and information systems to communicate with their staff and suppliers	Lynn et al. (1999); Uhrbach and van Tol (2004); Canavesio and Martinez, (2007); Gurau (2008)	
Economies of scale, experience, brand name recognition, market power	Hambrick et al. (1982); Woo and Cooper (1981); Woo and Cooper (1982); Forrester Research (2009)	

Table 2.7 identifies that, in contrast to large firms, SMEs face considerable difficulties and problems in areas that include understanding and applying marketing concepts and techniques (O'Brien, 1998; Zyl, 2008; O'Dwyer et al., 2009), especially promotion and market research (Huang and Brown, 1999; Stokes and Wilson, 2006; Riapl and Rialp, 2007; Canavesio and Martinez, 2007; Gurau, 2008; and O'Dwyer et al., 2009). In addition, Freel (2000) and Karagouni et al., (2008) point out that studies of SMEs have consistently raised the issue of poor management skills and, more precisely, that poor marketing skills have been a barrier to product innovation. Hannon and Atherton (1998) have also noted that the level of strategic awareness of owners/managers appears to be strongly influenced by the personal competence and attitudes of the owners/managers.

The list of problems that SMEs encounter in the area of competitive advantage together with their distinctive characteristics is a comprehensive one. As a result, it does not come as a surprise that the UK Government faces a major challenge to communicate its support and initiatives to SMEs.

## 2.2.5 New business approach

The belief that embracing technology can result in competitive advantage in the marketplace goes back as far as the 1980s when IT technology was in its infancy (Levitt, 1983). Large organisations have recognised that with technological know-how and financial resources, they have successfully engaged and implemented the technology in their businesses. However, in the 21st century and almost three decades later, SMEs are still struggling with and resisting technological advances and changing economies.

Various studies have identified some of the reasons behind this trend and these were presented previously in Table 2.4, Table 2.5 and Table 2.6 of this chapter. It is recognised that most problems that SMEs are experiencing are in the area of resources and capabilities. This consequently affects their superiority and value creation. On the other hand, their technology is one of the tools that can help SMEs overcome the differences with their larger counterparts and start competing with them in the global marketplace (Daniel and Myers, 2000; Timmers, 1999; Kalakota and Robinson, 2001; Sadvoski et al., 2002). But this contradicts Carr's (2004) statement that IT does not matter. He claims that IT is a modern commodity and that firms can compete with it but they cannot create advantage by using it.

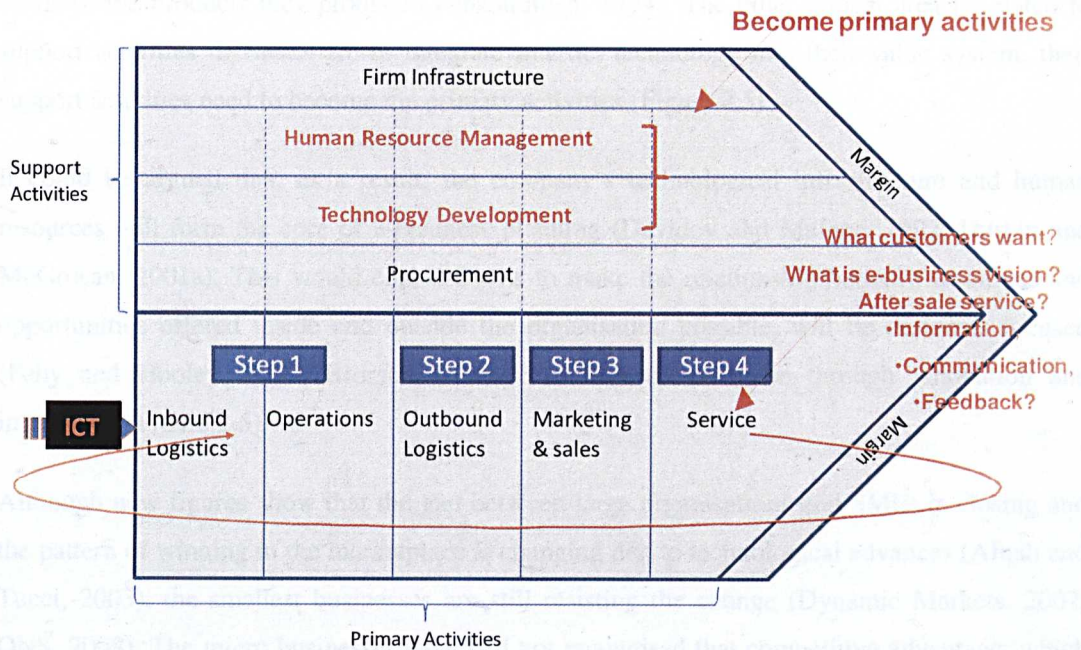
Many studies before Carr's revolutionary statement have shown that some particular companies have created a considerable advantage by using ICT. These studies have investigated companies that had been created at the turn of the century with the expansion of the Internet (Fahy and Hooley, 2002). These new types of businesses were known as 'high-tech start-ups'. These



contemporary organisations with new business structures have seized on the opportunities available simply by using Internet technologies. These new organisations – such as Amazon.com, AOL.com and Ebay.com – are reshaping industries and creating significant strategic advantages for their firms (Fahy and Hooley, 2002). The Internet was the core competence of these businesses and determined how they were structured and how they operated.

Looking at the financial strengths of large organisations and the Internet-based strategies used by these new start-ups to create competitive advantage, SMEs could be seen to benefit from the Internet by simply applying both of the above techniques. Firstly, SMEs need to start building upon their existing technologies and exploit the Internet's speed, flexibility and sophistication at a relatively cheap price. Since the cost of Internet technologies has decreased dramatically over the past decade (DTI, 2008), it appears that SMEs would be able to establish a local presence with a global reach on a very limited budget by simply using: (1) the Internet for global advertising and market research; (2) low-cost electronic mail to communicate with customers; and (3) mobile technologies such as cellular telephones and personal digital assistants (PDAs) for order-taking and field sales. This could in return make SMEs more viable in the area of marketing, marketing strategy and new product development, which would eventually make room for the implementation of much more sophisticated applications that are required in e-business strategies (Van Hooft and Stegwee, 2001). Once technological infrastructures are in place, SMEs could use the Internet as a core competence in a similar way to many new 'start ups'.

Despite technological advances and successful implementation of those technologies by large organisations, SMEs are still lagging behind. Research shows that SMEs are experiencing fundamental problems in the area of resources and capabilities which consequently affect the main building blocks of competitive advantage: efficiency, innovation, quality, and customer responsiveness (Figure 2.2). In other words, if SMEs are to implement technology as the basis of their businesses they need to re-examine the traditional value chain (Figure 2.4) and reverse some of the original elements (Figure 2.5).



**Figure 2.5: Traditional value chain reversed**

Source: Adapted from Michael Porter (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, p37, Figure 2-2.

It can be argued that a company's ICT should become a primary activity. This is because the basic tool for understanding the links between various activities within a firm and their contribution to competitive advantage is the value chain (Porter, 1985). The value chain provides a systematic way of 'disaggregating' the firm into its relevant units so that managers are better able to understand the nature of costs and potential sources of differentiation (Jones and Tilley, 2003). For that reason, it is believed that the value chain links upstream suppliers and downstream buyers. The result should be a larger stream of activities known as the value system (Porter, 1985, Figure 2.4). This is because the development of competitive advantage depends not only on the firm's specific value chain, but also on the value system of which the firm is a part (Porter, 1985).

In the traditional value chain (Figure 2.4), the emphasis is on initiating inbound logistics and operations through R&D (Step 1), putting well-understood products through outbound logistics (Step 2) on the market (Step 3) and offering service to buyers (Step 4). However, advances in technology and problems that SMEs are experiencing identified two critical areas in a traditional value chain as shown in Figure 2.5. One is in a domain of primary activities where services and buyers identified as Step 4 in the traditional value chain replaces R&D and becomes Step 1, so the traditional value chain is reversed at this point, as suggested by Venkatraman (1994). He argues that to invent value in the new ICT, environment managers must reverse the traditional value chain characteristics in which businesses define themselves in

terms of the products they produce (Venkatraman, 1994). The other critical area is related to support activities. If SMEs are to integrate Internet technology into their value system, their support activities need to become the primary activities (Figure 2.5).

It could be argued that, as a result, the company's technological infrastructure and human resources will form the core of e-business planning (Davidov and Malone, 1992; Durkin and McGowan, 2001a). This would enable SMEs to make the relationship between resources and opportunities offered inside and outside the organisation possible, will be customer focused (Fahy and Hooley, 2002; Brorson, 1998), and will create value through innovation and integration (Figure 2.5).

Although new figures show that the gap between large organisations and SMEs is closing and the pattern of winning in the marketplace is changing due to technological advances (Afuah and Tucci, 2003), the smallest businesses are still resisting the change (Dynamic Markets, 2007; ONS, 2008). The micro businesses have still not recognised that competitive advantage, which once belonged exclusively to the large firms, has become available to all SMEs through geographically open boundaries created by the Internet. In today's virtual environment organisations (large or small) that can understand their customers' problems, needs and desires, which can provide solutions to these problems; which can communicate those solutions to their target audiences; and which can provide easy customer ordering will be in a position to win in the marketplace (Lynn et al., 1999; Chaston, 2004). The era of the e-business is underway. This represents any system of suppliers, distributors, service providers, infrastructure providers, and customers that use the Internet as the basis for business communications and transactions (Afuah and Tucci, 2001; Jelassi and Enders 2008 and Chaffey, 2009). This new form of value creation is becoming the basis for development of a competitive strategy, which could be very beneficial for SMEs.

## 2.3 Internet development

To understand how e-business is currently used in the global environment, the Internet, the WWW, e-mail, e-commerce and e-business developments are examined in this section.

The Internet was born in 1982 at the crossroads of the computer and telecommunication industries. As a global network it consists of millions of computers around the world. All of them can be connected with each other through Internet technology. People pay their bills, book airline tickets and hotel rooms; rent, sell and buy homes, cars, and do a lot more online. Today, almost all businesses and publicly funded institutions, including the Government and its departments, have an opportunity to communicate online (Naughton, 2000).

During the Cold War in the 1950s and 1960s, the USA poured money into research in radar, communications, and computers (Hobbes, 2002). The USA was concerned by the signs of Russian superiority in technology, as illustrated by the Sputnik space missions. New agencies were created in the USA to promote advances in science and technology. One of these was the Advanced Research Project Agency (ARPA), which was formed in 1958 as part of the US Department of Defense (DoD). ARPA distributed funds to research institutes, one of the significant beneficiaries being the Massachusetts Institute of Technology (MIT). MIT graduates worked for new technology companies, which were being set up close to the MIT campus and one of the companies, Bolt, Barenek & Newman (BBN), helped develop ARPAnet in the late 1960s. ARPAnet was designed to provide reliable communication in a potential nuclear war.

In 1982 the Internet arrived and in 1990 the aging ARPAnet was switched off. Thirty years after the introduction of a secret US military research network ARPAnet, more than 600 million people were using the Internet daily (Nua, 2002).

However, the situation for UK companies is surprisingly different. Research conducted in 2007 by Dynamic Markets and on behalf of Internet Service Provider (ISP) UK Online shows that two-thirds of small businesses are still working without any Internet connection, e-mail or website. This study indicates that despite the phenomenal advances in the technology, the smallest businesses have not yet grasped the benefits of the Internet. This research also reported that 17% of those companies who use the Internet were still using dial-up connection instead of broadband. On the other hand, larger organisations, especially those with over 1,000 employees (Dynamic Markets, 2007), use the Internet to their advantage. The Office for National Statistics (2008) research shows that almost 100% of larger organisations use the Internet and have a broadband connection.

Furthermore, the Office for National Statistics (2008) also reported that on average 92% of businesses in the UK with ten or more employees had Internet access. This leaves the smallest businesses behind as 66% of them do not own a computer and believe that it is not necessary for their business (Dynamic Markets, 2007).

### 2.3.1 World Wide Web

Even though the Internet was developed more than three decades ago the introduction of the World Wide Web (WWW) was a relatively recent event. In 1990, Tim Berners-Lee of CERN (the European Laboratory for Particle Physics) developed the WWW and several communication protocols that formed its backbone (Deitel et al., 2001). The WWW allows computer users to locate and view multimedia-based documents (documents with text, graphics, animations, audios and /or videos) on almost any subject. This is also known as *Web 1.0*. The



burst of dot.com in 2000 marked the start of *Web 2.0*, an umbrella term covering websites that allow users to upload their own content – photos, videos, comments, ratings, and to connect individuals. Some researchers claim that Web 2.0 has been a little bit more than just a technological evolution. Web 2.0 has seen the emergence of social media. Some known examples are Google, YouTube, Flickr, Wikis, Blogs and Wikipedia. In 2008 *Web 3.0* started to emerge. This is yet another technological evolution designed to provide users with an even better experience, both online and offline. Web 3.0 has the potential to remove the wall between the web browser and the desktop, providing a full and secure integration with devices and services exposed by the operating systems (OS). Examples of features already available are Google Gears, The Adobe Flash Player and Java technology (Deitel et al., 2001).

The Internet and WWW will surely be listed among the most important and profound creations of humankind. In the past, most computer applications ran on stand-alone-computers, i.e. computers that were not connected to one another. Today's applications can be written to communicate among the world's hundreds of millions of computers. The Internet mixes computing and communications technologies by: (1) making information instantly available and conveniently accessible worldwide; (2) making it possible for individuals and small businesses to enjoy worldwide exposure; (3) changing the nature of the way business is done (Deitel et al., 2001). However, the UK's smallest businesses have yet to recognise the importance of the Internet and WWW (Dynamic Markets, 2007).

### 2.3.2 E-Mail

Electronic mail is a natural use of networked communication technology that developed along with the evolution of the Internet. Indeed, message exchange in one form or another has existed from the early days. However, the online e-mail services started in 1993 when the large network service providers America Online and Delphi started to connect their proprietary e-mail systems to the Internet, beginning the large-scale adoption of Internet e-mail as a global standard. Although e-mail was developed for the ARPANet shortly after its creation, it has evolved into a powerful technology that has become the most widely used application on the Internet at the beginning of the 21<sup>st</sup> century (Deitel et al., 2001).

### 2.3.3 E-commerce

For many businesses the Internet and the WWW made trading easier and quicker. Electronic commerce (e-commerce) quickly became a very useful tool for large organisations. However it is seen differently by many people. There exists a wide variety of e-commerce definitions and conceptualisations covering a plethora of issues, applications, and business models. For

example, academic definitions are narrow and focus on applications and business support. Zwass (1996:21) defines e-commerce as

*“...the sharing of business information, maintaining business relationships and conducting business transactions by means of telecommunications networks”.*

Others (Applegate, 1999; Fellenstein and Wood, 2000) also support this view and consider e-commerce to include various processes within and outside the organization in addition to buying and selling activities. On the other hand, Laudon and Traver (2007:34) define e-commerce simply as

*“...the use of the Internet and Web to transact business within the context of a global marketplace”.*

This is mainly because some organisations and academics view the evolution of e-commerce in different ways: 1<sup>st</sup> generation of traditional e-commerce, 2<sup>nd</sup> generation of Internet based e-commerce, 3<sup>rd</sup> generation as the golden age of e-commerce 1995-1999 and 4<sup>th</sup> generation of global e-commerce including mobile commerce (m-commerce).

The first generation e-commerce is also known as traditional e-commerce and refers to forms that have existed since 1965 and result in trillions of dollars worth of activity every day. It was made possible by the development of:

- Electronic Data Interchange (EDI) – the exchange of business documents from one computer to another in a standard format
- Automatic Teller Machines (ATMs) – when consumers were able to withdraw money
- Electronic Point of Sale (EPOS) – when consumers were able to make purchases using POS terminals
- Credit cards systems that crossed organisational boundaries and enable organisations to exchange information and conduct business electronically commonly known as inter-organisational systems (Fellenstein and Wood, 2000; Senn, 2000; Molla and Licker, 2001).

In the mid 1970s, EDI was formalised by the Accredited Standard Industry Committee in the United States which allowed companies to exchange information, place orders, and conduct electronic funds transfer through computers (Iacovou et al., 1995). However, the take up of EDI was slow. By the late 1990s less than 1% of companies in Europe and the United States had adopted EDI (Timmers, 1999). The huge expense to getting connected to an EDI network and some technical problems limited its spread (Turban et al., 2008).

The second generation of e-commerce is characterised by transaction of goods and services through the Internet, which started as a research tool, but has generally evolved into a commercial tool. In the 1980s the Internet had still maintained its non-commercial nature, and all of its networks were based on the free use of the National Science Foundation Network (NSFNET) backbone. The primary users were still scientists and engineers working for the Government of United States or for universities. Academics and researchers were the only ones capable of using the Internet, because sophisticated computer skills were necessary for Internet use at that time (Eccleson, 1999; Becker, 2008). The biggest breakthrough, however, came in 1991 when NSFNET decided to lift the commercial restriction on the use of the network, and thereby opened up opportunities for e-commerce which consequently led to its golden age (Deitel et al., 2001; Kim, 1999).

The golden age of e-commerce between 1995 and 1999 is seen as the third generation of e-commerce. In 1995, private companies took over a leading role on the Internet (Kim, 1999). The term 'e-commerce' became popular, signifying the rapid development of commercial applications of the Internet. Also in 1995, Amazon.com, nowadays the largest online (book)store, was launched. Two months later, e-Bay, the world's first online auction site, was launched. In 1996 Dell began to sell personal computers directly to consumers on the Internet and in 1997, the commercial domain (.com) replaced the educational domain (.edu) as the largest in use (Kim, 1999; Becker, 2008). The Internet became the fastest growing technology in economic history (Becker, 2008).

The dot.com bubble burst in 2000 and 2001 and the dot.com crash was attributed to the unrealistic expectations of e-commerce and Internet companies. Ironically, despite the bankruptcy of many Internet companies, e-commerce sales actually increased in the year of the crash 2000–2001 (Cassidy, 2002). The increased sales created the ground for the resurgence of e-commerce in 2002. The fourth generation of e-commerce continues its successful journey through additional opportunities created by advances in global telecommunication and mobile technology.

The 'digital economy' emerged in the last decade of the 20<sup>th</sup> century which is based on an electronic goods and services produced by an electronic business and traded through electronic commerce, it is from here that e-business began its journey.

### 2.3.4 E-business

The late 1990s witnessed the initial breakthrough of *e-Business 1.0*, and the more conservative, cost cutting period after the failure of the new economy bubble in the early 2000s, also known as *e-Business 2.0*. The underlying information infrastructures have matured and today few

people doubt their importance for modern business and their leveraging effect (European Commission, 2007). The novel word of 'digital economy' that emerged in the last decade of the 20<sup>th</sup> century brought together e-commerce and e-business. The digital economy in which businesses perform today is based on electronic goods and services produced by e-business and traded through e-commerce. The major advances in global telecommunications, mobile communications as well as cross-cultural practices, created fertile ground for *e-Business 3.0*. The improved e-maturity of organisations and companies' ICT infrastructure opened new opportunities for outsourcing specific business processes to boost the productivity of companies.

Similar to e-commerce, there is a no universally accepted definition of e-business. Consequently, the term 'e-business' is used interchangeably (Fillis et al., 2003) and/or is mistaken (Lawson et al., 2003) with 'e-commerce'. E-business means different things to different people (Searle, 2001), and the term has been variously defined (Rodgers et al., 2002; Searle, 2001; Martin and Matlay, 2001). To make the term 'e-business' clearly understood, in this study the definition used by IBM is adopted (Van Hooft and Stegwee, 2001: 44):

*"A secure, flexible and integrated approach to delivering differentiated business value by combining the systems and processes that run core business operations with the simplicity and reach made possible by Internet technology."*

E-business is a powerful vehicle for different kinds of improvement within a company. It can be used for effectively managing the transformation of a traditional business strategy that represents the traditional economy into a new e-economy that symbolises a modern and visionary business approach (Van Hooft and Stegwee, 2001). Although e-business allows for the extended organisation to be connected together (Van Hooft and Stegwee, 2001), it is still a relatively new and under-developed practice in UK SMEs (Waters, 2000; FSB, 2002). Therefore, for owner-managers who have become aware of the benefits associated with e-business applications and wish to replicate these results within their own firms, knowledge and understanding of e-business and its practices are essential (Kalakota and Robinson, 2001; Local Future Groups, 2001; DTI, 2003). Interestingly, King and Clift (2000) argue at the turn of the century that the 'e' will soon be dropped and that e-business will be business as it comes to be generally understood. Almost a decade later however, e-business in UK SMEs is still in its infancy and generally not accepted as a way of creating competitive advantage (DTI, 2008).

The definition of e-business and the arguments above imply that e-business is more than just technology. It is about considering customers' needs. It is using the Internet and other information and communication technologies to increase business performance and success. The most important function of e-business is its interconnectivity and system interaction (Follit, 2000). As a result of e-business automation, many human functions are eliminated from various



processes such as unnecessary keyboard input, intervention and internal reprocessing of electronic business information (Follit, 2000). Efficiency improvement resulting from faster processing and reduced errors is then realised in routine data processes and business interactions (Follit, 2000). However, the involvement and commitment of, employees continue to be a major factor in the implementation of e-business strategies in SMEs. For that reason, a study by Gunasekaran et al., (2001) promotes a better understanding of organisational issues through their proposed framework. This suggests that an appropriate organisational IT infrastructure still depends on the level of employees' skills, training, education, incentive and rewards.

Furthermore, e-business allows manufacturing and the service industry to interact with their suppliers and customers and in exchange this improved relationship results in increased loyalty, increased profits and a competitive advantage (Alshawi, 2001; Rodgers et al., 2002). Alshawi (2001) further claims that through e-business this relationship between suppliers and customers allows the development of a responsive and integrated infrastructure that supports the penetration of supply chains through systems such as enterprise resource planning (ERP). In other words, e-business is changing supply chains through its various applications. For example, e-commerce helps a network of supply chain partners to identify and respond quickly to changing customer demand captured over the Internet, while e-procurement, allows companies to use the Internet for processing direct or indirect materials, as well as handling value-added services like transportation, warehousing, customer clearing, payment, quality validation, and documentation (Johnson and Whang, 2002; Lee and Whang, 2002a). In addition, applications such as e-collaboration facilitate coordination of various decisions and activities among the supply chain partners, both suppliers and customers, over the Internet (e.g. coordination of engineering changes in the bill-of-materials for a product that is manufactured by an outsourced partner (Johnson and Whang, 2002). It is believed that these e-business applications would provide organisations with a greater transparency in supply chain operations as collaboration is very important for their success and would consequently create grounds for virtual supply chain management as proposed by Gunasekaran and Ngai (2004).

The key to e-business success is to understand how customers work as well as to adapt the management of business. It is a simple yet powerful concept which connects customers, employees, suppliers and distributors to the business systems and information that they need (Van Hooft and Stegwee, 2001; Rodgers et al., 2002; Koh and Maguire, 2004).

## 2.3.5 E-business technological enablers

E-business consists of three technological enablers: *Internet*, *Intranet* and *Extranet*. Together with a computer, these technological enablers allow organisations to be globally connected by using a private network for their employees and an external network for their business partners.

### 2.3.5.1 Internet and e-business

The Internet is seen as the main technological enabler of e-business and its development was explained in the previous section 2.3. As an integral part of e-business the Internet is seen as a global connection of computer networks in organisations where any computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers). Today, the Internet is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet from other communication channels is its use of a set of protocols called TCP/IP (for Transmission Control Protocol/Internet Protocol). To operate an e-business organisations also need two recent adaptations of the Internet technology, the Intranet and the Extranet, which also make use of the TCP/IP protocol (Naughton, 2000). In other words, organisations use the Internet for e-mails, the World Wide Web, and to facilitate their Intranet and Extranet.

### 2.3.5.2 Intranet

An Intranet is a private network that is contained within an enterprise and uses a secure network that is accessible to those with privileges. Organisations are increasingly making use of Intranets for more effective communication and information exchange between employees as well as to support workflow processes (Callaghan, 2002). It may consist of many interlinked local area networks (LANs) and also use leased lines in a wide-area network (WAN). Typically, an Intranet includes connections through one or more gateway computers to the Internet. The main purpose of an Intranet is to share company information, to promote work group collaboration by providing access to online services, teleconferencing and electronic tools (e.g. white boards, discussion forums, and chat rooms). Intranets are increasingly being used to support project management activities and to streamline communication process associated with e-mail. Management is relying on Intranets for collaborative decision-making and the efficient dissemination of information throughout the organisation (Callaghan, 2002; Becker, 2008) Intranet is widely used by large organisations and educational establishment (Freel, 2000) however, it is less popular within SMEs. This is mainly due to the lack of awareness and interest

on the part of owners/managers. Their perceived benefits are not necessarily linked to the Internet as a 'good' thing (Iacovou et. al., 1995; Kirbi and Turner, 1993; Thong and Yap, 1995; DTI 2007; Yorkshire Forward, 2006).

### 2.3.5.3 Extranet

An Extranet is a private network that uses Internet technology and the public telecommunication system to securely share part of business information or operations with suppliers, vendors, partners, customers, or other businesses (Wilkinson, 2005). An Extranet can be viewed as part of a company's Intranet that is extended to users outside the company. It is a private network with controlled access to those with privileges. Extranets are growing in popularity in the business-to-business (B2B) commerce environment, as they bring together members of a supply chain through network capabilities. Extranets support inventory management by allowing suppliers to check an organisation's delivery schedule and inventory levels through private network capabilities (Becker, 2008). Extranets have also been described as a 'state of mind' in which the Internet is perceived as a way to do business with other companies as well as to sell products to customers (Naughton, 2000).

An Extranet requires security and privacy. These can include firewall server management, the issuance and use of digital certificates or similar means of user authentication, encryption of messages, and the use of virtual private networks (VPNs) that tunnel through the public network.

While the Extranet is very popular with large organisations (Freel, 2000), it is most likely to be used by medium-manufacturing companies to facilitate their supply chain (Daniel and Myers, 2000). Research in this area shows that the more sophisticated the system, the less likely it is to be used by all SMEs and in particular the smallest organisations which employ less than 10 employees. SMEs that have computers are still more likely to use only e-mails and the WWW for their business (DTI, 2003, 2007).

## 2.3.6 Impact of the Internet and e-business on businesses

From its humble beginning 5,000 years ago to the 21<sup>st</sup> century ICT has experienced many changes. The last decade of the 20th century and the beginning of the 21st century have seen unparalleled advances in technologies. As previously mentioned and proven during the dot.com crash, it is now widely believed that a new digital era and success is reserved for those companies which integrate emerging technology and traditional business operation (Chaston, 2004). This is because the Internet is a powerful enabling technology that can be used in almost

every industry and it plays a critical role in organisational strategy formulation processes (Porter, 2001). However the use of the Internet differs between organisations.

For the purpose of this study it is important to recognise, emphasise and exploit the ways of doing business in the global economy that have been enabled by the invention of the Internet. E-mails, websites, e-commerce and e-business are seen as new business-enabling technologies that go far beyond just putting a brochure on-line. Essentially what is happening globally is that industrial sectors such as telecommunications, satellite broadcasts, digital television and computing are blending together. As a result of this integration, the world is being offered a more flexible, more rapid and extremely low cost way of exchanging information (Chaston, 2004).

After the dot.com bubble burst at the turn of the century, the cyberspace trading survivors were typically the companies who had added on-line trading to their existing market operations (Chaston, 2004). Because of that experience, many managers of large organisation recognised the need to incorporate technological issues within strategic decision making. Consequently, in recent years, large organisations have increasingly discovered that technology and strategy are inseparable and need to be considered in a company's strategic planning. One way or another technology should be included in the process of creating a concept of business; identifying its goals and objectives and the long-term policies to meet them and formulating plans of action. In return, technology helps to create a system of planning and production through which a company's abstract capability is translated into the goods and services on which it ultimately depends for success (Chaston, 2004).

On the other end of the spectrum, SMEs have been reluctant to start embracing e-commerce as a path through which to exploit new, entrepreneurial opportunities. The UK Online for Business (2007) director Chris Stenning said:

*"I was surprised by the low level of Internet use by small companies in the UK - only 44 per cent of businesses who employ less than 10 people have a computer! I was expecting the figure to be nearer 70-80 per cent. It does show that the smallest businesses have not grasped the benefits of the Internet."*

For example, SMEs have the following opportunities in the use of e-commerce: the Internet, electronic data interchange, e-mail, electronic payment systems, and advanced telephone systems, handheld digital appliances – such as mobile telephones, interactive televisions, self-service kiosks and smart cards. If the owners/managers of SMEs decide to use e-commerce as a path through which to exploit new, entrepreneurial opportunities, then an immediate outcome is that the organisation's knowledge platform becomes much more closely linked with other knowledge sources elsewhere within the market system (Seybold and Marshak, 1998). The reason why this occurs is that once buyers and sellers become electronically linked, the volume

of data interchange dramatically increases as trading activities begin to occur in real-time. The outcome is the emergence of a very dynamic, rapid response to changing circumstances by both customer and supplier within the market system (Chaston, 2004).

By implementing technologies in their businesses, the potential benefits for SMEs owner/managers are: to cut costs, increase competition and improve the functioning of price mechanisms in many markets (Anon, 2000; Anon, 2001). As such, it may bring the world closer to the textbook definition of perfect competition in which there is abundant information, zero transaction costs and no barriers to entry. Although it is as yet hard to test such theories, some studies seem to support the concept of markets moving towards a perfect competition model (Internet Indicators, 1999; Anon, 1999; Anon, 2000; Anon, 2001; Forrester Research, 2000; E-commerce times, 2000; Chaston, 2004). In B2B markets, e-business is also impacting on operating costs. Procurement costs are falling because it is easier to locate the cheapest supplier and moving purchasing online is reducing transaction costs. There is also evidence to suggest that supply chain management is being made more efficient and firms are able to significantly reduce inventory holding costs (Chaston, 2004).

Emerging economies could be the prime beneficiaries of e-business. As the Internet reduces transaction costs and exploits the economies of scale available from vertical integration, this could lead to a decline in the optimal size of firms in the future. That means that it has never been more important for SMEs in the UK to integrate technology and bring their businesses forward and into the 21st century. This study will now concentrate on the e-business and its impact on SMEs. The following section will describe e-business in more detail and link it to the distinctive features of SMEs.

### 2.3.7 Use of e-business in UK SMEs

The survey conducted by National Statistics Online in 2005 showed that 7 out of 10 UK businesses have a website. The research covers only organisations that employ more than 10 employees as previous data indicated that the smaller the organisation the less likely it was to use ICT to its benefit (Yorkshire Forward, 2006; Dynamic Markets, 2007; ONS, 2008).

In that study it was reported that 93% of businesses in the UK with ten or more employees were using personal computers or similar devices. Amongst the largest businesses (those with 1,000 or more employees) 93% use computers (Dynamic Markets, 2007). This compares with 70% of businesses between 10 and 49 employees and only 44% in businesses for less than 10 employees (Dynamic Markets, 2007). Furthermore, the research shows that companies with computers do not necessarily use the Internet or WWW. However, for many businesses, websites have become an essential means of communicating with customers. In 2005, 70% of



businesses reported having a website, while one in three (31%) had an Intranet, and 8% had an Extranet (NSO, 2005). This indicates that many businesses, regardless their size, are still not using advanced technology (i.e. e-business) as the basis for their businesses and only a small percentage have embarked on that territory. More specifically, figures indicate that the external connectivity with customers and suppliers is very limited and it is possibly mainly used by few larger organisations.

### 2.3.8 SMEs barriers and benefits of adopting ICT and e-business

Taking into consideration SMEs distinctive characteristics and ways how they can create a competitive advantage it becomes apparent that the use of technology should bear a positive impact on their business strategies (Table 2.4–Table 2.6). However, despite the fact that 1.9 million small businesses in the UK are connected to the Internet, surpassing the government's original goal of 1.5 million (DTI, 2003). Research by the UK's Federation for Small Businesses (2002), DTI (2007), Yorkshire Forward (2006), Dynamic Markets (2007), Pavic et al. (2007); ONS (2008) and Lyons et al. (2009) indicate that the use of the Internet by SMEs is still relatively underdeveloped. This is reflected in the areas of resources (Chappell et al., 2002; DTI 2007; ONS, 2008; Lyons et al., 2009), capabilities (Daniel and Myers, 2000; Kalakota and Robinson (2001), Docherty and Simpson, 2003; Yorkshire Forwards, 2006; Zhu, 2009), product development ( Bunker and MacGregor et al., 2000; DTI, 2003 and 2007; Vargo and Lusch, 2004), and environment (Chappell et al., 2002; Martin and Matlay 2001; Al-Debei et al., 2008; Hussain et al., 2009) which in return create barriers for value creation in SMEs through efficiency, innovation, quality and customer responsiveness (Figure 2.2). These barriers to e-business adoption are summarised in Table 2.8.

**Table 2.8: Barriers to e-business adoption**

<b>Barriers to e-business competitiveness</b>	
<b>Resources</b>	<b>Reported by</b>
Limited resources in terms of time and effort to incorporate IT facilities	Chappell et al. (2002); Yorkshire Forward (2006); DTI (2007); Dynamic Markets (2007); Pavic et al. (2007); ONS (2008); Al-Debei et al. (2008) ; Lyons et al. (2009)
Ignorance surrounds the technology fuelling concerns about security, return on investment, costs, legislation and interoperability	Timmers (1999); Pavic et al. (2007); Al-Debei et al. (2008); Hussain et al. (2009); Zhu et al. (2009)
High running costs, lack of awareness of what e-technology involves, shortage of technological skills, insufficient knowledge and education, absence of help and time	Darch and Lucas (2002); Lyons et al. (2009)



<b>Resources</b>	<b>Reported by</b>
Inadequate telecommunication infrastructure, lack of trust and the perceived lack of relevance of e-technology to the particular industrial sector	Docherty and Simpson (2003)
Most businesses do not want to use the internet for online trading, preferring instead to use ICT to augment changes in how they connect with their customers and reduce costs through more efficient management of their internal processes.	UK Online for Business (2002); Yorkshire Forward (2006); ONS (2008)
Many small businesses still do not own a computer and cost is still a major barrier for those companies with a turnover of less than £50,000	Federation for Small Businesses (2002); DTI (2007); ONS (2008)
<b>Capabilities</b>	<b>Reported by</b>
The older the SMEs the less likely they were to use e-technology	Daniel and Myers (2000); Docherty and Simpson (2003)
Perceived benefits by owner/managers in SMEs – Owner/managers do not necessarily think that the Internet is a good thing.	Iacovou et al. (1995); Kirbi and Turner (1993); Thong and Yap (1995); Martin and Matlay (2001)
Lack of education, IT skills and computer literacy as well as the unwillingness of managers to be responsible for technological change. Due to dramatic changes in e-technology, market expectations and market responses, the opportunities for SMEs are clearly in improving their existing skill profile if they are to compete in the new e-economy. Local Futures Group (2001) suggests that increasing the knowledge and skills base of SMEs across the board, especially in low-knowledge industry sectors holds the key to transforming SMEs. Their research shows a high correlation between knowledge intensity in the SME sector, and the state of e-commerce development at a local level.	Kalakota and Robinson (2001); Kirby and Turner (1993); Thong and Yap (1995); DTI (2003, 2007); Local Futures Group (2001); Al-Debei et al. (2008); Hussain et al., (2009); Lyons et al., (2009); Zhu et al., (2009)
<b>Core business (Product/Service)</b>	<b>Reported by</b>
SMEs are product oriented rather than service which limits their e-business opportunities SMEs are not interested in large shares of the market, have restricted product range and limited market share.	Reynolds et al. (1994); Bunker and MacGregor (2000); MacGregor et al. (1998); DTI (2003); Quayle (2002); Vargo and Lusch (2004); Chaffey (2009).
<b>Environment</b>	<b>Reported by</b>
Lack of SME bespoke information	Chappell et al. (2002); Al-Debei et al. (2008); Hussain et al. (2009)
E-technology readiness and adoption vary by industry sector	Bodorick et al. (2002); Martin and Matlay (2001)
<b>Value creation</b>	<b>Reported by</b>
New Product Development (NPD) – This links back to SMEs' orientation to niche markets and concentration on narrow product range that limits their e-business opportunities.	Reynolds et al. (1994); Bunker and MacGregor (2000); Quayle (2002); MacGregor et al., (1998); DTI (2003, 2007); Chaffey (2009)

### 2.3.8.1 Resources

Table 2.8 shows that SMEs experience limited IT resources in terms of time and effort to incorporate more advanced IT facilities (Chappell et al., 2002; Yorkshire Forward, 2006; DTI, 2007; Pavic et al., 2007; ONS, 2006; Lyons et al., 2009). These studies identified that SMEs still tend to use the basic functions of the Internet only to send e-mails, transfer files or documents or gather information. Throughout the literature it has been argued that effective adoption and implementation of ICT may rely heavily on individual factors such as

organisational size, structure, mix of available human and financial resources and capabilities (Supri et al., 2000; Ried; 2008; Lyons et al., 2009). Studies so far show that although SMEs are more flexible and more adaptable to change (Carrier, 1994; d'Amboise and Muldowney, 1988), can act faster (Katz, 1970) and are more receptive to new ideas and techniques (Hitt et al., 1991; Woo, 1987), they lack the human and financial resources and capabilities of large firms (Ettlie, 1983; March, 1981; Dubey and Wagle, 2007; Lyons et al., 2009; Zhu, 2009). Therefore, they face limitations in purchasing and implementing new systems. Furthermore, Lynn et al. (1999) argue in their study that while speed, flexibility and the receptivity to new processes work to the advantage of a small firm, the lack of financial resources of SMEs makes it critical for them to pick their strategies carefully. The UK's Federation for Small Businesses (2002), Yorkshire Forward (2006), Dynamic Markets (2007), ONS (2008); Lyons et al. (2009) and Zhu et al. (2009) complement that study by suggesting that 30 % of small businesses still do not own a computer. Cost is still a major barrier for those companies with a turnover of less than £50,000.

### 2.3.8.2 Capabilities

Owners/managers of SMEs do not necessarily think that the Internet is a good thing. Therefore, a lack of perceived benefits, education, IT skills and computer literacy as well as the unwillingness of managers to be responsible for technological change, impact on the level of IT used in these organisations (Kirbi and Turner, 1993; Thong and Yap, 1995; Martin and Matlay, 2001).

Due to dramatic changes in e-technology, market expectations and market responses, the opportunities for SMEs are clearly in improving their existing skill profile if they are to compete in the new e-economy. Local Futures Group (2001) suggests that increasing the knowledge and skills-base of SMEs across the board, especially in low-knowledge industry sectors, holds the key to transforming SMEs. Their research shows a high correlation between knowledge intensity in the SME sector, and the state of e-commerce development at a local level.

This ignorance of the use of Internet technology and lack of awareness of what e-technology involves by SMEs (Timmers, 1999; Pavic et al., 2007; Al-Debei et al., 2008; Hussain et al., 2009; Zhu et al., 2009) is a result of shortage of appropriate technological knowledge, education and skills by human resources in firms (Darch and Lucas, 2002; Lyons et al., 2009).

### 2.3.8.3 Core business

Scholars such as Reynolds et al. (1994), Bunker and MacGregor (2000), MacGregor et al. (1998), DTI (2003), Quayle (2002), Vargo and Lusch (2004), and Chaffey (2009), argue that SMEs are product oriented rather than service-oriented and that limits their e-business

opportunities. They further claim that SMEs are not interested in large market share which restricts their product range. If, however, SMEs expand their market share and remove the barriers inherited by their traditional approach to niche market (Chaston, 2004 and UK Online 2007) by changing their organisational strategies (Grant 1998 and Wittington, 1999) and investing more in IT infrastructure their opportunities would increase (Lyons et al., 2009; ONS, 2008).

#### 2.3.8.4 Environment

Since SMEs lack bespoke information (Chappell et al., 2002) their customer responsiveness is slow and limits the added value to their organisations (Al-Debei et al., 2008; Hussain et al., 2009). In addition, firms' IT readiness and adoption vary by industry sector (Bodorick et al., 2002; Martin and Matlay, 2001) and not all SMEs are taking the advantages offered by the UK Government through various initiatives to improve their technological resources (DTI, 2003, 2007). As a result of slow responses to the environmental changes and IT advances SMEs are not able to differentiate themselves from their competitors and add value to their core businesses (DTI, 2003, 2007; Lyons et al., 2009).

#### 2.3.8.5 Value creation

The value creation of SMEs is mainly seen through New Product Development (NPD) and it links back to SMEs' orientation to niche markets and concentration on narrow product ranges which limits their e-business opportunities (Reynolds et al., 1994; Bunker and MacGregor, 2000; Quayle, 2002; MacGregor et al., 1998; DTI, 2003, 2007; Chaffey, 2009). By investing in better IT infrastructure, SMEs could potentially create additional value and be capable of efficiently organising activities within ever changing and flexible business environment (Hitt et al., 1998; Prashantham, 2008; Naldi, 2009).

In contrast to barriers to e-business adoption by SMEs, Table 2.9 provides a summary of benefits that are believed to be creating value through improved efficiency, quality, innovation and customer responsiveness (Chapman et al., 2000; Lyons et al., 2009; Zhu et al., 2009). These, however, can only come via a company's investment in resources (Yorkshire Forward, 2006; Dynamic Markets, 2007; ONS, 2008; Lyons et al., 2009), capabilities (Al-Debei et al., 2008; Hussain et al., 2009; DMD, 2007; Zhu et al., 2009), product development (Chaston, 2004; UK Online for Business, 2007) and responding to the competitive environment (Daniel and Myers, 2000; DTI, 2007; Lyons et al., 2009).



**Table 2.9: Benefits to e-business adoption**

<b>Benefits for e-business competitiveness</b>	
<b>Resources</b>	<b>Reported by</b>
The Internet technology has become more affordable and widely available New opportunities have risen from available outsourcing of the adequate technology that aims at specific needs of SMEs. This would in return raise the brand profiles of SMEs	Yorkshire Forward (2006); Dynamic Markets (2007); Dubey and Wagle (2007); ONS (2008); Lyons et al. (2009)
<b>Capabilities</b>	<b>Reported by</b>
Knowledgeable staff to offer appropriate training and technical support to other employees Knowledgeable and well informed owner/manager who would influence and propel the decision-making process towards an e-business strategy	Al-Debei et al. (2008); Hussain et al. (2009); DMD (2007); Zhu et al. (2009)
<b>Core business (Product/Service)</b>	<b>Reported by</b>
Possibilities for SMEs to expand their market share and remove barriers inherited by their traditional approach to niches market and few customers Opportunities for SMEs to compete with their larger counterparts	Chaston (2004); UK Online for Business (2007)
<b>Environment</b>	<b>Reported by</b>
Responding to competitors by being their first	Daniel and Myers (2000) Sadowski et al. (2002)
To enhance customer relationships – added value by speed and responsiveness	Daniel and Myers (2000); Lyons et al. (2009)
External pressures by new customers and their value proposition of ‘what, when and how they want it, at the lowest cost’. Differentiation strategy added to core business of products/services	Kalakota and Robinson (2001)
UK Government – endless opportunities offered through various initiatives and support – improving SMEs resources (financial help) and capabilities (skills)	DTI (2003, 2007)
<b>Value creation through differentiation or low cost</b>	<b>Reported by</b>
Improve business competitiveness	Chapman et al. (2000); Lyons et al. (2009)
Increased sales and brand profile	Actinic (2002); Lyons et al. (2009); Moore and Manring (2009)
Low entry costs leading to an early return on investment whilst safeguarding such investments. It is argued that the Internet and e-business create almost perfect competition as barriers to entry are reduced, transaction costs lowered, customers are able to obtain better access to information, customer driven pricing is possible and all with the minimum of legislation and regulation.	Timmers (1999); ONS (2008); Zhu et al. (2009); Moore and Manring (2009)
As a company grows in size it becomes more difficult to communicate with its customers so that e-business and the Internet become more important	Daniel and Myers (2000); Actinic (2002); UK Online (2002); Lyons et al. (2009)
Availability of better and faster communication and information channels, accessible global market etc.	Chappell et al. (2002); Lyons et al. (2009)
The Internet as a ‘lifesaver’ for ailing businesses. It was suggested that some small businesses only exist because of moving onto the Internet and the notion of the internet as a salvation for businesses appears to be a relatively new idea	Moore and Manring (2009); Wroe (2002)
Endless opportunities, based on cost, rather than for strategic reasons	Moore and Manring (2009); Sadowski et al. (2002); ONS (2008)



For example, studies by Hoffman and Novak (1996) suggest that if SMEs can overcome the initial problem of acquiring the basic IT infrastructure (Table 2.8), the cost effectiveness of the new media would provide a viable alternative for SMEs (Table 2.9). They found that the Internet provides an effective channel for advertising, marketing, distributing goods and information services, all of which are believed to be the main source for gaining a competitive advantage in SMEs (Hoffman and Novak, 1996). Furthermore, Verity and Hof's (1994) study suggests that it may be nearly 25 % cheaper to conduct direct marketing through the Internet than through conventional channels. In contrast, statistics from the DTI (2003, 2007), Oftel (2003) and ONS (2008) show that, although the cost of being connected to the Internet has reduced dramatically in the past decade, it is still not used in a more sophisticated way by SMEs.

Interestingly, Fann and Smeltzer (1989) in their study of market information in SMEs concluded that as data become more abundant and less costly, SMEs will begin to use this information in more sophisticated ways. However, almost two decades later, the ONS (2008) shows that, although 70% of businesses have Internet access, only 57% of those use a broadband connection (ONS, 2008), and 18% have no anti-virus software (Dynamic Markets, 2007). But, it is believed that SMEs are not to be blamed for this and that the slow rollout of broadband in the UK has frustrated many of them (FSB, 2002). The level of broadband connection varies from 5% for the smallest companies to 99% for those with 1000 or more employees (ONS, 2000, 2008).

Overall, not only have SMEs limited financial resources in terms of acquiring suitable technology, but they also lack human capabilities, which contribute to a general lack of skills and knowledge within the organisation to cope with new ideas, concepts and technologies. Bharadway (2000) and Gunasekaran et al. (2001) argue that the ICT skills of SME owners/managers play a vital role and that IT-capable firms outperform others on profit and cost-based performance measures. Poon and Swatman (1997) also suggest that the reactive or proactive approaches of SME owner-managers to rapid technological changes in the marketplace will determine the level of ICT adoption and implementation. Managerial commitment and the perceptions of ICT benefits are seen as major factors in this process (Poon and Swatman, 1997).

## 2.4 Business models

Most organisations are in business to outperform their competitors. These businesses adopt new technologies to reinforce their existing competitive advantage and make profit in new markets. To do so, performance is critical and depends on business models and environment. Since

business environment was discussed in some length in section 2.2.3, this section concentrates on determining business model definitions and their use in organisations.

There has been a vast amount of academic research in this area and many studies focused on how to best define business models. To name a few, Timmers (1998) proposed a definition which is based on the architecture for products, services and information flow. In the same year Venkatraman and Henderson (1998) saw business models as the strategy that reflected the architecture of a virtual organisation along with three main factors: customer interaction, asset configuration and knowledge leverage. Two years later, Linder and Cantrell (2000), and Rappa (2000) defined business model as centres for revenue sources and value proposition. Their research identified that companies would make money by specifying where they are positioned in the value chain. The same idea of value proposition came from Petrovic et al. (2001); Amit and Zott (2001) and Torbay et al. (2001) who claimed that their definition of business models have a logic of business systems and therefore firms would create value through the exploration of new business opportunities. A year later in 2002, Stahle recognised that all definitions of business models were too complex for SMEs to understand and proposed a framework that represented a simplification of complex reality (Stahle, 2002). At the same time Magretta (2002) and Bouwman (2002) proposed a value chain definition which emphasised the relationship between a company, its customers, partners and suppliers. The research and creation of further definitions of business models based on the value proposition, collaborative transactions and business logic has continued with work by Rajala and Westerlund (2005); Andersson et al. (2006); Kallio et al. (2006); Al-Debei et al. (2008); Hussain et al. (2009); Lyons et al. (2009).

These selected scholarly definitions of business models show that many authors mean different things when they write about business models as noted by Linder and Cantrell (2000). This suggests that the term 'business model' is still vague and requires further conceptualisation.

Considering the complex theoretical underpinning of its meaning in this study the following definition of a business model by Afuah and Tucci (2003:4) is used:

*"The business model is the method by which a firm builds and uses its resources to offer its customers better value than its competitors and to make money doing so. The model is what enables a firm to have a sustainable competitive advantage, to perform better than its rivals in the long term. A business model can be conceptualised as a system that is made up of components, linkages between the components and dynamics".*

This definition is suitable for this study because it makes it possible to link new advanced technologies with the company's value chain, product portfolio, distribution and cooperation

strategies, and consequently enable firms to make money. In addition this definition complies with Porter's Five Forces Model that theoretically underpins this study.

## 2.4.1 Internet based business models

As the previous paragraph demonstrated, the discussion is still very much alive between scholars about how to define a business model. However, the development of the Internet and web has created a new debate – this time on how, in particular, an Internet business model should be defined. Afuah and Tucci (2003) suggest that the Internet business models would simply transform traditional organisations and will eventually create new companies that are purely Internet-based. However, there is always an opportunity and danger in traditional businesses that develop Internet-based business models, of inheriting impediments from the past, while purely Internet-based companies will be clean of that baggage (Afuah and Tucci, 2003).

For the purpose of this study the following definition of the Internet business model by Afuah and Tucci (2003:23) is adopted:

*“...the system components, linkages, and associated dynamics – that takes advantage of the properties of the Internet to make money. It takes advantage of the properties of the Internet in the way it builds each of the components – choice of profit site, value, scope, revenue sources, pricing, connected activities, implementation, capabilities, sustainability, and cost structure – and crafts the linkages among these components.”*

This definition is suitable for this study because it characterises and emphasises the Internet as a tool that can connect all components in an organisation. The definition of the standard business model and the definition of the Internet business model can act as a signpost for the creation of a new e-business model.

With the development and advances of the Internet and related technologies, businesses have experienced dramatic changes and many of them now essentially require adding 'e' in front of their business description. One of the most significant changes is in the way companies are conducting business and that was caused by the introduction of the Internet and WWW (see Table 2.10).

**Table 2.10: Timeline of e-commerce, e-business and web evolution\***

Development	e-commerce	e-business	Web
1965 – 1990	e-commerce 1.0		
1991 – 1994	e-commerce 2.0		Web 1.0
1995 – 2001	e-commerce 3.0	e-business 1.0	Web 2.0 (1999)
2002 – to date	e-commerce 4.0	e-business 2.0	
2006 – to date		e-business 3.0	
2008 – to date			Web 3.0

\*Note: This timeline was developed using the literature review in sections 2.3.3.1, 2.3.3.3, and 2.3.3.4.

Table 2.10 shows that from being primarily a resource for rapid and secure communications of the scientific and military communities, the Internet and related technologies have developed and are still developing into communication systems of choice for a variety of business activities in a diverse range of industries (Graphics, Visualisation and Usability Centre, 1999; Nua Internet Survey, 2000; Barnes and Hunt, 2001). For many organisations, these changes and dramatic developments of the Internet-based technologies presented in Table 2.10 are both fascinating and frightening at the same time. It is fascinating, because they have the power to accelerate the rate of change in companies that adopt them. It is frightening, because companies which ignore these growing opportunities are likely to fall behind in the competitive race for customers (Barnes and Hunt, 2001).

Unfortunately, despite the fast development of Internet-related technologies, UK SMEs have not yet reached the point at which most businesses are taking advantage of them. Although large organisations are almost all Internet companies (as presented earlier in Figure 2.1), the situation in the SMEs market is still such that more than half still do not have a computer let alone the Internet and other related technologies (Dynamic Markets, 2007; ONS, 2008).

To help organisations to deal with the changes caused by the rapid development of Internet technology, a significant number of new Internet business models have been introduced. Although online resources and services exert an impact on more traditional service delivery mechanisms, it is not clear how these emerging mechanisms for online service delivery will result in profitable business models.

Table 2.11–Table 2.15 which follow, show only some examples of e-business models and business model analysis which exemplify the various phases involved in moving towards greater sophistication, with respect to the use and management of information technology. Because of many different theories and definitions of business models these frameworks have been classified into four categories; (1) supply-chain management based business models; (2) operations-based business models; (3) strategic business models; and (4) social networking



business models. Since this study focuses on the area of strategic management, the strategic approach to e-business models is of most immediate concern.

In addition, Table 2.11–Table 2.15 offer an insight into the various models developed by different scholars for the purpose of improving organisational businesses. These tables identify model names, author(s), purpose and concerns. They are presented in the order of e-commerce, e-business and web development and cover a period of 26 years, 1984–2009.

**Table 2.11: Business model up to 1990s (e-commerce 1.0)**

Model	Classification	Author(s)	Purpose and concerns
A production system variable 'connectance' model	Operational	Burbidge, 1984	<p><b>Purpose:</b> Intended for the design of manufacturing systems. This model helps managers identify and study variable interrelationships. Managers should use their own understanding of the product environments as a key to make sense of complex interactions. The model was also used as a base for developing other simpler models.</p> <p><b>Concern:</b> Although designed as a simple model, in reality and when applied to real production situation it became complex, less effective and in the long run not suitable for smaller firms.</p>
The technology acceptance model	Strategic	Davis, 1989	<p><b>Purpose:</b> Addresses IT adoption, implementation and diffusion in terms of perceived ease of use and perceived usefulness based on behavioural intentions.</p> <p><b>Concern:</b> This model only takes into consideration one aspect of the organisation (behaviour). The new models also need to include further developments of the Internet (web 3.0, e-business 3.0 and e-commerce 4.0)</p>



**Table 2.12: Business models 1991–1994 (e-commerce 2.0 and Web 1.0)**

Model	Classification	Author(s)	Purpose and concerns
Typical 'linear' model of transforming technology through social processes and a new 'cyclical' model.	Supply chain	Scarborough and Corbett, 1992.	<p><b>Purpose:</b> This typical linear model implies that technological necessity operates by welding science, technology, markets and organisations together into an object and an interlocking causal chain.</p> <p><b>Concern:</b> Scarborough and Corbett argue for a rather different model, viewing invention, use and exchange of technology in terms of subjective actions and loosely coupled forms of social organisation, giving rise to a cyclical and reciprocal process rather than a linear process.</p>
Evolutionary process model, Five levels of IT – enabled business transformation model. This model was later used for developing e-commerce models by Poon and Swatman (1999).	Operational/ Supply chain	Venkatraman, 1994	<p><b>Purpose:</b> This well-accepted model suggests that there are five distinct levels of business transformation enabled by traditional IT systems. Out of five levels, Venkatraman suggests that the first two levels are within the organisation (evolutionary level), and the remaining three are external (revolutionary levels). Venkatraman's argument is that the benefits an organisation can realise from its IT investments will increase with these increased levels of integration. However, with these increased levels of organisation there will be a need for greater changes within the organisation.</p> <p><b>Concern:</b> Although this model gives a greater degree of freedom to organisations in terms of when the evolutionary level becomes revolutionary, it is still viewed as hierarchical.</p>

**Table 2.13: Business models 1995–2001 (e-commerce 3.0, e-business 1.0 and Web 2.0)**

Model	Classification	Author(s)	Purpose and concerns
MIT90 Framework – IT based capabilities of modern organisation	A general business model, later used for developing more sophisticated e-business models  Operational/ Strategic	Scott Morton, 1995	<p><b>Purpose:</b> An organisation can be viewed as being composed of five interrelated components: management processes, structure, strategy, technology, individuals and roles. Because they closely interact with one another, changes to any of the components will require changes to the others to bring their objectives and activities back into alignment. This framework was originally developed to guide organisations through their adoption of IT as an organisational and strategic resource from their computer automated environments (i.e. data processing, automated reporting, computer integrated manufacturing, etc.). This was done in the context of the traditional business model. It focuses on micro factors affecting the adoption of e-business and not individual factors. The key underlining assumption in the paradigm shift includes the adoption of a new organisational strategy and IT. For the organisation to benefit from the shift, all parts must be designed to work together.</p> <p><b>Concern:</b> The MIT90 framework does not, however, suggest applicability to e-business (because it is a business model with a focus on the IT revolution) or indicate the sequence of events that leads to success.</p>



Model	Classification	Author(s)	Purpose and concerns
Typology of owner-manager model	Strategic	Blackburn and McLure, 1998	<p><b>Purpose:</b> This model is based on three different types of owner/managers in SMEs: enthusiasts, pragmatists and artisans.</p> <p><b>Concern:</b> The model is founded on and restricted to only owner/managers: attitudes to ICT, level of ICT skills and management orientation.</p>
Model of Internet commerce adoption – MICA.	Operational	Cooper and Burgess, 1998	<p><b>Purpose:</b> Model attempts to describe evolutionary process of e-commerce adoption. They propose three stages – Promotion, Provision and Processing. This model follows a Darwinian evolution paradigm, i.e. the organism evolves from a simple structure to a more complicated one with better ability to adapt to the environment. The organisation starts with a simple and static Internet presence, then the organisation moves gradually to more complicated and integrated functions.</p> <p><b>Concern:</b> This model does not suggest any application to e-business. Due to advances in technology and a flexible environment, a static Internet presence is no option for SMEs anymore.</p>
Owner-manager characteristics model	Strategic	Southern and Tilley (2000); Van Akkeren and Cavaye (1999); Blackburn and McLure (1998)	<p><b>Purpose:</b> Used for developing different models and strategies in organisations based on human resources and their personal characteristics. Owner/manager characteristics are defined as personal characteristics of people who make the major decisions and determine strategies in SMEs. These characteristics have been perceived in the literature as crucial in adopting Internet strategies.</p> <p><b>Concern:</b> This model takes only one dimension and focuses on owners/managers' personal characteristics.</p>
The Internet commerce maturity model.	Supply chain	Poon and Swatman, 1999	<p><b>Purpose:</b> This model is based on Venkatraman's model. The authors suggest that there are three hierarchical stages (not five) of e-commerce adoption in SMEs. They believe that the first level is to develop Internet services (e-mail, websites) to communicate with suppliers and customers. The next step is to undertake a limited degree of integration with their existing internal systems and only at the highest level full integration is achieved. This suggestion turns Venkatraman's model inside-out when applied to e-commerce. Knowledge and experience is gained at each level of integration.</p> <p><b>Concern:</b> This model does not include the possibilities that some firms will never use e-commerce but may use e-business and vice versa.</p>
Department of Trade and Industry (DTI) SMEs e-business adoption ladder	Supply chain	DTI, 2000.	<p><b>Purpose:</b> The e-adoption ladder is a linear model which implies sequential adoption of ICT from e-mail and website use through e-commerce, e-business and to "transformed organisations". Originally this model was developed for e-commerce and later used for the development of the "transporter model" by Levy and Powell (2003).</p> <p><b>Concern:</b> The main criticisms of this model are its linear characteristics. Research in this area and further developments of the Internet show that some organisations would never trade on-line and some will only use Intranet, some only Extranet and some both. Therefore, models should not be restricting firms but helping them improve their businesses.</p>



Model	Classification	Author(s)	Purpose and concerns
Model based on typology of the whole firm	Operational	Southern and Tilley, 2000	<p><b>Purpose:</b> This model builds upon Blackburn and McClure's (1998) model of typology of owner/managers. They used an interview-based method, to develop a model which is based on the typology of the whole firm. It is a non-hierarchical approach, which suggests the relationship between types of ICT use is non-linear, dynamic and relative with fuzzy boundaries. Their typology is: (1) Low small-firm users of ICTs, (2) Medium small-firm users of ICTs, (3) High small-firm users of ICTs.</p> <p><b>Concern:</b> This model classifies firms in hierarchical level of ICT use and therefore is not suitable for organisations using e-commerce 4.0, Web 3.0 and e-business 3.0. Also, some organisations will never use all technological availabilities but only ones that are suitable for their type of business.</p>
E-business models	Strategic	Afuah and Tucci (2001)	<p><b>Purpose:</b> Internet business models and strategies provide a general framework for developing an Internet-based business model which offers theory-grounded arguments about traditional organisations and new Internet start-ups using various frameworks.</p> <p><b>Concern:</b> These business models are, however, concerned with revenue generation and not with how to gain a competitive advantage.</p>
SMEs e- business and e-commerce development model - crossing two digital divides	Strategic	Local Future Groups, 2001	<p><b>Purpose:</b> Linear model in terms of crossing two digital divides: (1) The first divide requires basic ICT skills to operate e-mail and a simple brochure website; (2) The second divide requires more advanced technology and ICT skills (including R&amp;D), and a wide range of specialised knowledge (for example, management development and strategy, marketing).</p> <p><b>Concern:</b> Concerns for this model are its linear characteristic and two aspects of technological usage. Some SMEs will always be in between these two divides and use one or the other aspect when needed.</p>

**Table 2.14: Business models 2002-to date (e-commerce 4.0, e-business 2.0, and Web 2.0)**

Model	Classification	Author(s)	Purpose and concerns
Framework for transitioning to an e-business model	Strategic	Chen and Ching, 2002	<p><b>Purpose:</b> This model is based on the MIT90 framework and its purpose is to guide the successful transition from a traditional to an e-business model. In this model it is suggested that all aspects of organisational operations must be synchronised and co-aligned. The authors suggest that the organisation needs to first change its strategy and technology. The authors believe that this will determine the structure, management process, individuals and roles. They draw upon resource-based theory which will bring sustained competitive advantage to the organisation.</p> <p><b>Concern:</b> However this model does not take into consideration the owners/managers: attitude towards change, organisational readiness and stages of adoption, external pressure, size and age, IT skills and knowledge, etc.</p>



Model	Classification	Author(s)	Purpose and concerns
TAPS – The Tool	Operational	Tan and Platts, 2002	<p><b>Purpose:</b> Computerised tool which facilitates the building and analysis of the ‘connectance’ model designed originally by Burbidge (1984). This new tool enabled manufacturing managers to communicate and make decisions more effectively. This model is used in manufacturing industry.</p> <p><b>Concern:</b> Although this model increases the transparency and traceability of managerial decision making it is a computerised model that is not suitable for SMEs which still have no computers.</p>
The transporter model	Strategic	Levy and Powell, 2003	<p><b>Purpose:</b> This model is based on the DTI e-adoption ladder. This is a strategic model which suggests that criteria for adoption are dependent upon the owner’s attitude to growth. The transporter model identifies four roles for Internet technologies in SMEs – brochure ware, support, opportunity and development.</p> <p><b>Concern:</b> The main criticisms of this model are its linear characteristics as it is based on DTI-s e-adoption ladder. Since then, research has shown that further development of the Internet, and organisational behaviour and identified that some firms would never trade on-line and some will only use parts of e-business enablers. However, the models should not be restricting firms but helping them improve their performance.</p>
A conceptual model of e-business development	Strategic	Fillis, Johansson and Wagner, 2003	<p><b>Purpose:</b> This conceptual model attempts to consider how a range of internal and external factors influence attitudes towards e-business, as well as its implementation as part of the company’s business strategy. Factors considered in the model are: macro-factors, industry/sectoral factors and firm/managerial factors. Many important factors that might influence successful adoption of e-business strategy have been taken into consideration.</p> <p><b>Concern:</b> However, this is a theoretical model and has not yet been tested. In addition this model does not suggest when structural changes will occur and what will happen at the macro level, industry level and firm level. In reality it only presents the barriers and benefits of e-business adoption rather than the sequence of events that could lead to success.</p>
E-business models	Strategic	Afuah and Tucci (2003)	<p><b>Purpose:</b> This model is regarded as a pure e-business model that is free of baggage and impediments of past. It is very suitable for new start-up companies and firms whose vision is to use available Internet technology.</p> <p><b>Concern:</b> As a pure e-business model it is not suitable for many SMEs who either have no business model at all or have some plans for the future and have partially implemented some IT in their companies. As with previous model from 2001, this model is still profit-oriented only and less aimed at building strategies for competitive advantage.</p>
E-business models	Strategic	Jelassi and Enders (2008)	<p><b>Purpose:</b> This is a traditional business model based on internal and external environmental scanning.</p> <p><b>Concern:</b> The model overlaps between stages and is generally sequential and sometimes requires returning to a previous stage.</p>



Model	Classification	Author(s)	Purpose and concerns
E-business model	Strategic	Chaffey (2009)	<p><b>Purpose:</b> This e-business model is very comprehensive and suitable for large organisations that have their strategic plans in place.</p> <p><b>Concern:</b> It is too complex a model for SMEs especially for micro and small businesses whose strategic plans may be underdeveloped.</p>

**Table 2.15: Business models 2006 – to date (e-commerce 4.0, e-business 3.0 and Web 3.0)**

Model	Classification	Author(s)	Purpose and concerns
Brokerage model and affiliate marketing models	<p>These models help bring partners together to make their own transactions</p> <p>Suitable for supply chain</p>	<p>Dubey and Wagle (2007); DMD (2007);</p> <p>Lyons et al. (2009)</p>	<p><b>Purpose:</b> Main third parties have different roles: broker, adviser, and sponsor such as Expedia.com or eBay. Often commission based.</p> <p>Affiliate marketing model as used by Amazon or iTunes where the website is used to drive traffic to another website which then compensates the affiliate website company.</p> <p><b>Concern:</b> These models can be useful to SMEs; however, the main concern is the level of technical ability and set-up required for some virtual worlds.</p>
Conceptual processing and database services, offered as old style utilities – also known as SaaS model	Social networking	Rappa (2008); Ma and Seidmann (2008)	<p><b>Purpose:</b> Utility model: User pays provider; provider offers service to user, for example: Salesforce.com, Technologies, Digital Insight, and Ultimate Software WebEx.</p> <p><b>Concern:</b> Primary concern about this model is for businesses moving from in-house IT installations to acquiring IT services through this SaaS model. This involves: perceived lack of customisations, ongoing cost, lack of ownership, issues of data security and reliability, complex service contrasts.</p>
Trader model	<p>Transactional services for physical products and packaged software information, or media products</p>	<p>Lyons et al. (2009); Rappa (2008)</p>	<p><b>Purpose:</b> Trader is the most standard e-commerce model. For example:</p> <p>Apple's iTunes Store, Borders.com, 1800flowers.com, runningroom.com, where person engage in buying or selling goods and services for profit.</p> <p>Manufacturer – IKEA, where company produces and sells goods for profit directly to users.</p> <p><b>Concern:</b> The main concern is that the high level of technical ability may be required.</p>



Model	Classification	Author(s)	Purpose and concerns
Content providers in the old and new media.	Advertising model: Old system newspapers; new system Google, Yahoo. Subscription model: Old system standard newspaper and cable TV; new system World of Warcraft Infomediary model: new system Doubleclick and Cnet Community model: New system Wikipedia, Facebook, YouTube, Amazon customer review, Second Life, LinkedIn	Schmidt (2006); Solove (2008)	<b>Purpose:</b> These proposed models work as social networking models that focus on communication systems that allow users to interact and share data, and collaborative systems that enable information sharing and collaboration among users. These include: Social networking sites such as Lindin, MySpace, Meetup and Facebook. Information and media sharing sites such as Digg, Reddit, Flickr, YouTube and Blogger. Extentions to commercial sites such as Amazon and eBay. <b>Concern:</b> The main concern of social computing sites models is privacy and having their information exploited by the service providers. It is suggested that providers of social computing services must be careful not to violate the trust of their members.

The above business models will be discussed in the following two sections. The first section covers e-commerce, e-business, and web models between 1989 and 2005, and the second section debates business models from 2006 to date.

#### 2.4.1.1 E-commerce, e-business and web models 1989–2005

Due to an increased academic interest created by the expansion of Internet technology, numerous models that address IT adoption were created between 1989 and 2005 (as seen in Table 2.11, Table 2.12, Table 2.13 and Table 2.14), all of which support and encourage SMEs to implement and use Internet technology as the basis of their businesses. During these 15 years, e-commerce has evolved several times and human kind experienced developments of the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generation of e-commerce (as presented in Table 2.10). As technological developments did not stop at e-commerce the world further experienced the development of two generations of e-business: e-business 1.0 and e-business 2.0. Those developments of e-commerce and e-business were made possible by the evolution of WWW. Between 1990 and 2005 two generations of the Web evolved (as shown in Table 2.10).

Frameworks that originally initiated the explosion of numerous business models between 1989 and 2005 are listed below:

1. Connectance model – This framework used the old style e-commerce 1.0 which was popular before the web technology broke through in the 1990s. This model was designed for manufacturing systems by Burbidge (1984) with the intention to help managers identify and study variable interrelations. This model influenced the development more robust computerised model by Tan and Platts (2002) which is presented in Table 2.14.
2. Technology acceptance framework – This framework used the old style e-commerce which was popular just before the 1990s' breakthrough in web technology. This model was based on human behaviour and acceptance of IT implementation (Davis, 1989). See also Table 2.11 as this framework influenced the development of models presented in Table 2.12.
3. MIT 90 Framework – a general business model, later used for developing more sophisticated e-business models (Scott Morton, 1995). See Table 2.13.
4. Afuah's and Tucci's (2001, 2003) Internet based models and strategies provide a general framework for developing for traditional organisations and new Internet start-ups. See also Table 2.13 and Table 2.14. For example, Afuah and Tucci's (2003) framework offers strategies and tactics for this new electronic era and is valuable for both researchers and managers trying to make sense of this new world. Whereas, Jelassi and Enders (2005) take a more classical approach – applying the ideas of Michael Porter.
5. Venkatraman's (1994) evolutionary process model, later used for developing e-commerce models (Poon and Swatman, 1999). See Table 2.13.
6. DTI's (2000) e-adoption ladder model which was originally developed for e-commerce and later used for the development of the 'transporter model' by Levy and Powell (2003). See Table 2.13 and Table 2.14.
7. Owner/manager characteristics model used for developing different kinds of models and strategies in organisations based on human resources and characteristics (Souther and Tilley, 2000; Van Akkeren and Cavaye, 1999; Blackburn and McLure, 1989). See Table 2.13.

Overall, the above frameworks and the emergence, growth, globalisation and interest in Internet technology have resulted in the creation of various general business models and e-business models relating to Internet strategies. These models propose a fairly solid base for the adoption and integration of e-business strategy in an organisation. However, these existing models lack the unity that brings the industry, IT, an organisation and human factors together. Hence, it created grounds for a new e-business model.

### 2.4.1.2 E-commerce, e-business and web models 2006 to date

Technological advancements initiated further evolution of e-commerce and e-business. In 2006, e-commerce (generation 4.0) and e-business (generation 3.0) emerged. Only two years later, in 2008, web 3.0 started to evolve (Table 2.10). Due to these rapid technological advancements, many companies have a presence in the virtual worlds and these organisations now use virtual space for brand awareness, advertising, selling (virtual and real goods and services), and communication with customers and among employees (DMD, 2007). This variety resulted in many unanticipated implications for how members of human society work, learn, interact, use the Internet, shop, and play (Lyons, et al., 2009).

Several different virtual worlds exist in the business environment of SMEs together with many kinds of business models. Table 2.15 combines an overview of these emerging Internet business models and demonstrates their value to SMEs. They include:

1. Computational processing and database services, offered as old-style utilities (Rappa, 2008; Ma and Seidmann, 2008).
2. Content providers from the old media (gathered by news teams and shared through wire services) and new media (gathered from the Internet or created by online communities (Schmidt, 2006; Solove, 2008).
3. Transactional services for physical products and packaged software information, or media products (Lyons et al., 2009; Rappa, 2008).
4. Brokerage models that help bring partners together to make their own transactions (Dubey and Wagle, 2007; DMD, 2007; Lyons et al., 2009; Lyons, 2009).

The arrivals of e-business 3.0 and web 3.0 allowed researchers to take a radical shift from the standard business models discussed previously and offered software-based business models (brokerage models) in which organisations do not need to invest heavily in their own IT infrastructure but install and run the software application on their own systems (Dubey and Wagle, 2007). This also means they do not have to maintain, upgrade, operate and otherwise support the software applications themselves or through service and maintenance agreements. These tasks become part of the service provided. However, this also means that the owners/managers of those firms give up control over upgrades and specific change requirements. The cost of software is ongoing as compared with a typical one-time cost when software is purchased (Ried, 2008; Carraro, 2006).

As the world developed from being goods-dominant to service-dominant (Vargo and Lusch, 2004), additional third-party participants play increasingly significant roles in successful online

business models. Other radical shifts concern social communication networking tools and services that can be differentiated by other kinds of services on the Web. Some social networking services adopted traditional business models such as advertising. Some brands engage users through e-mails, messaging, contests, and polls to raise the brand's profile (Lyons et al., 2009).

More novel business models include the brokerage models. Web applications bring buyers and sellers together and take a percentage of each transaction that goes through, as it is done by PayPal or eBay (Lyons et al., 2009). In the affiliate-marketing model, one (affiliate) website is used to drive traffic to another with the target website company compensating the affiliate website company. This kind of model is manifested as referrals in Amazon or iTunes. Many community sites are free but benefit from the value created by that community (Wikipedia). This is manifested in a way that anyone can add to or edit the site. Furthermore, some sites allow users to create applications that serve as advertisements or channels (e.g. Facebook) by having a virtual effect among connections when popular participants use or talk about the product (Lyons et al., 2009).

Al-Debi et al. (2008) argues that the dynamic environment, high level competition, and uncertainty in the world of digital business have created a gap between business strategy and process which requires new ways of thinking about business models. This means that traditional SMEs are facing changes in their business strategies and formulation of an e-business model approach. For that reason, in the past decade many have attempted to create Internet-based business models. However, with the speed of technological development there is a need for different approaches.

## 2.5 Research gaps and propositions

This literature review identified that SMEs do not recognise and acknowledge technological changes in their business environment. The result is that SMEs are now renowned for their lack of knowledge, information, education and general slow take-up of e-business as the basis for business communication and transaction (DTI, 2003; NSO, 2005; Dynamic Markets, 2006; DTI, 2007; ONS, 2008). This is because setting up and running an e-business requires technical, marketing and advertising expertise. It is believed that the businesses that provide the most reliable, most functional, most user-friendly and fastest services will be in ones that succeed (Chaston, 2004).

Furthermore, the literature review demonstrated that the dynamic environment, high level competition, and uncertainty in the world of digital business have created a gap between SMEs that use technological advances to facilitate their businesses and those smaller SMEs who do

not use technology at all. This creates grounds for development of many business models (Al-Debi et al., 2008). Traditionally, many scholars believed that the transition to e-business is a journey rather than an event. In most cases this journey was characterised in terms of progression through a number of key steps (DTI, 2000; Levy and Powel, 2003). These beliefs were also followed by other scholars (Lim et al., 1999; Porter, 1980; Miles and Snow, 1978; Dess and Beard 1984; Barney 1991; Grant, 1991; Amit and Schoemaker, 1993; Peteraf, 1993; Porter, 1985; Spanos and Spyros, 2001) as well as the UK government (DTI, 2003; DTI, 2007).

Over the years, many researchers came to the conclusion that none of the implemented initiatives worked, which created grounds for more advanced solutions and more complicated models (see Table 2.15). However, the reality is that micro businesses that do not own computers and have no online connection require a simple e-business model (Yorkshire Forward, 2006). This simple model needs to be incorporated in the SMEs' business strategies with the aim to developing competitiveness through the effective use of technology. This should occur in an owner/manager's own time and without the feeling of intimidation by scores of initiatives.

In addition, the literature review confirmed that the interest in business models and frameworks has grown over the years, including academic interest and government involvement, and that there is an increasing interest in applying these models to SMEs (Table 2.11–Table 2.15). It was also long argued that only by integrating the Internet into an overall strategy would this powerful new technology become an equally powerful force for competitive advantage (Porter, 2001). The main problem to date is that this has not been done to any meaningful extent (Porter, 2001; Wagner et al., 2003; Yorkshire Forward, 2006; Al-Debi et al., 2008). None of these business model approaches appear to give a complete picture of what is actually needed to create a competitive advantage in SMEs using e-business. Rather, these business models highlighted the need for further empirical research in this sector and have subsequently created grounds for this study.

The literature review suggests that a new e-business model is required and should be based on the promises of the 'e-business 3.0' and Web 3.0, but at the same time, not forgetting that most SMEs are still using older technology or no technology at all. If the new e-business model is based on these assumptions it is likely that many companies will revise or change their existing business models in line with their new e-business strategy. This study will therefore include decisions such as: which parts of the value chain to cover (customer, supplier or both), product portfolios, distribution, and cooperation strategies.

Having all this in mind, this study has identified three broad areas of concern which are used for developing and creating propositions in this study: (1) SMEs internal structure that is based on



resources, capabilities, core competence and value creation: (2) SMEs external environment that is based on Porter's Five Forces Model, UK government initiatives and IT and the Internet development; and (3) Business models. These three areas are discussed individually in sections, 2.5.1, 2.5.2, and 2.5.3.

### 2.5.1 SMEs' internal structure and strategies

Internal structure of SMEs that is based on organisations' distinctive features of resources and capabilities, core business and value creation are seen as critical and affecting the firms' long-term strategies. This created the bases for propositions 1, 2 and 3 ( $P_1$ ,  $P_2$  and  $P_3$ ) in this study.

$P_1$ : SMEs' flatter organisational structure and small size are seen as better suited for quick change and are consequently suitable for the implementation of ICT and Internet technology (Wittington, 1999; Grant, 1998; Scott Morton, 1991). However, lack of investment in IT resources (Chappell et al., 2002; Yorkshire Forward, 2006; DTI, 2007; Dynamic Markets, 2007; ONS, 2008; Lyons et al., 2009), lack of knowledge and skills by human resources (Ghoshal and Bartlett, 1988; Whittington and Mayer, 1997; Grant 1996a; 1996b; Darch and Lucas, 2002; Kalakota and Robinson, 2001; Kirby and Turner, 1993; Al-Debi et al, 2008; Lyons et al., 2009), high cost of technology (DTI, 2003, 2007), and the attitude of owners/managers towards IT and the Internet (Iacovou et al., 1995; Daniel and Myers, 2000; Doherty and Simpson, 2003; Martin and Matley, 2001) are seen as critical points when looking at the internal organisational strategies of SMEs and the level of IT in individual firms.

$P_{1a}$ . *Financial resources of owners/managers in SMEs, are positively related to the purchase of more advanced IT and the Internet and as a result are affecting firms' superiority.*

$P_{1b}$ . *Knowledge by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.*

$P_{1c}$ . *Skills by owners/managers are positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.*

$P_2$ : In addition, the fact that the internal resources and capabilities of SMEs tend to focus on product rather than service (Reynolds et al., 1994; Bunker and MacGregor, 2000; DTI, 2003; Vargo and Lusch, 2004) is seen as disadvantage if small firms are to create a core competence by using IT and the Internet.

$P_{2a}$ . *Focus on service by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.*

$P_{2b}$ . *Information by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.*



**P<sub>3</sub>:** In the traditional value chain (Porter, 1980), managers concentrate on being effective by involving firm's "primary activities" of R&D (stage 1), putting the product (stage 2) on the market (stage 3) and offering service (stage 4) to buyers (see Figure 2.4) directly in competition with any industry. In the same traditional value chain 'supporting activities' are created from human resources and IT management. Having in mind technological advances and the successful implementation of IT by large organisations it can be argued that if the value chain is reversed (Venkartaman, 1994) and IT becomes the integral part of "primary" activities (Davidov and Malone, 1992; McGowan, 2001a), SMEs need to reverse some of the original factors in the traditional value chain. This would enable SMEs to make a relationship between resources and the opportunities offered inside and outside the organisation possible, will be customer focused (Fahy and Hooley, 2002; Bronson, 1998) and will create value through integration.

*P<sub>3a</sub>. Perceived benefits related to opportunities inside and outside the organisation by SMEs owners/managers is positively related to investment in more advanced IT and the Internet.*

These new ways of creating a competitive advantage through geographically open boundaries created by the Internet have added pressure onto small firms. SMEs need to understand their customers better, reach them quicker, and provide solutions to their problems more efficiently to be able to position themselves in the marketplace advantageously. However, in the literature it is argued that SMEs' orientation towards niche markets rather than larger market share (Reynolds et al., 1994; Bunker and MacGregor, 2000; Quayle, 2002; Chaffey, 2009) disadvantages small companies and consequently restricts possible value creation through investment in IT and the Internet.

*P<sub>3b</sub>. Focus on large market share is positively related to investment in more advanced IT and the Internet.*

## 2.5.2 SMEs' external business environment

An external business environment of SMEs is very important because such companies are more vulnerable to external influences due to their size. This creates the basis for propositions 4 and 5 (**P<sub>4</sub> and P<sub>5</sub>**) in this study.

**P<sub>4</sub>:** The external business environment is partly manifested in small firms' inability to control the business environment at the micro level when compared with their larger counterparts (Buzzell and Gale, 1987; Venkatraman and Van de Ven, 1998). Although the 21<sup>st</sup> century digital environment modified the positions of SMEs and is forcing them to adapt to these changes, SMEs are still reluctant to shape their business strategies in that direction (Jennings and Beaver, 1997; Jones, 2003). If SMEs overcome those misalignments by using IT and the



Internet to their advantages, they could potentially create opportunities for themselves at the micro level of “vertical” and “horizontal” competition (Bili and Raymond, 1993).

*P<sub>4a</sub>. Ability of owners/managers to see opportunities arising from the fast development of IT and the Internet when dealing with forces from ‘horizontal’ competition (threat of substitute products, threat of established rivals, and threat of new entries) is positively related to investment in more advanced IT and the Internet.*

*P<sub>4b</sub>. Ability of owners/managers to see opportunities arising from the fast developments of IT and the Internet when dealing with forces from ‘vertical’ competition (bargaining power of suppliers and bargaining power of customers) is positively related to investment in more advanced IT and the Internet.*

**P<sub>5</sub>:** Since SMEs are very important for the overall development of the UK economy it is obviously paramount for the Government to build upon their effectiveness (DTI, 2003). In recognition of the rapid developments of IT and the Internet, the UK Government created policies that should help owners/managers support their businesses through on-line transactions. However SMEs have not shown much interest in these initiatives and are not taking advantages of the Internet and related technologies (DTI, 2007; Dynamic Markets, 2007; ONS, 2008).

*P<sub>5a</sub>. Interest in UK Government initiatives related to support in SMEs is positively related to investment in more advanced IT and the Internet technology.*

*P<sub>5b</sub>. Awareness of the Government initiatives related to the e-business advice is positively related to investment in more advanced IT and the Internet technology.*

*P<sub>5c</sub>. Trust when seeking e-business advice or support is positively related to investments in more advanced IT and the Internet technology.*

### 2.5.3 Business models

Business models play an important role in SMEs. This is because most organisations are in business to outperform and outrun their competitors. These businesses adopt new technologies to reinforce their existing competitive advantage and make a profit in new markets. To do so, performance is critical and depends not only on the business environment but also on business models. This created the basis for proposition 6 (**P<sub>6</sub>**) in this study.

**P<sub>6</sub>:** It was also long argued that only by integrating the Internet into an overall strategy would this powerful new technology become an equally powerful force for competitive advantage (Porter, 2001). The main problem to date is that this has not been done to any meaningful extent (Porter, 2001; Wagner et al., 2003; Yorkshire Forward, 2006; Al-Debi et al., 2008).

*P<sub>6a</sub>. IT and the Internet infrastructure are positively related to a successful e-business strategy.*

Since the literature review suggests that a new e-business model is needed it is possible to estimate that they need to be based on the promises of the ‘e-business 3.0’ and Web 3.0 (see



Table 2.10), it is necessary for SME owners/managers to change their existing strategies and business models in the line with their new e-business strategies.

*P<sub>6b</sub>. IT and the Internet infrastructure are positively related to changing business strategies.*

In the past, many business models were created but none of the implemented initiatives worked, which created grounds for more advanced solutions and more complicated models (Table 2.15). However, SMEs that do not own computer and have no online connection require a simple e-business model (Yorkshire Forward, 2006). This simple model needs to be incorporated in SMEs' business strategies with the aim of developing competitiveness through the effective use of technology. This should occur in owner/manager's own time and without the feeling of intimidation by many initiatives.

*P<sub>6c</sub>. IT and the Internet infrastructure are positively related to the internal integration of SMEs.*

*P<sub>6d</sub>. IT and the Internet infrastructure are positively related to the external integration of SMEs.*

Based on this comprehensive literature review and proposed testing of H<sub>1</sub>, H<sub>2</sub>, H<sub>3</sub>, H<sub>4</sub>, H<sub>5</sub> and H<sub>6</sub> it is believed that the creation of a new e-business model would create a solid base for an appropriate IT infrastructure in SMEs that would enable owners/managers to change strategies in their organisations and build towards an internal and external integration with a possibility of creating competitive advantage at each stage of integration.

## 2.6 Summary

This chapter has reviewed the theoretical concepts in relation to possible creation of competitive advantage through e-business in SMEs. First, using the Bolton Committee Report (1971) and EU Definitions (2003) the definition of SMEs to be used in this study was confirmed as being an independent business, with a small market share. It was established that SMEs have a smaller product range, thus creating a limited, but niche market. However, by maintaining this smaller product line, the ability to compete at the same level as their larger counterparts is compromised. Operating in a smaller market creates a risk-averse culture, yet if they were willing to be risk-takers their smaller size generates fewer obstacles to change, making them better able to respond to changes in the environment.

In the UK, SMEs have had a supportive government, creating policies such as liberalising telecommunications and creating favourable environments for economic trading. This IT could have taken the SMEs' niche product and knowledge to a wider area, with the more flexible, more rapid and extremely low-cost way of exchanging information (Chaston, 2004) creating a new business model. However, with only 44 % of businesses who employ less than 10 people



owning a computer (UK Online, 2007) the technology has remained expensive and out of reach for SMEs, which alongside the risk-averse culture has meant that few have taken advantage of the policies. Further highlighted is that the smallest businesses have not grasped the benefits of the Internet (UK Online, 2007).

This study has focused on UK SMEs in particular and the need for an e-business model that will open new opportunities for SMEs. Although, many theoretical business models have been created in the past surprisingly, not a one achieved the meaningful contribution to small businesses (Porter, 2003). This has resulted in 16 propositions made in this chapter. The following chapter identifies and critically discusses the best research methodology for testing of these propositions and answering of research questions.

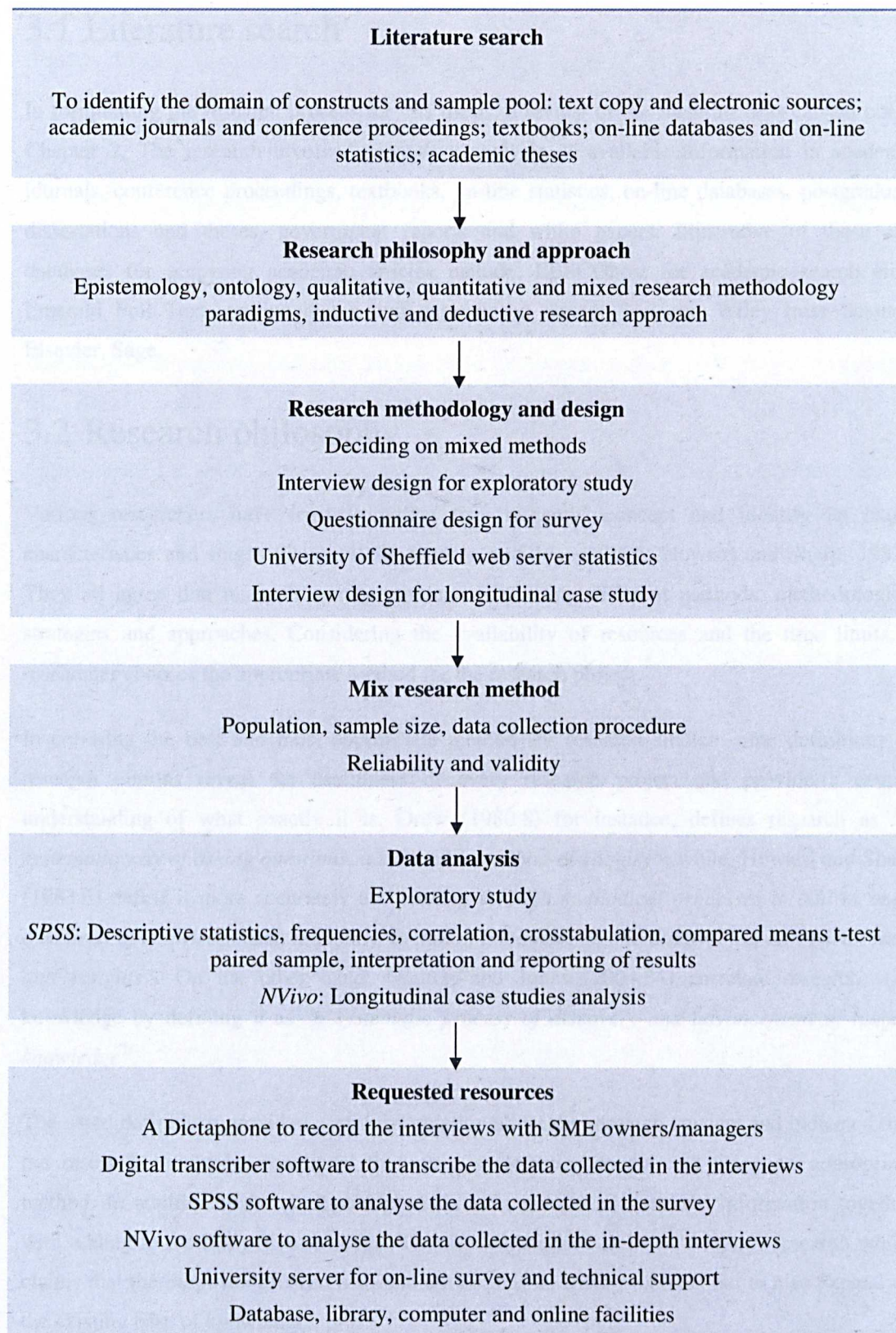
# Chapter 3

## 3 Research methodology

This research could have been conducted in variety of ways. However, an appropriate choice of methods was necessary to ensure the validity of the information gathered. In order to design the best possible research method, the research question was first considered. Then, the role of assumptions about the way in which the world works was taken into consideration together with what is believed to be acceptable knowledge. Here epistemology and ontology are discussed in more detail as well as the inductive and deductive research approaches. In addition, the role of the writer's own values and research paradigms of qualitative, quantitative and mixed methodologies are outlined.

Overall, this chapter highlights the main characteristics of research methods and establishes the method for the primary investigation (see Figure 3.1). It broadly covers five areas: (1) literature search, which identifies and outlines the research questions using a range of various information available at the time; (2) research philosophy and approach – theoretical perspective that includes the philosophical stance which underpins the methodology in question; (3) the research methodology and design outlines and discusses in detail the choice of mixed method; (4) the mixed research method – the plan of action which links the methods to outcomes, techniques and procedures proposed for this study in which the reliability and the validity of the mixed research choice is examined; and (5) data analysis – use of specialised software SPSS and NVivo.

In addition, the research process in Figure 3.1 identifies feed-forward and feedback loops as well as the resources required to complete this study. The diagram identifies a close relationship between chapters in which all the components bear equal weight and lead to the completion of this study. These components are discussed individually in the forthcoming sections.



**Figure 3.1: The research process**

## 3.1 Literature search

In formulating the research process for this thesis, a review of the literature was carried out in Chapter 2. The research involved secondary analysis of available information in academic journals, conference proceedings, textbooks, on-line statistics, on-line databases, postgraduate dissertations and theses, government reports and white papers. Illustrative of these are: databases for accessing academic articles include, EBSCOhost for academic search elite, Emerald Full Text, on-line theses and paper-based theses, Springer, Wiley Inter Science, Elsevier, Sage.

## 3.2 Research philosophy

Various researchers have tried to define the 'research' concept and identify its major characteristics and stages (Drew, 1980; Gratton and Jones, 2004; Howard and Sharp, 1983). They all agree that research can be conducted by using different methods, methodologies, strategies and approaches. Considering the availability of resources and the time limits, a researcher chooses the appropriate method for the research project.

In choosing the best and most appropriate method for research studies some definitions of research notions reveal the usefulness of every research project and provide a deeper understanding of what exactly it is. Drew (1980:8) for instance, defines research as "*a systematic way of asking questions, a systematic method of enquiry*", while, Howard and Sharp (1983:6) define it more accurately as "*seeking through methodical processes to add to one's own body of knowledge and, hopefully, to that of the others, by the discovery of non-trivial facts and insights*". On the other hand, Gratton and Jones (2004:34) correlate research with knowledge by defining it as "*a systematic process of discovery and advancement of human knowledge*".

The listed definitions provided useful information about the research concept and indicated that the research should be conducted through a systematic process and using an appropriate method. In addition, research should produce new, non-trivial data and information together with adding to the body of knowledge. This is characterised in Drew's (1980) research which claims that the purpose of research should not be only to solve problems but to also expand on the existing base of knowledge.

In addition to what the 'research' is, it is necessary to identify 'research philosophy'. Throughout the literature, research philosophy is described as consisting of two major ways of



thinking about research: ontology and epistemology, each containing an important difference which enhances understanding of this particular field of study.

Epistemology, the study of the foundations of knowledge, examines the nature of these premises and how they work. By examining these assumptions the superiority of the scientific approach over other approaches to knowledge can be better understood (Frankfort-Nachmias and Nachmias, 1996). Furthermore, ontology is concerned with the nature of reality. This raises the question of the assumptions researchers have about the way the world operates and the commitment held to particular views. For the purpose of this study two aspects of these are discussed – objectivism and subjectivism. This is because both have their devotees among business and management research (Saunders et al., 2009).

Objectivism is premised on the existence of social entities in reality that is external to social actors concerned with their existence, while subjectivism holds that phenomena are created from the perception and consequent actions of those social actors concerned with their existence (Saunders et al., 2009).

Burrell and Morgan's (1982) work is helpful in clarifying the difference between epistemology and ontology (see Table 3.1). They offer a categorisation of social science paradigms which can be used in management and business research to generate fresh insights into a real-life issues and problems (Saunders et al., 2009). In their view the 'interpretive paradigm' is the philosophical position referring to the way humans attempt to make sense of the world around them (interpretivism). In this paradigm, Burrell and Morgan (1982) argue that a researcher is looking at an organisation's everyday life like a miraculous achievement. The concern in this situation would not be to achieve a change in that organisation but to understand and explain what is going on (see Table 3.1). Burrell and Morgan's work also refers to set of epistemological perspectives and philosophies of science known as 'positivism' which holds the view that scientific method is the best approach to uncovering the process by which both physical and human events occur. Positivism deals with positive facts and observable phenomena and the primary goal is not only description but prediction and explanation. More specifically, its classification of substances and events, and observation of these, provides the basis for descriptive laws based on consistencies in patterns and properties. This epistemological perspective is characterised by absolute or varying degrees of generalisability and is quantitative, as it draws on measurable evidence (Table 3.1). Since this study is aimed at organisational changes, the interpretive paradigm and positivism perspective are not deemed as most appropriate for the task at hand.

The 'radical humanist paradigm' is located within the subjectivist and radical change dimensions. If a researcher is to choose this paradigm, the concern is with changing the status

quo, or in Burrell and Morgan's words (1982:32) "*to articulate ways in which humans can transcend the spiritual bonds and filters which tie them into existing social patterns and thus realise their full potential*". The ontological perspective for this would be subjectivist (Saunders et al., 2009). The radical human paradigm is also classed as unsuitable because this study is concerned with a rational explanation of why organisations behave in a certain way and want to provide some solutions to that behaviour.

The 'radical structuralist paradigm' is a view aimed at achieving fundamental change based upon an analysis of organisational phenomena based on a power relationship and patterns of conflict. This paradigm involves structure of patterns in organisations such as hierarchies and reporting relationships and the extent to which these may produce disfunctionalities (Burrell and Morgan, 1989). It adopts an objectivist perception because it is concerned with objective entities, unlike the radical humanist ontology which attempts to understand the meanings of social phenomena from the subjective perspective of participating social actors (Saunders et al., 2009).

**Table 3.1: Comparison of four research philosophies in management research**

Source: Saunders et al. (2009)

	Positivism	Realism	Interpretivism	Pragmatism
<b>Ontology:</b> The researcher's view of the nature of reality or being	External objective and independent of social actors	Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple	External, multiple, view chosen to best enable answering of research question
<b>Epistemology:</b> The researcher's view regarding what constitutes acceptable knowledge	Only observable phenomena can provide credible data, facts. Focus on causality and law like generalisations, reducing phenomena to simplest elements	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations which are open to misinterpretation (critical realism). Focus on expanding within a context or contexts.	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data
<b>Data collection techniques most often used</b>	Highly structured, large samples, measurement, quantitative, but can use qualitative	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in-depth investigations, qualitative	Mixed or multiple method designs, quantitative and qualitative

Moreover, 'realist and critical realist paradigms' have emerged recently in the context of the debate about the validity of interpretive research methods and the need for appropriate criteria for evaluating qualitative research. This position can be seen in the work of Hammersley (1990) and Silverman (1997). Realist ontology assumes that there are real world objects apart from human knowledge. In other words, there is an objective reality. Critical realists assume that our ability to know this reality is imperfect, and claims about reality must be subject to wide critical examination to achieve the best understanding of reality possible. In terms of epistemological perspective, realists cannot separate themselves from what they know. In other words, the investigator and the object of investigation are linked such that who we are and how we understand the world is a central part of how we understand ourselves, others and the world (Guba and Lincoln, 1994). In addition, Maxwell (1992) argues that 'objectivity' remains as an ideal that researchers attempt to attain through careful sampling and specific research techniques. It is possible to evaluate the extent to which objectivity is attained. This can be evaluated by the community of scholars as well as by the community of people who are studied (Silverman, 1997). By positioning a reality that can be separated from our knowledge of it (separation of subject and object), the realist paradigm provides an objective reality against which researchers can compare their claims and the extent to which they ascertain truth. This is sometimes called credibility or trustworthiness of an account (Angen, 2000). However, the realist paradigm also recognises that researchers' values are inherent in all phases of the research process. Truth is negotiated through dialogue. Thus, this objective reality cannot be apprehended in a perfect way. 'Objectivity' is an ideal to strive towards and can be achieved through the use of rigorous qualitative research methods (Guba and Lincoln, 1994). Although approaches of the 'radical structuralist paradigm' and 'realism/critical realism' tend to rely on a combination of qualitative and quantitative methods both are considered unsuitable because they deal with power relationships and patterns of conflict which were not the focus of this study (Table 3.1).

The 'radical humanist paradigm' adopts a critical perspective on organisational life. Burrell and Morgan (1982) note this paradigm is often problem-oriented in approach, concerned to provide practical solutions to practical problems. In addition, interpretive studies assume that people create and associate their own subjective and inter-subjective meanings as they interact with the world around them. Interpretive researchers therefore, attempt to understand phenomena through accessing the meanings participants assign to them (Orlikowski and Baroudy, 1991). For instance philosophical traditions underpinning interpretive research come from 'phenomenology' (Zuboff, 1988), 'ethnomethodology' (Suchman, 1987) and 'hermeneutics' (Boland and Day, 1989). Similar to other approaches, after considering 'radical humanist paradigm' and 'interpretivism' the assumption is that the organisations are rational entities, in

which rational explanations offer solutions to rational problems (Saunders et al., 2009) and therefore both approaches are viewed as being unsuitable for this study (Table 3.1).

The 'functionalist paradigm' and 'pragmatist philosophy' are chosen as suitable for this study because the focus of this research is a particular problem in organisations with an aim to propose suitable recommendations to managers/owners of these companies (see Table 3.1). Reason and Bradbury (2001:2) argue that pragmatist philosophy also known as 'action research' is to "*produce practical knowledge that is useful to people in the everyday conduct of their life*". In addition pragmatism was chosen as a research philosophy because it will enable the researcher to best answer the research question. In addition, this study has a wider purpose and with applying pragmatic philosophy it aims to achieve and contribute to the knowledge of science. "*Pragmatists start with a Darwinian accounts of human beings as animals doing their best to cope with the environment – doing their best to develop tools which will enable them to enjoy more pleasure and less pain*" (Rorty, 1999:22-23). This way the researcher is likely to adopt this paradigm if the focus of research is a rational explanation of why a particular organisational problem is occurring and in return developing a set of recommendations set within the current structure of the organisation. Here, mixed research methodology is applied.

### 3.3 Research methodology and design

While research philosophy helps researchers identify their own ontological and epistemological orientation, 'research methodology' assists in deciding on the best and most appropriate method for the research project. A starting point in trying to understand the collection of information to address the research question is the recognition of broadly two approaches: Quantitative Research Methodology and Qualitative Research Methodology (Tashakkori and Teddlie, 1998).

Early forms of research originated in the natural sciences such as physics, chemistry, biology etc. Such research was mainly concerned with investigating things which could be observed and measured in some way so that such observations and measurements can be made objectively and repeated by other researchers. This process is referred to as the quantitative research approach (Lacey and Luff, 2001).

Much later, researchers working in the social sciences, such as sociology, anthropology and psychology were interested in studying human behaviour and the social world inhabited by human beings. They found it very difficult to explain human behaviour in measurable terms. Measurements explain 'how often' and 'how many' people behave in a certain way but they do not answer the question 'why' people act the way they do. The process of answering questions



about why things are the way they are in the social world is referred to as qualitative research approach (Lacey and Luff, 2001).

Both methods provide various insights into how to gather and interpret information or research data, and their relative merits have been debated in the literature (Veal, 2006). For example, Nunnally and Bernstein (1994) argue that research without application of quantitative approaches cannot be considered as scientific; whereas Denzin and Lincoln (1998) claim that qualitative approaches are displacing 'outdated' quantitative approaches. However, each approach is appropriate or inappropriate, depending on the research being undertaken – that is, which is most suited to the subject under investigation and provides the information best suited to the purpose of the research (Collis and Hussey, 2009).

As a natural complement to traditional qualitative and quantitative research, pragmatists offer an alternative and at the same time an attractive new option called mixed method research. This is when researchers combine two traditional paradigms to provide the best possible answer to their research questions (Johnson and Onwuegbuzie, 2004).

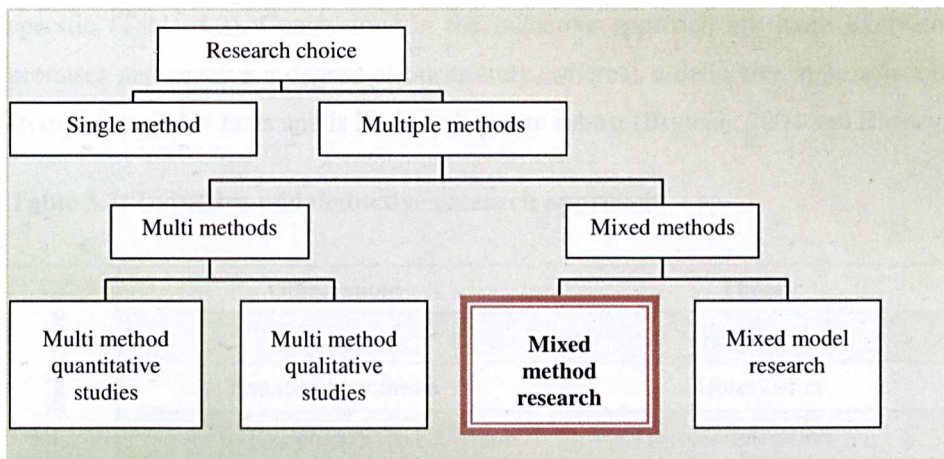
For more than a century there has been a 'war' between researchers in qualitative and quantitative research paradigms (Campbell and Stanley, 1963; Lincon and Guba, 1985). Quantitative followers (Ayer, 1959; Maxwell and Delaney, 2004; Popper, 1959; Schrag, 1992) argue that social observations should be treated as entities in the same way as physical scientists treat a physical phenomenon. This is also known as a *positivist* philosophy (Table 3.1). In addition, quantitative followers believe that social science enquiry should be objective (Nagel, 1986). This school of thought argues that time and context based on free generalisations are desirable and real causes of social scientific outcomes can be determined reliability and with validity. These researchers have traditionally been called *realists* and *critical realists* and are involved in a writing style that uses an impersonal passive voice and technical terminology (Tashakkori and Teddlie, 1998).

In contrast, qualitative followers (also known as *constructivists* and *interpretivists*) reject what they call positivism (Johnson and Onwuegbuzie, 2004). They argue for the superiority of constructivism, idealism, relativism, humanism hermeneutics and post-modernism (Guba and Lincoln, 1989; Lincon and Guba, 2000; Schwandt, 2000; Smith, 1983, 1984). The followers of this school of thought believe that research is value-bound, that it is impossible to differentiate fully cause and effect, that logic flows from specific to general, and that knower and known cannot be separated because the subjective knower is the only source of reality (Guba, 1990). Qualitative followers are also characterised by a dislike of a detached and passive style of writing and prefer instead rich and descriptive writing (Johnson and Onwuegbuzie, 2004).

Both of these schools of thought (qualitative and quantitative) believe that their paradigm is ideal for research and they advocate the *incompatibility thesis* (Howe, 1988) meaning that these two paradigms should not be mixed. However, Johnson and Onwuegbuzie (2004) believe that a third research-method paradigm is of mixed methods and argue that both qualitative and quantitative methods are important and useful when used together. The goal of the mixed methods is not to replace either of these approaches but rather to draw from the strengths and minimise the weaknesses of both in single research studies and across studies. The mixed method research is a way for researchers to think about the traditional dualism that has been debated by the followers of the qualitative and quantitative paradigms and take a pragmatic position that will improve communication amongst researchers as they advance through knowledge (Johnson and Onwuegbuzie, 2004).

Qualitative approaches involve the collection of non-numerical data, including large amounts of relatively rich information about relatively few subjects. This can be conducted through in-depth interviews, focus groups, participant observations and case studies (Neuman, 2006; Veal, 2006, Cavana et al., 2001). Moreover, qualitative approaches involve inductive hypothesis-generating research (as opposed to hypothesis testing), and tend to emphasise data that supports the researcher's argument – which is limited to indications of contrary evidence being sought. Consequently, results can vary from research to research, becoming problematic when researchers become fixated on exploratory research and do not progress beyond this to the hypothesis testing stage (Silverman, 2006; Tashakkori and Teddlie, 1998). Nevertheless, in practice, qualitative research can be seen as tending to identify trends and new areas of research, whereas the quantitative approach focuses more on particular aspects to prove or disprove what has been suspected throughout in qualitative observation. Although the quantitative approach has been criticised for its inability to produce theory or generate in-depth explanations of qualitative enquiry, it can verify hypotheses or generate strong reliability and validity (Amaratunga et al., 2002; Cavana et al., 2001).

While arguments between qualitative and quantitative paradigms have a long history, mixed research has a long history in research practice because researchers in fact show through their practice that a mixed approach can best help them to answer their research questions. Indeed, mixed methods have support and such an approach has been increasingly advocated within business and management research (Curran and Blackburn, 2001; Tashakkori and Teddlie, 1998, 2003). As Tashakkori and Teddlie (2003) argue, individual qualitative and quantitative techniques and procedures do not exist in isolation. Therefore, in choosing the research method for this study the writer used more than one data collection technique and procedures for analysis in order to best answer the research questions set in Chapter 1. The diagram in Figure 3.2 presents the path of *mixed method research* design that was used in this study.



**Figure 3.2: Research choice in this study**

In Figure 3.2 the research choice splits between a single method and multiple methods. A *Single method* design includes either qualitative or quantitative research where a single technique is used (i.e. in-depth interviews with qualitative data analysis or survey questionnaire with quantitative data analysis). *Multiple methods* refer to those combinations where more than one data collection technique is used but it is restricted to either a quantitative or qualitative view. For example researchers may choose to collect data by using both survey questionnaire and in-depth interviews but will analyse the data using only qualitative or quantitative procedures (i.e. statistical data analysis). On the other hand, *Mixed methods* use generally both qualitative and quantitative technique and analysis procedures. There are two ‘mixed’ types:

- a) *Mixed method research* – enables the collection of data using both qualitative and quantitative techniques but the researcher will not mix procedures (i.e. collecting data using in-depth interviews and analyse this data using non-numerical qualitative procedures) and
- b) *Mixed model research* – enables the researcher to mix techniques and procedures.

Based on the research choices outlined in this study, “*mixed method research*” (as highlighted in Figure 3.2) was chosen as most suitable to answer the research question outlined in Chapter 1. This is discussed further in section 3.4. The next section first discusses the research approach taken in this study.

### 3.3.1 Research approach

In research, scholars often refer to the two broad methods of reasoning, ‘deductive’ and ‘inductive’ approaches. While inductive reasoning works from specific observations to broader generalisations and theories, deductive reasoning works from the more general to the more



specific (Table 3.2). Conclusions in the inductive approach are more likely to be based on premises and involve a degree of uncertainty, whereas a deductive approach follows logically from the available facts and is likely to be more robust (Bryman, 2004 and Burney, 2008).

**Table 3.2: Inductive and deductive research approach**

<b>Inductive</b>	Observation	<b>Theory</b>	<b>Deductive</b>
	Pattern	Hypothesis	
	Tentative hypothesis	Observation	
	<b>Theory</b>	Conformation	

Table 3.2 presents both approaches, suggesting that these two methods of reasoning have a very different “feel” to them when conducting research. Inductive reasoning is more open-ended and exploratory, especially at the beginning (Seale, 2006). This type of research tends to start with observations and detecting patterns which leads the researcher to develop new theories (Creswell, 2002). Deductive reasoning is narrower in nature and is concerned with testing or confirming hypotheses. If this approach is taken, the researcher starts from a wide literature search, collects observations to address the hypothesis or propositions and this ultimately leads to the testing of the hypotheses with specific data – a confirmation (or not) of original theories narrows it down to testing the hypothesis or propositions and making conclusions (Burney, 2006, 2008; Bryman, 2004).

In general, deductive research is theory-testing and inductive research is theory-generating (Creswell, 2002; Hammersley and Atkinson, 1995). Often people link deductive research with quantitative experiments or surveys, and inductive research with qualitative interviews or ethnographic work. These links are not hard and fast – for instance, experimental research, designed to test a particular theory through developing a hypothesis and creating an experimental design, may use quantitative or qualitative data or a combination of the two (Burney, 2008; Oppenheim, 1992). If the research starts with a theory and is driven by hypotheses that are being tested (e.g. that social class background and social deprivation or privilege are likely to affect educational attainment), it is, broadly speaking, deductive (Bryman, 2004; Creswell, 2002; Seale, 2006; Arksey and Knight, 1999; Dale et al., 1998; Hammersley and Atkinson, 1995; Oppenheim, 1992).

Since this study begins with theoretical underpinning, it is taking a mixed research method approach to analysing its primary research and is driven by proposition testing; the deductive research approach is at the heart of this study.



### 3.4 Mixed research method

A pragmatic ontological and epistemological philosophy was adopted for this study (as presented in Table 3.1), in which the intention is to study a set of propositions drawn from the existing literature. A quantitative research design allows flexibility in the treatment of data, in terms of comparative analyses, statistical analyses, and repeatability of data collection in order to verify reliability (Tashakkori and Teddlie, 1998). This survey-based study will produce broad data across a large sample of SMEs in the UK allowing the question 'what' to be answered and the behavioural patterns of organisations to be ascertained. The quantitative design should permit a simple comparative analysis between different kinds of SMEs, and it would also enable longitudinal data to be collected in order to enhance reliability. On the other hand, a qualitative research design is similarly suitable for this study because most of the research and investigation do not take place in a sterile laboratory, but rather in a complex social environment, with human subjects who can affect the success of the project. Therefore, to ignore the complexity of the background would impoverish the evaluation. Similarly, when investigating human behaviour and attitudes, it is fruitful to exploit a variety of data collection methods (Patton, 1990). By using different sources and methods at various points in this evaluation process, it is possible to build on the strength of each type of data collection and minimise the weaknesses of any single approach. A mixed methodology approach to evaluation, as outlined in Figure 3.3, is thus expected to increase both the validity and reliability of the data.

Although during the past three decades, several 'wars' have raged in the social and behavioural science (Tashakkori and Teddlie, 1998) regarding the superiority of one or the other of the two major social science paradigms (qualitative and quantitative research methodology), a mixed research method seems to be the most appropriate to use in this field of study. As a result, a selection of case study interviews and an on-line survey were chosen as the most appropriate research techniques to fulfil the aims and objectives of this study, and to answer the research questions listed in Chapter 1.

The following two conditions were identified as important when choosing the research strategy:

1. *The type of research question posed:* This is the first condition for differentiating among multiple research strategies. Open question types (see Table 3.3) with such as 'how' and 'why' are an appropriate method to analyse the case study while closed questions such as 'who', 'what', 'where', 'how many' and 'how much' are appropriate for surveys (Yin, 2003). In this study the nature of the research questions being investigated (see Table 3.4) is seen as appropriate for the use of both, survey-based research approach and an interview approach.

2. *The degree of focus on contemporary as opposed to historical events:* This is the second condition for differentiating among multiple research strategies. The mixed research approach was selected to investigate contemporary events (see Table 3.3) as opposed to historical events (Yin, 2003). This thesis focuses on the ongoing contemporary issues of e-business practices, organisational strategies and employees' attitudes.

**Table 3.3: Relevant situation for two different research strategies**

Source: Adapted from Yin (2003)

Strategy	Form of Research Question	Requires Control of Behavioural Events?	Focuses on Contemporary Events?
Survey	Who, <b>what</b> , where, how many, how much?	No	Yes
Case study	<b>How</b> , <b>why</b> ?	No	Yes

Table 3.3 presents how two different research strategies have been used in this study. The survey form of research technique was used to respond to research questions 1, 2, 3, 5, 6 and 7 (see Table 3.4) and the case study form of research technique was used to respond to questions 2,3, 4, 5 and 6 (see Table 3.4).

**Table 3.4: Broad research question**

Question	Answer
1. <b>How</b> is technology impacting on SMEs across a range of size, location, age and sector group?	Survey
2. <b>What</b> evidence is there that technology in general and e-business in particular really improve SMEs' performance, and how can this be measured?	Survey/Case studies
3. <b>What</b> role does managerial leadership and other human resource issues play in the introduction of technology?	Survey/Case Studies
4. <b>How</b> and <b>why</b> are SMEs changing in their use of e-technology?	Case studies
5. <b>How</b> are SMEs using e-technology currently, and how do they plan to use it in future?	Survey/Case Studies
6. <b>What</b> are the most important factors influencing technology use in SMEs?	Survey/Case Studies
7. <b>What</b> role does IT infrastructure play in the SME interface?	Survey

Succinctly, after an initial literature search and the development of a theoretical framework the decision was made to accept a pragmatic functionalist paradigm as research philosophy and to take the mixed research method and deductive research approach in this study. A first set of interviews were carried out at the end of 2003 as an exploratory study. The research methodology was checked for robustness, gathering the initial data, identifying any problems requiring the modification of the research method, and constructed an e-business model. This

was followed by a national survey in 2005 using an on-line questionnaire. The survey allowed the author to reach larger number of SMEs, enabling generalisation of the research. In addition, longitudinal case studies were carried out. The original nine SMEs were interviewed again in 2009 which enabled the validation of the earlier survey results as well as an update of the proposed e-business model. The longitudinal study also added value for SMEs by looking at their technological evolution over the period of 5 years.

The information gathered through these three techniques were combined and led to the major original contribution of this study – the construction of a revised and novel e-business model named CATE-b for the UK SMEs. This research process is outlined is provided in Figure 3.3.



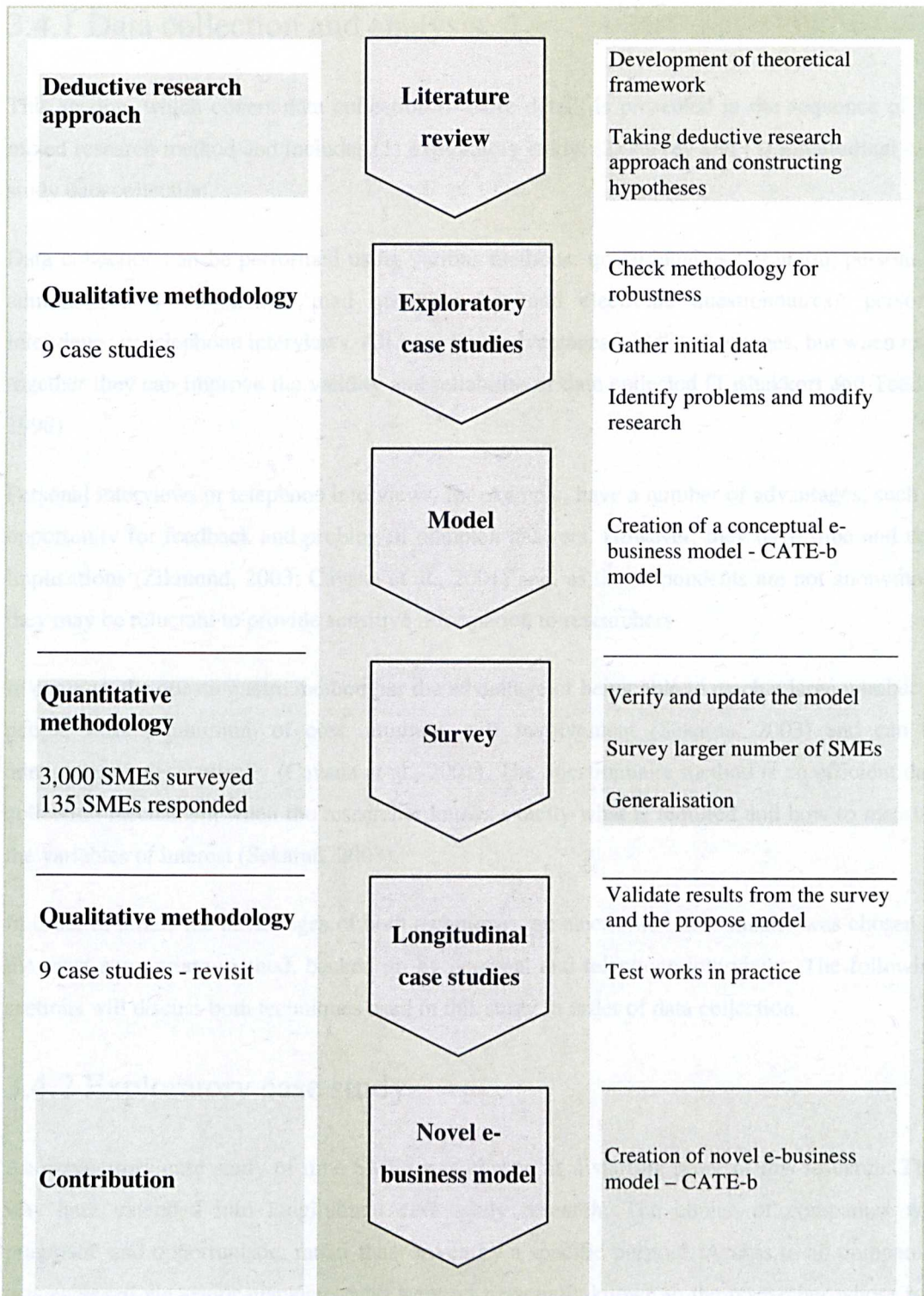


Figure 3.3: Mixed methodology and deductive approach – sequence of events



### 3.4.1 Data collection and analysis

This section, which covers data collection in more detail, is presented in the sequence of the mixed research method and includes (1) exploratory study, (2) survey and (3) longitudinal case study data collection.

Data collection can be performed using various methods: questionnaires (including personally administered questionnaires, mail questionnaires and electronic questionnaires); personal interviews; or telephone interviews. All have their advantages and disadvantages, but when used together they can improve the validity and reliability of data collected (Tashakkori and Teddie, 1998).

Personal interviews or telephone interviews, for example, have a number of advantages, such as opportunity for feedback and probing of complex answers. However, they have time and cost implications (Zikmund, 2003; Cavana et al., 2001) and, as the respondents are not anonymous they may be reluctant to provide sensitive information to researchers.

In contrast, the questionnaire method has the advantage of being able to reach a large number of people with a minimum of cost, minimal staff involvement (Sekaran, 2003) and can be administered electronically (Cavana et al., 2001). The questionnaire method is an efficient data collection mechanism when the researcher knows exactly what is required and how to measure the variables of interest (Sekaran, 2003).

In order to utilise the advantages of both techniques, an electronic questionnaire was chosen as the most appropriate method, backed up by personal and telephone interviews. The following sections will discuss both techniques used in this study in order of data collection.

### 3.4.2 Exploratory case study

An exploratory case study of nine SMEs was chosen as a starting point of this research. This was later extended into longitudinal case study research. The choice of companies was pragmatic and opportunistic, rather than driven by a specific purpose. Access to all companies was achieved via senior managers who were all personally known to the researcher whose role was to interpret events.

This exploratory study was required to improve the understanding of the SMEs' behaviour, their adaptability to new economic demands and the possibility for them to create competitive advantage by using e-business. In addition, this exploratory study was used to check that as previously described, the research methodology was robust, correct and to gather the initial data

which would be expanded further and used to propose a preliminary e-business model based on the review of the literature and case study analysis. Furthermore, it provided information on whether or not the data collection tool yielded the depth, range and quality of information required. In short, the exploratory study provided an opportunity to identify any problems and to modify the research method before embarking on the more ambitious survey. The exploratory study increased the likelihood that the data collected in the survey would be appropriate for the purpose of this study.

In this exploratory case study analysis a qualitative research approach was employed. The research was based on a multiple case study methodology (Yin, 2003) in which semi-structured interviews was used to collect data from SMEs' owners/managers.

### 3.4.2.1 Interviews

The data collection for the exploratory study involved specific personal and telephone interviews with owner/managers of SMEs. Knight (2000:31) recognises that

*"...detailed data are best collected through in-depth interviews with executives in affected industries as a means of building up comprehensive case histories that would trace strategic and tactical shifts and thoroughly account for their causes".*

With regard to this particular research, specific reasons for following this approach were:

1. Personal interviews would permit the gathering of rich qualitative data;
2. The use of interviews allowed the researcher to see SMEs' relationship within the business environment, how they interact with local government agencies and how they use resources and capabilities to design strategies that lead to the creation of competitive advantage;
3. It was possible to observe how the owners/managers of SMEs utilise ICT in their organisations.

### 3.4.2.2 Exploratory case study data analysis

The interviews with SMEs owners/managers were recorded by using written notes. All interviews lasted approximately 20 minutes and were answered in the same semi-structured manner. They were analysed within one week.

### 3.4.3 Survey questionnaire

The second stage of the research involved a large national survey, for which the quantitative research approach was adopted. The University of Sheffield database and UK directories of the

National Chamber of Commerce and Industry were combined. An electronic questionnaire (see Appendix A) was used to examine the extent to which: (a) ICT and the Internet are being used by SMEs in the UK; (b) technology helps SMEs to gain competitive advantage, and (c) SMEs use Government support. The answers were analysed using the Statistical Package for Social Scientists (SPSS) and the results from the analysis were used to verify and update the proposed e-business model.

A quantitative research design allows flexibility in the treatment of data, in terms of comparative analyses, statistical analyses, and repeatability of data collection in order to verify reliability (Tashakkori and Teddlie, 1998). Survey produced broad data across a representative sample of SMEs in the UK, enabling the question 'what' to be answered (as presented in Table 3.3 and Table 3.4) and ascertain the behavioural patterns of organisations. A quantitative design permits a simple comparative analysis between different kinds of SMEs, and also enables longitudinal data to be collected in the future. This enhances reliability. A quantitative research design allows flexibility in the treatment of data, in terms of statistical analyses and repeatability of data collection in order to verify reliability (Tashakkori and Teddlie, 1998).

### 3.4.3.1 Population

The population of interest for this study was the UK SMEs which are using technology. The data set was identified through the stored details of companies' e-mail addresses and web links (see section 3.4.3.4 for more details). No other constraints were placed on the population, such as geographical location. Indeed, it was preferred that a wide spread was achieved to ensure that the results obtained have the widest applicability amongst SMEs.

### 3.4.3.2 On-line survey questionnaires

Questionnaires can be self-administered, sent by mail or sent electronically. Since this study involved a large national survey of SMEs in the UK, a self-administered questionnaire was deemed as unsuitable; making the choice limited to sending questionnaires by mail using postage and package or electronically using the University of Sheffield web server and e-mail address. Due to the type of research in question the researcher decided to administer an electronic questionnaire. This method was deemed appropriate as the study is interested in SMEs which have computers as opposed to ones without computers in order to best answer the research questions. However, there are many limitations associated with online surveys. These disadvantages include time and space available. For example companies such as SurveyMonkey and SuperSurvey can charge extra if the researcher wants to extend the specified time. Also, company's servers would cost extra if the survey needs to be available for a longer period of time. These limitations have been overcome with the availability of the University of Sheffield

server which was provided to the researcher with no time limit. Although the online survey has its critiques (Wright, 2005) it also has many advantages:

1. It covers a large geographical area and saves time. Its response rate is relatively high and the researcher receives a reply within days as opposed to weeks (Bachmann and Elfrink, 1996; Garton et al., 2003; Taylor, 2000; Yun and Trumbo, 2000).
2. It can be completed when person have time (Zikmund, 2003)
3. It incurs a minimum cost which is measured primarily in the researcher's time rather than financially (Bachmann and Elfrink, 1996; Couper, 2000; Llieva et al., 2002; Yun and Trumbo, 2000; Fox et al., 2001; Nie et al., 2002). More segments of society are using the Internet for communication and information and thousands of organisations have moved online (Wright, 2005). It eliminates the need for paper and other costs, such as those incurred through postage, printing and data entry (Llieva et al., 2002; Watt, 1999; Witmer et al., 1999)
4. Many studies have been conducted using online surveys (Flaherty et al., 1998; Flanagan and Metzger, 2001; Ahuja and Carley, 1998; Rice and Katz, 2001; Wright, 2005; Horrigan, 2001; Wellman, 1997; Wellman and Haythornthwaite, 2002; Parks and Floyd, 1996; Tidwell and Walther, 2002)
5. It is environmentally friendly – it minimises the use of transport and saves paper and energy.

As the advantages outweigh the disadvantages it was decided that the electronic questionnaire survey method was the most suitable to gather the data required for this study, particularly as quantitative analysis of several variables across a relatively large sample can be carried out (Larsson, 1993). By utilising the electronic questionnaire, respondents were able to answer freely to the questionnaire with the assurance that their identities would remain anonymous. Allowing respondents to be anonymous is a critical factor in obtaining more valid answers, especially compared to personal or telephone interviews (Cavana et al., 2001). In addition, the electronic survey provided added value to this study by enabling the University of Sheffield web statistics to be analysed (see section 3.4.3.6).

### 3.4.3.3 Questionnaire development

According to Sekaran (2003:28) "*a questionnaire is a pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives*". It is a significant instrument in a survey when it is known exactly what is required to measure the variables (Bailey, 1994), and is appropriate for obtaining sensitive information such as that



relating to the personal attitudes, perceptions and background of respondents. This kind of instrument is one of the most frequently utilised for data collection (Saunders et al., 2009) due to its effectiveness in gathering empirical data from a large sample (McClelland, 1994). In designing questionnaires, the sequence of questions can affect the nature of respondents' answers and cause some errors in analysis (Kinnear and Taylor, 1996). Furthermore, Tull and Hawkins (1993) suggest that the overall questionnaire should reflect the objectives of the research and move from one topic to another in a logical manner (for example all questions focusing on one topic completed prior to moving on to the next topic). Zikmund (2003) recommends that, to reduce the potential for a low response rate, a questionnaire should not exceed six A4 pages.

The on-line questionnaire was developed having in mind these basic rules. It contained 34 questions, and when printed was limited to five A4 pages. Questions were designed in such a way that the same topics were grouped together to aid dynamics and the flow of reading and answering. Considerable attention was given to developing clear, unequivocal and useful questions before distributing the questionnaires to gather the primary data. This was significant because designing questions that respondents can accurately answer would decrease non-response and measurement errors (De Vaus, 2002). The hard copies of this survey instrument, as well as corresponding letters, are attached in Appendix A. The correspondence contained the following: (1) the purpose of the study; (2) the importance of the study; (3) assurance of complete confidentiality; (4) directions for responding to each question; (5) gratitude of the writer to respondent's participation; and (6) the questionnaire itself. The questionnaires were sent via e-mail and the correspondence included:

1. *An e-mail* – with overall information of the research and the URL link to the University of Sheffield web server – The purpose of this was to enable the recipient to forward the e-mail to the relevant person or to directly access the link.
2. *Cover letter* – introducing the research background and aims, disclosing the identity and profile of the researcher with all corresponding details, promising confidentiality and anonymity for respondents. This letter included the URL link to the questionnaire itself.
3. *Questionnaire* – which was presented in six sections as follows:
4. *Demographic information* – This section included five questions about company details, number of employees, position and the background of the organisation.
5. *Trading of the organisation* – This section included four questions and included organisational suppliers, customers and core business.

6. *ICT information* – This section included 13 questions including ones on general IT information, level of IT commitment within the company, time when IT was introduced and the level of integration with their suppliers and customers.
7. *Importance of ICT in organisation* – This section included questions before and after the introduction of ICT in the organisation.
8. *Use of Government agencies* – This section included the general knowledge of Government agencies, their usefulness and the level of usage.
9. *E-business* – This section included the information about the level of Intranet in the organisation
10. The questionnaire was concluded with an option for the organisation to receive a final report about the research.

#### 3.4.3.4 Sample size

Four samples were used combining government and business sponsored databases that were available at the time of the study. The questionnaire was distributed throughout the UK steps were taken to ensure that organisations from different databases were not duplicated. These are as follow:

1. **Yorkshire and Humberside Chamber of Commerce and Industry Directory 2003/2004 for SMEs**

This was a Database of SMEs that was held within the researcher's institution. The database held in total 2,500 names and company details. This directory covered a wide range of industry sectors. The questionnaire was distributed in no particular order to 700 companies throughout Yorkshire and Humberside region of the UK.
2. **Business directory of the UK SMEs 2005**

This commercial database was published in 2005 and purchased in 2006. The database held in total 14,000 names and company details. This directory covered a wide range of industry sectors. The questionnaire was distributed in no particular order to 600 companies throughout the UK.
3. **UK Business Directory 2005**

This CD ROM commercial database was published in 2005 and purchased in 2006. The database included large organisations as well as SMEs. It contained in total 20,000 names and other relevant company details. For this reason companies were chosen on the bases that they employ 250 or fewer employees. The questionnaire was distributed in no particular order to 700 companies located throughout the UK.

#### 4. Caterer and Hotelkeeper 2006

This commercial directory included both, SMEs and large organisations and contained 15,000 names and company details. For that reason companies were chosen on the bases that they employ 250 or fewer employees. The questionnaire was distributed in no particular order to 1000 companies throughout the UK. This database was chosen as an additional source of data and it was free of charge.

Overall, the above databases did not provide information about the level of technology used or whether the selected companies were using or considering using e-business. It was assumed that all of them were using some kind of technology since their e-mail addresses were listed. However, it was not known if those e-mail addresses and web sites were operational. In total 3,000 questionnaires were distributed via e-mailed requests which contained a web link to the home page of the survey. The reason for choosing 3,000 companies in this study was the need to gather a large enough data set with the time restrictions of the research. All companies were chosen in no particular order from the directories. Table 3.5 presents an overview of the business population in the UK and its relation to the number of questionnaires answered.

**Table 3.5: Business population in the UK, questionnaire and response rate**

Source: BERR (2006), Office for National Statistics (2008)

Total		Number of employees	Number of businesses		Questionnaire distributed	Questionnaire responses	Response %
98%	72%	0 Sole traders	3,270,105	4.45m	1,350 (1-9)	46 (1-9)	3.4%
	26%	1-19	1,182,290		1,050 (10-49)	49 (10-49)	4.7%
					<b>2,400</b>	<b>95</b>	<b>4%</b>
2%		20-49	60,575	0.1m	<b>600</b>	<b>33</b>	<b>5.5%</b>
		50-199	28,045				
		200-249	1,810				
		250-499	3,700				
		500+	4,415				
<b>Total</b>		<b>29.4m</b>	<b>4.55m</b>		<b>3,000 (0.07%)</b>	<b>n= 135</b>	<b>4.5%</b>

Table 3.5 shows that, generally, in the UK economy, 98% of SMEs employ between 0 and 19 people of which 72% are sole traders (i.e. no employees) and 26% employ 1–19 staff. They together make up 4.45m businesses in the UK. The remaining 2% are companies that employ 20 or more people and their total number is progressively lower as the companies get larger. Table 3.5 indicates that 2,400 e-mail requests were sent to micro and small businesses (0–49 employees) with a response rate of 4% and 600 questionnaires were sent to medium-sized

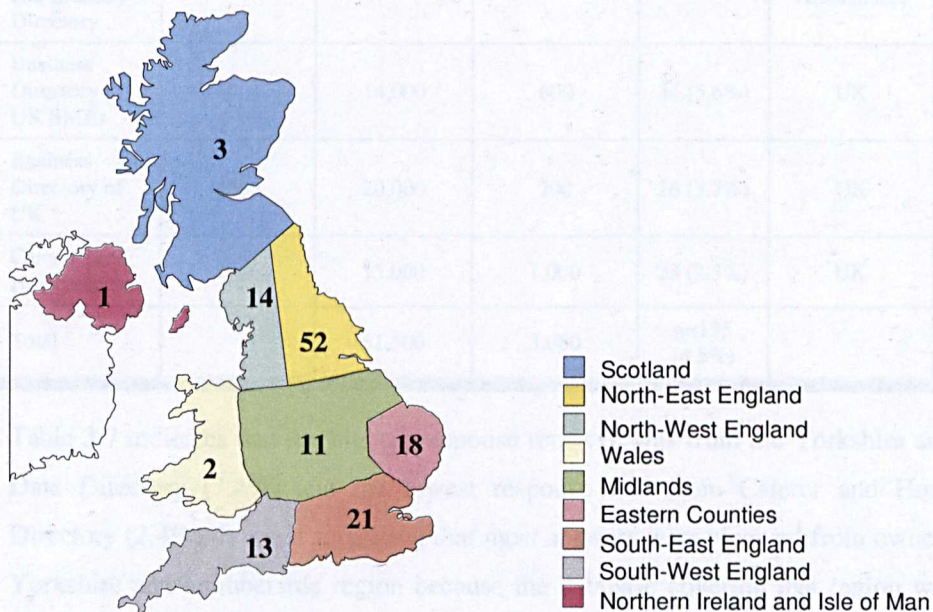


companies (50–250 employees) with the response rate of 5.5%, indicating a higher response rate than for the micro and small businesses. The number of respondents linked to their size can also be viewed in Table 3.6. The table shows that seven companies did not respond to question 1 which was related to the company's size.

**Table 3.6: Analysis of responses by number of employees including missing values**

	Size	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-9	46	34.1	35.9	35.9
	10-49	49	36.3	38.3	74.2
	50-249	33	24.4	25.8	100.0
	<b>Total</b>	<b>128</b>	<b>94.8</b>	<b>100.0</b>	
Missing		7	5.2		
<b>Total</b>		<b>135</b>	<b>100.0</b>		

In addition, it was possible to track the origins of the completed questionnaires. Figure 3.4 shows that all parts of the UK were included, but the numbers differ geographically. This is easily explained as 700 questionnaires were sent to Yorkshire and Humberside alone (see section 3.4.3.5). This yielded 52 valid responses from that region which is approximately 7%, fitting statistical expectations when one of the four databases used was managed by Yorkshire and Humberside Chamber of Commerce.



**Figure 3.4: Regional map of UK presenting location of respondents**

Figure 3.4 presents the location of companies that responded to the questionnaires. Those responses were used as a basis for the findings and analysis in this study. In addition, due to the technology used, the writer was also able to track the time and peaks when emails were picked



up by the potential respondents. This also indicated that approximately 90% of responses were received within two days. Further details of the companies that responded to this survey are discussed in section 3.4.3.6.

### 3.4.3.5 Response rate

An online survey was conducted over the period of 18 months between September 2005 and April 2007. Due to the on-line nature of the questionnaire, it was possible to some extent to track the journey of the e-mailed requests. This is a clear benefit of an on-line survey, relative to a standard paper-based surveys sent by mail.

Firstly it was possible to track and measure the response rate by sample selection. This is presented in Table 3.7.

**Table 3.7: Sample selection and response rate**

Database	Year published	Total number of companies in directory	Distributed sample	Response rate	Region based sample	Industry based sample
Chamber of Commerce and Industry Directory	2003/2004	2,500	700	52 (7.4%)	Yorkshire and Humberside	None-specific
Business Directory of UK SMEs	2005	14,000	600	34 (5.6%)	UK	Non-specific
Business Directory of UK	2005	20,000	700	26 (3.7%)	UK	Non-specific
Caterer and Hotelkeeper	2006	15,000	1,000	23 (2.3%)	UK	Hospitality industry
Total		51,500	3,000	n=135 (4.5%)		

Table 3.7 indicates that the highest response received was from the Yorkshire and Humberside Data Directory (7.4%) and the lowest response was from Caterer and Hotelkeeper Data Directory (2.4%). It is not surprising that most answers were received from owners/managers in Yorkshire and Humberside region because the database covering that region was available to use. However it was surprising to receive such a low response from owners/managers covering a specific industry, especially as the highest number of questionnaires was sent to these addresses.

Above all, an indispensable tool for evaluating the response rate was using statistical data pertinent to the survey's home page <http://www.shef.ac.uk/spavic> which was provided by the



Corporate Information and Computing Services (CICS) at the University of Sheffield. All together, there were three attempts to gather data presented in this thesis and each of the 3,000 e-mailed survey requests was sent three times, once per attempt (Table 3.8).

**Table 3.8: Overall response rate**

	Total number of emails	Total unique sites***	%	Submitted	Invalid	Valid	%	%
<b>1<sup>st</sup> attempt</b>	3,000	312	10.4	83	n/a	n/a	n/a	n/a
<b>2<sup>nd</sup> attempt</b>	3,000	123	4.1	15	n/a	n/a	n/a	n/a
<b>3<sup>rd</sup> attempt</b>	3,000	301	10.0	70	n/a	n/a	n/a	n/a
<b>Total</b>	<b>3000</b>	<b>736</b>	<b>24.5</b>	<b>168</b>	<b>33</b>	<b>135</b>	<b>4.5*</b>	<b>18.3**</b>

\* Percentage relative to the total number of requests.

\*\* Percentage relative to total unique sites.

\*\*\* These are different computers accessing the home page of the survey and are therefore likely to represent different people.

The 3,000 requests sent prompted 736 different people to access the home page of the survey. It is interesting to note that the remainder of the requests (more than 2,000 of them) were dispersed. A large number of them, probably more than 50% based on cursory counting of reports on e-mail delivery failures, were not delivered due to unknown e-mail addresses or full e-mail boxes, as evidenced by non-delivery or delayed delivery reports from Mail Delivery Systems received after sending the e-mails. This happened despite the fact that the e-mail addresses were taken from existing legitimate databases held by government and commercial organisations. As might be expected, other e-mailed requests, which were received normally, were not responded to, probably due to hesitation to reveal potentially sensitive information and to open an attachment from an unknown source or, simply ignorance.

It is even more interesting to see what happened to different people who received and acted on the e-mailed survey request. Out of 736 different computers/people who visited the survey website, 168 clicked the submit button. There were 33 obviously invalid submissions (e.g. empty web forms, repeated identical submissions, trial submissions by the website developers). In the end, there were 135 valid submissions which makes 4.5% response rate relative to all 3,000 questionnaires (many of which not delivered) or 18.3% effective response rate relative to the number of people who received the survey request and made initial inspection of what was required. Therefore, it is likely that more than 80% of people who received and clicked on the hyperlink to the survey home page were not interested in participating in the survey. However, the remainder who were interested provided a valid sample of usable data which makes up the backbone for this thesis. This is evaluated and discussed in more detail in the following section 3.4.3.6.

### 3.4.3.6 The University of Sheffield web server statistics analysis

The University of Sheffield web server was used to collect answers from the on-line questionnaire. The site <http://www.shef.ac.uk/spavic> was available for two years and is no longer accessible. The e-mail requests and the distribution of questionnaires started in September 2005. The names and contact details were taken from the previously mentioned databases in no particular order. In the first instance the questionnaire was sent in several rounds between September 2005 and March 2006. It is worth stressing that most e-mails were sent in mid January 2006, mainly because the researcher believed that SMEs owners/managers would respond to questionnaires better after the Christmas break. All 3,000 questionnaires from the four databases were sent in the space of seven months. The second attempt to re-send the questionnaire to all SMEs which did not respond was made in April 2006, and the final attempt was made during January and February 2007.

The statistical analyses of the three distribution attempts are presented in the following section.

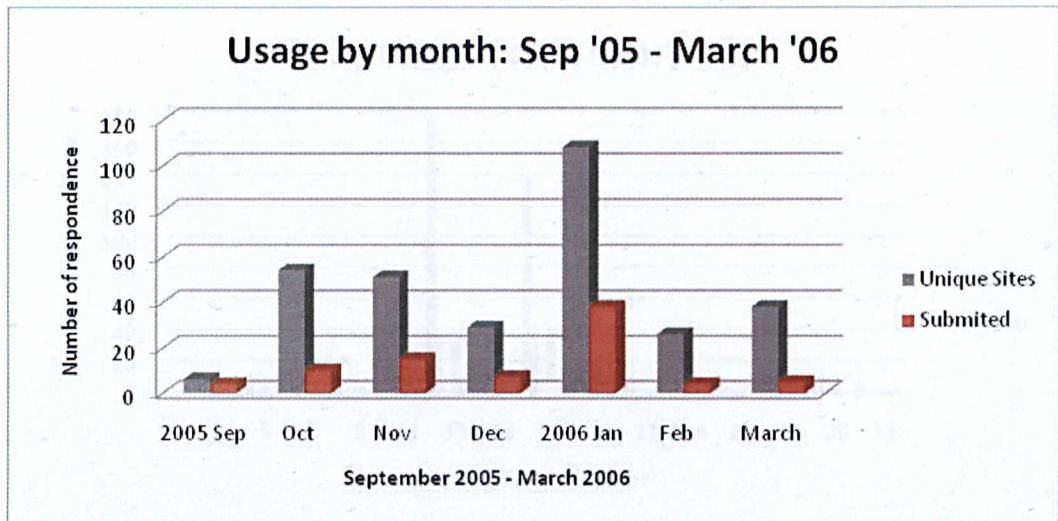
#### **First questionnaire distribution statistics**

The distribution of e-mails/questionnaires was carefully planned and it was decided to adopt a strategy of sending e-mails typically (with few exceptions) on Sundays to wait for their recipients first thing on Monday morning as the researcher believed that e-mails were more likely to be responded to at the beginning of a new working week.

In the first distribution attempt, out of 3,000 e-mails sent, the questionnaire website was accessed by 312 different computers which is highly likely to indicate that 10.4% of people showed some interest in the survey (Table 3.8). Out of these, there were 83 submissions (Table 3.8).

Figure 3.5 presents a distribution of the number of different computers (so called 'unique sites' in the web-stats utility programme) accessing the questionnaire website, and submissions made between September 2005 and March 2006.

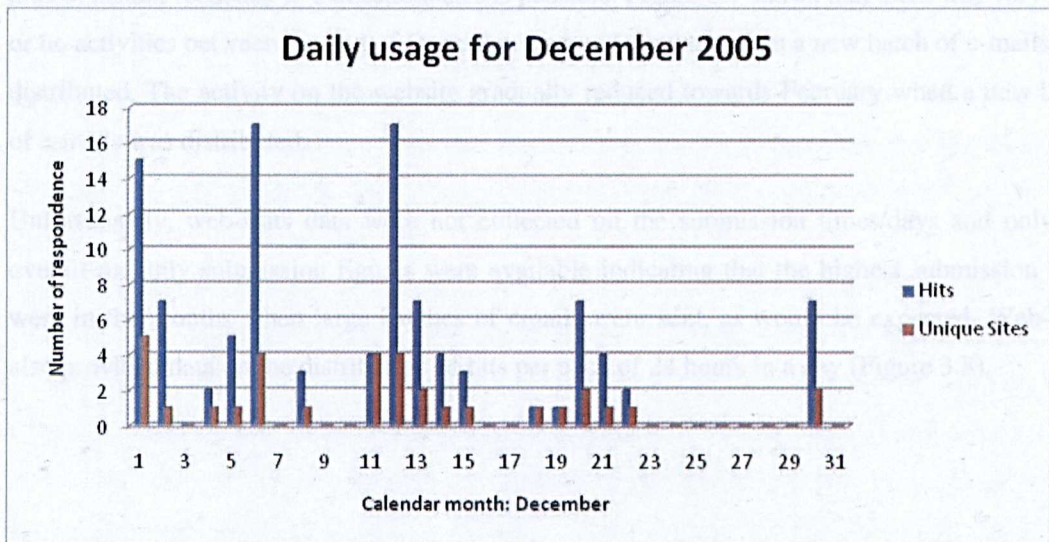




**Figure 3.5: Example of submitted questionnaires by month: September 2005-March 2006**

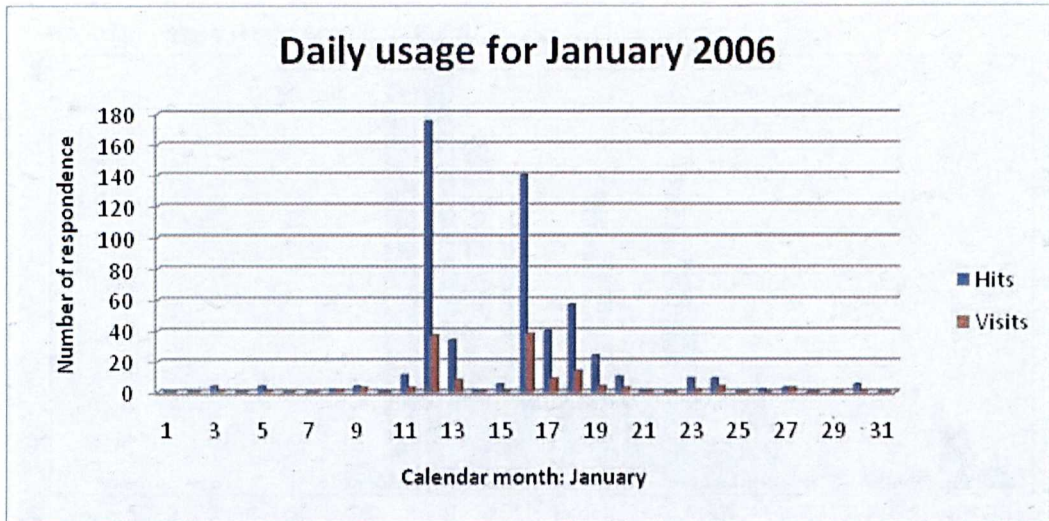
Despite the obvious initial interest of more than 10%, there was a gap between the number of unique sites and submissions. As to the high activity in January 2006, this is not surprising considering that most e-mails were sent during this month – hence the highest number of visits and submissions.

Figure 3.6 and Figure 3.7 present examples of the daily usage of the website for December 2005 and January 2006.



**Figure 3.6: Daily statistics for December 2005**





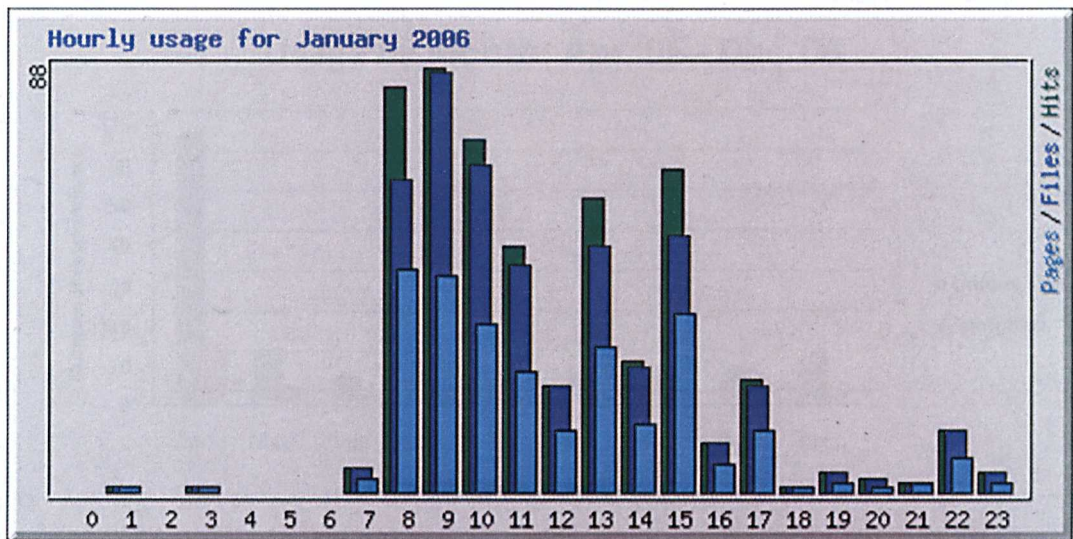
**Figure 3.7: Daily statistics for January 2006**

The 'Hits' data on both graphs present a number of web pages under the questionnaire website (<http://www.shef.ac.uk/spavic>) accessed by each computer i.e. 'unique site'. This number is, therefore, equal or greater than the number of 'unique sites' for each day, because each computer was used to load one or more web pages examined by the computer user.

The graphs also indicate that the number of hits peaked within two days of sending large batches of e-mails, which is a valuable lesson for future exercises of this kind indicating that almost instant feedback to a questionnaire is possible. Figure 3.7 shows that there was very little or no activities between the end of December and mid-January when a new batch of e-mails was distributed. The activity on the website gradually reduced towards February when a new batch of e-mails was distributed.

Unfortunately, web-stats data were not collected on the submission times/days and only the overall monthly submission figures were available indicating that the highest submission rates were in the months when large batches of emails were sent, as would be expected. Web-stats also provided data on the distribution of hits per each of 24 hours in a day (Figure 3.8).





**Figure 3.8: First attempt - hourly distribution of hits on various pages of the questionnaire web site.**

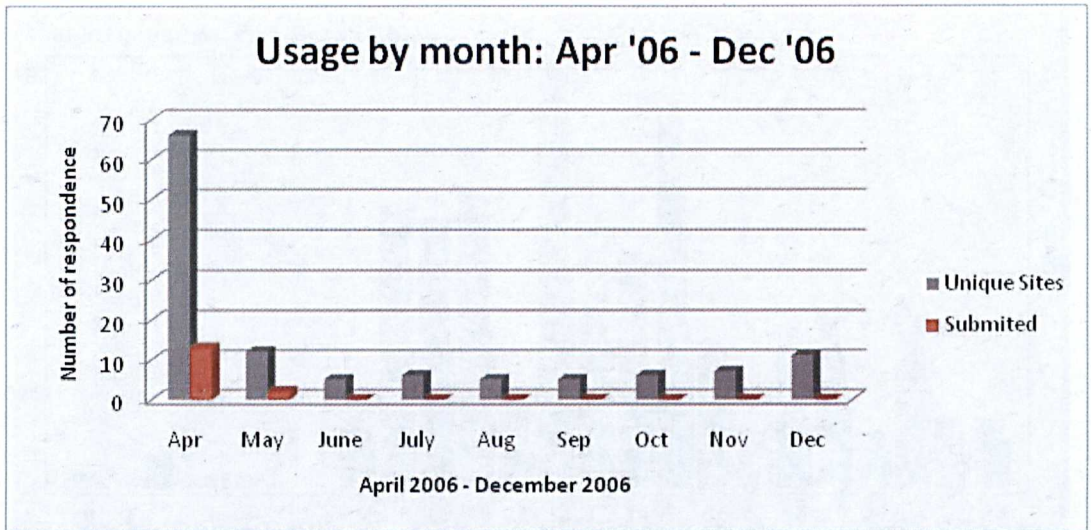
It can be seen that the vast majority of hits happened during normal working hours in the UK with particularly strong activity first thing in the morning and drop in the activity around the lunch time and towards the end of the working day.

### Second questionnaire distribution statistics

The same batch of 3,000 e-mail requests was re-sent as reminders at the end of April 2006. Overall there were 123 (4.1%) different computers which accessed the website and this could reasonably be attributed to this second round of sending e-mails (Table 3.8). This was somewhat disappointing since all 3,000 e-mails were sent at once, as opposed to the gradual sending of e-mails between September 2005 and March 2006. The hope was that this new strategy would improve the response rate, but unfortunately this did not happen. Overall, only 15 submissions were made as a result of the second round of questionnaire distribution. One possible explanation for such low response could be that e-mail requests were sent too soon after the first attempt. As the first round of e-mail was spread over seven months, some companies benefited from more time while some received second e-mails soon after the first ones. This problem was addressed in the third round of e-mails by giving the same amount of time to all companies.

Figure 3.9 shows the total number of unique sites and submissions corresponding to the second distribution of 3,000 reminder e-mails in April 2006.

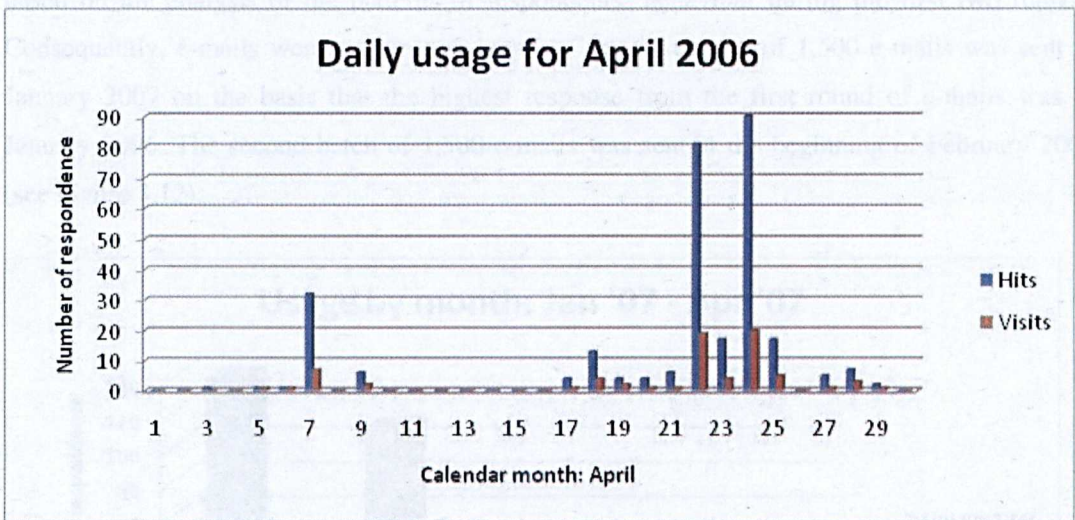




**Figure 3.9: Usage by month: April 2006 – December 2006**

There were 13 submissions in April and only two in May 2006 after which there were no submissions.

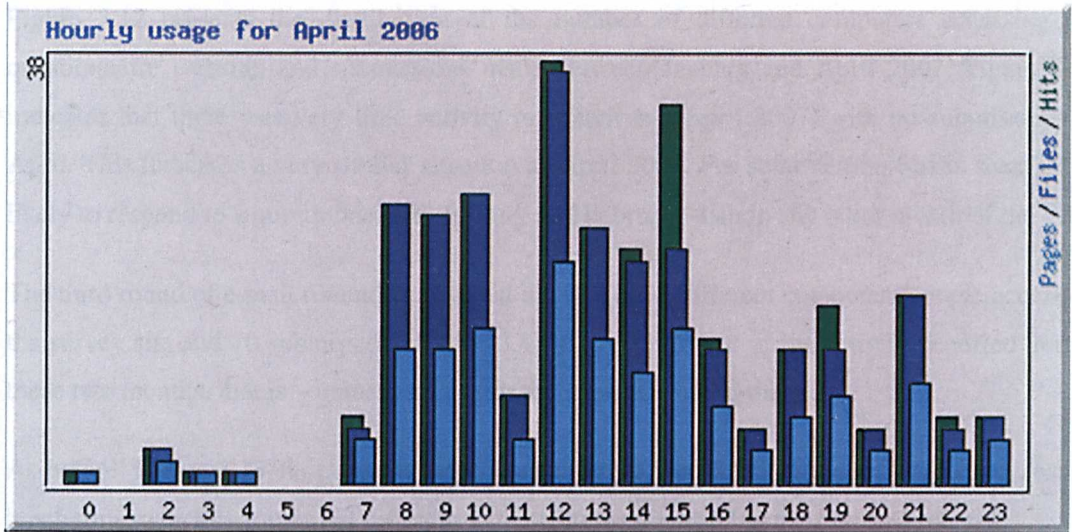
Figure 3.10 shows the daily usage for the most active month of April. Most of the activity happened immediately after the e-mails were sent in the second half of April.



**Figure 3.10: Daily statistics for April 2006**

As before, Figure 3.11 shows the hourly distribution of hits to various web pages in the questionnaire site. It can be seen that, again, most activity occurred during normal working hours in the UK, with some evening activity, too.

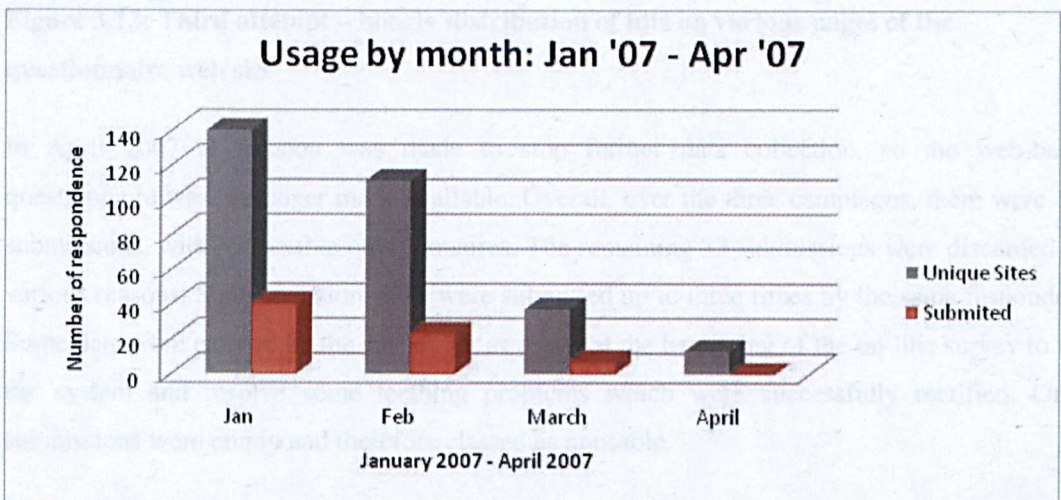




**Figure 3.11: Second attempt – hourly distribution of hits on various pages of the questionnaire website**

**Third questionnaire distribution statistics**

The third and final re-sending of 3,000 e-mail reminders occurred in January and early February 2007. To increase the response rate, the strategy for sending the e-mails was changed slightly based on the analysis of the patterns of respondents’ behaviour during the first two rounds. Consequently, e-mails were sent in two batches. The first batch of 1,500 e-mails was sent in January 2007 on the basis that the highest response from the first round of e-mails was in January 2006. The second batch of 1,500 e-mails was sent at the beginning of February 2007 (see Figure 3.12).



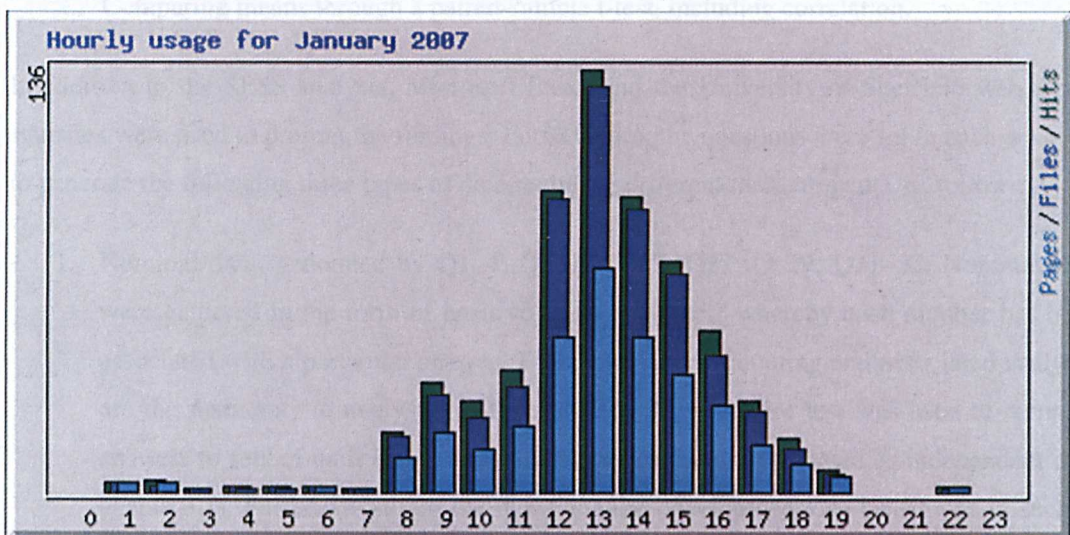
**Figure 3.12: Usage by month: January 2007–April 2007**



Figure 3.12 presents the distribution of the number of different computers accessing the questionnaire website, and submissions made between January and April 2007. Figure 3.12 indicates that there was very little activity in March and April 2007, with no submissions in April. This indicated a very similar situation as April 2006. For some reason SMEs seem more likely to respond to a questionnaire in January and February than in any other month of the year.

The third round of e-mail reminders resulted in 301 (10%) different computers/people accessing the survey site and 70 submissions (Table 3.8). As before, most of the activity occurred during these two months, that is – immediately after the requests were e-mailed.

As before, Figure 3.13 shows the hourly distribution of hits. Most of the hits happened around lunch time, which is somewhat different to the patterns observed in the first two rounds.



**Figure 3.13: Third attempt – hourly distribution of hits on various pages of the questionnaire web site**

In April 2007 a decision was made to stop further data collection, so the web-based questionnaire was no longer made available. Overall, over the three campaigns, there were 168 submissions, with 135 usable questionnaires. The remaining 33 submissions were discarded for various reasons. Some questionnaires were submitted up to three times by the same respondent. Some data were entered by the researcher as a trial at the beginning of the on-line survey to test the system and resolve some teething problems which were successfully rectified. Other submissions were empty and therefore classed as unusable.

### 3.4.3.7 Survey data analysis

All responses were analysed together by using a standard Statistical Package for Social Scientists (SPSS). The data analysed focussed on the extent of e-business adoption within the SMEs surveyed, together with distinctive characteristics of SMEs, barriers experienced and benefits derived from implementation. In addition, the statistics from the University of Sheffield web server hosting the questionnaire were analysed and presented in an Excel spreadsheet.

The analysis focused on the extent of e-business adoption within the SMEs surveyed, as well as the impact of the UK Government initiatives. The following tools were used:

1. Descriptive statistics via frequencies and cross-tabulation,
2. Comparing means through a paired-sample t-test, including correlation.

In addition to the SPSS analysis, Microsoft Excel and the University of Sheffield web server statistics were used to present the findings. Furthermore, the questions were set in such a way as to generate the following three types of data requiring different measurements, as follows:

1. Nominal data, generated by Q1–4; Q5–19; Q22; Q27; Q 29; Q31–32. Nominal data were gathered in the form of positive integer numbers whereby each number has been associated with a particular answer. Therefore, simple counting and associated analyses are the main way to analyse this type of data. A chi-square test was used to compare answers to sets of pairs of questions, whereby each set was treated as independent data (Table 3.7). Further details of the questionnaire development can be viewed in section 3.4.3.3.
2. Interval/scale data, generated by Q25–26. Scaled data were used for measuring the importance of Internet technology in SMEs before and after the introduction of the Internet. A five-point Likert scale was used to measure the competitive advantage gained by the introduction of the Internet in the organisations. A paired sample t-test was used to test relationship between the two variables, one from Q25 and the other from Q26, dealing with changes in the organisation *before* and *after* the introduction of the Internet. In addition, the paired sample t-test and Wilcoxon signed rank test was used to compare two variables.
3. Ordinal data generated by Q20–21; Q23–24; Q28; Q30. Ordinal data had a rating scale attached. This type of questions enabled the counting and ranking of the data but not measuring. A five-point Likert scale was used in which the level of importance of Internet technology in SMEs was measured. A Spearman's Rank correlation was used to test the relationship between the two variables (Table 3.9). In addition, for questions



15 and 24 and 15 and 30 two sample hypothesis tests of independent samples t-test and Mann-Whitney U test were used to compare changes between the two variables.

4. Finally, Q33 was an invitation for a free text comment and of qualitative nature and Q34 was the request for the final report in which the writer offered access to a final report of this research for the participation in the survey. Further details of the questionnaire development can be viewed in section 3.4.3.3.

**Table 3.9: Summary of popular statistical tests\***

Source: Zimmerman (1994, 1998, 2000)

	Two samples		More than two samples			Relationship testing
	Independent samples	Related samples	Independent samples	Related samples	2 or more factor tests	Correlation
<b>Nominal</b>	Comparing distribution of two independent samples Chi-square	McNemar test	Comparing distribution of more than two independent samples Chi-square	Cochran Q test		
<b>Ordinal</b>	To test for significant differences <ul style="list-style-type: none"> <li>Mann Whitney U test</li> <li>Wilcoxon rank sums test</li> </ul>	To test for significant differences <ul style="list-style-type: none"> <li>Sign test</li> <li>Wilcoxon test</li> </ul>	To test for significant differences <ul style="list-style-type: none"> <li>Kruskal-Wallis one way ANOVA</li> </ul>	To test for significant differences <ul style="list-style-type: none"> <li>Friedman 2way ANOVA</li> </ul>	Two factor only <ul style="list-style-type: none"> <li>Friedman Test</li> </ul>	Relationship between two variables <ul style="list-style-type: none"> <li>Spearman's Rank correlation</li> </ul>
<b>Interval/ratio</b>	Test whether two sample means are significantly different <ul style="list-style-type: none"> <li>Independent sample t-test</li> </ul>	Test whether two sample means are significantly different <ul style="list-style-type: none"> <li>Paired sample t-test</li> </ul>	2+factor ANOVA with multiple comparison	2+factor ANOVA (Repeated measure) with multiple comparison	2+factor ANOVA with multiple comparison	Relationship between two variables <ul style="list-style-type: none"> <li>Pearson's 'r' correlation</li> </ul>

Note\* - Only the tests highlighted in grey were included in the analysis in Chapter 6.

### 3.4.4 Longitudinal case study

Following an initial exploratory study and the on-line survey, a longitudinal case study was used to study changes in SMEs and their use of ICT over a period of time. Adams and Schvaneveldt (1991) point out that the main strength of a longitudinal case study is that in observing people or events over time in which a researcher is able to exercise a measure of control over the variables being studied, provided they are not affected by the research process itself. The longitudinal study took place in 2009 which was 5 years after the original case study interviews



were carried out. The nine SMEs were revisited in order to validate the results acquired in the national on-line survey and to verify and update the e-business model proposed in the exploratory study. The choice of longitudinal case study analyses was preferred as it enabled direct interviews with the persons involved in the event and would make comparison possible. This study also enabled the validation of results from the on-line survey and for testing the proposed model as well as the construction of a new e-business model.

Furthermore, the linear-analytic structure presented in Table 3.10 was seen as most suitable and as a result was applied in this longitudinal case study analysis.

**Table 3.10: Six structures and their applications to different purposes of the case studies**

Source: Yin (2003)

<i>Type of structure</i>	<i>Purpose of case study</i>		
	<b>Explanatory</b>	<b>Descriptive</b>	<b>Explanatory</b>
Linear-analytic	X	X	X
Comparative	X	X	X
Chronological	X	X	X
Theory building	X		
Suspense	X		
Un-sequenced		X	

The purpose of the longitudinal case studies was to analyse, and report on, issues arising first in the literature review – rather than to do so in the exploratory case study interviews – and finally, issues studied in the national survey. The subtopics proceeded to cover the methods used, the findings from the data collected and analysed, and the conclusions and implications from the findings.

#### 3.4.4.1 Longitudinal case study data analysis

In this longitudinal case study analysis, a qualitative research approach was adopted. This research was based on multiple case study methodologies (Yin, 2003) in which semi-structured interviews were used to collect data from a chosen sample of SMEs. The opportunistic choice of companies was outlined and discussed in section 3.4.2.

The data gathered in interviews was analysed using a variety of techniques offered by NVivo 8. The software enhanced analysis and enabled coding of non-numerical and unstructured data collected in interviews. The software allowed sorting of text and examining relationships in the data. The following analyses were performed: (1) Sources, (2) Nodes, (3) Queries, (4) Classification of cases and relationships.

The following two sections 3.5 and 3.6 concentrate on discussion of the reliability and validity of each methodological technique used in this thesis.

## 3.5 Reliability

Joppe (2000:1) defines reliability as:

*"...The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable."*

The main emphasis embodied in Joppe's (2000) quotation is the idea of repeatability of results. Kirk and Miller (1986:41) identify three types of reliability referred to in quantitative research, which relates to: (1) the degree to which a measurement, given repeatedly, remains the same; (2) the stability of a measurement over time; and (3) the similarity of measurements within a given time period. In addition, Charles (1995) adheres to the notions that the consistencies with which questionnaires are answered remain relatively the same and can be determined through the retest method at two different times. This attribute of the instrument is referred to as stability. If the measure is stable the results should be similar. A high degree of stability indicates a high degree of reliability, which means the results are repeatable.

However, Joppe (2000) detects a problem with the test-retest method which can make the instrument, to a certain degree, unreliable. She explains that the test-retest method may sensitise the respondent to the subject matter, and hence influence the responses given. It is assumed that the researcher cannot be sure that there was no change in extraneous influences such as the respondents' attitude. This could lead to a difference in the responses provided. Similarly, Crocker and Algina (1986) note that when a respondent answers a set of test items, the score obtained represents only a limited sample of behaviour. As a result, the scores may change due to some characteristic of the respondent, which may lead to errors of measurement. These kinds of errors will reduce the accuracy and consistency of the instrument and the test scores. Hence, it is the researchers' responsibility to assure the high consistency and accuracy of the tests and scores. Thus, Crocker and Algina (1986:106) say, *"Test developers have a responsibility of demonstrating the reliability of scores from their tests"*.

In this study both qualitative and quantitative research methodology was used to enable and improve the reliability of the data collected. For example, interviews in case studies had a number of unique advantages and provided the opportunity for feedback and probing of complex answers. This was further enhanced by administration of longitudinal case studies which were carried out five years later. The conditions for interviews were similar with the

exception of one case study, where the interviewee declined the subsequent interview. Although time was a possible implication in this instance, a longitudinal case study enhanced the reliability of data. The researcher was well known to the respondents which allowed more sensitive information to be gathered.

In contrast, the survey questionnaire provided an opportunity for the researcher to reach a larger number of SMEs with a minimum cost (Sekaran, 2003) and was administered electronically (Cavana et al., 2001). The national survey was an efficient mechanism that enhanced the reliability of the study allowing flexibility in the treatment of the data. For that purpose the nominal data was analysed by comparing the distribution of more than two independent samples while the interval/ratio data was analysed by paired sample t-test. In addition, Spearman's rank correlation was used for ordinal data to establish the level of relationship between the two variables.

### 3.6 Validity

The traditional criteria for validity find their roots in the positivist tradition, and to an extent, positivism has been defined by a systematic theory of validity. Within the positivist terminology, validity resides amongst, and is the result and culmination of, other empirical conceptions: universal laws, evidence, objectivity, truth, actuality, deduction, reason, fact and mathematical data to name just a few (Winter, 2000).

Similar to the reliability of data analysis, Joppe (2000:1) provides the following explanation of what validity is in quantitative research:

*“Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. Researchers generally determine validity by asking a series of questions, and will often look for the answers in the research of others.”*

Wainer and Braun (1998) add to the above definition by describing validity in quantitative research as “construct validity”. The construct is the initial concept, notion, question or hypothesis that determines which data are to be gathered and how they are to be gathered. They also assert that quantitative researchers actively cause or affect the interplay between construct and data in order to validate their investigation, usually by the application of a test or other process. In Wainer and Brown's (1998) definition, the involvement of the researchers in the research process would greatly reduce the validity of a test.

Validity in this study is established by longitudinal case study interviews. Nine case studies used in the exploratory study were revisited five years later to validate the results from the on-



line survey and to update the construction of a new e-business model. To increase the validity of the data collected, NVivo8 software was used for analysis of the qualitative data. The software enabled the classification of cases and relationships between variables. Since this research combines two essentially different paradigms (Kuhn, 1970) of qualitative and quantitative research methodologies, the validity and reliability are seen as added value rather than as a disadvantage. For example, reliability and validity in quantitative research reveal two strands: Firstly, with regards to reliability, whether the result is replicable. In this study the national survey was sent once which was followed by two subsequent reminders (see sections 3.4.3.5 and 3.4.3.7 for more details). Secondly, with regards to validity, whether the means of measurement are accurate and whether they are actually measuring what they are intended to measure. This is explained in section 3.4.3.7.

However, the concepts of reliability and validity are viewed differently by qualitative researchers who strongly consider these concepts defined in quantitative terms as inadequate. In other words, these terms as defined in quantitative terms may not apply to the qualitative research paradigm. The question of replicability in the results does not concern them (Glesne and Peshkin, 1992), but precision (Winter, 2000), credibility, and transferability (Hoepf, 1997) provide the lenses for evaluating the findings of qualitative research. In this thesis longitudinal case study analyses are seen as a bridge which complements these two essentially different paradigms.

### 3.7 Required resources

In order to complete this research study over the period of six years the following resources were required:

- A Dictaphone/tape recorder to record the interviews with owners/managers – Firstly, a tape recorder was used to complete the interviews in the exploratory study. However, through the line of the business the researcher acquired a package that included a Dictaphone and a digital transcriber that can automatically download the data into Nvivo. This was supplied by Sheffield Hallam University where the researcher is employed.
- Digital transcriber software to transcribe the data collected in the interviews – this was used in a conjunction with the Dictaphone.
- SPSS software to analyse the data collected in the survey – the researcher attended several SPSS courses the first two years of study. The software was supplied by the University of Sheffield.
- NVivo software to analyse data collected in the interviews – The researcher attended a one-day course to better understand this software. The software was supplied by Sheffield Hallam University where the writer is employed.

- Snagit – Software for capturing screen shots that was used for organising pictures in the text and appendices.
- Dropbox – Microsoft application for transferring documents between different PCs and laptops.
- University server to collect data from the survey.
- Databases – Two databases were bought from the research grant that was available for this study.

Since the nature of this study was to develop an e-business strategy for SMEs, the researcher felt it was necessary to use as many technological gadgets as possible to experience the new and up-coming technologies. However, the mastering of technology involved both time and institutional support. This support was provided by both universities, the University of Sheffield and Sheffield Hallam University in terms of courses and opportunity to use software and databases available for the duration of the study.

### 3.8 Summary

This chapter investigated a research philosophy, its paradigms and number of research techniques in order to identify the most appropriate research methodology to answer the aims and objectives of this study. Following this an investigation into the primary research techniques enabled the researcher to identify the most effective method for conducting a reliable and valid piece of research. As a result of that investigation, the mixed methodology paradigm was chosen as the primary research. This was administered by using the qualitative and quantitative research method. The qualitative research method included longitudinal case study approach that lasted over five years in which a semi-structured interview technique was used to create nine case studies. These techniques were applied to gain more detailed data as recommended by Knight (2000:31). Longitudinal case study analyses were also used to strengthen reliability and validity of the data and to bridge the gap between qualitative and quantitative research. In addition, the quantitative research method was utilised in which a regional and national on-line survey of UK SMEs was conducted. This was to cover a broad geographical area, at minimal cost and at the convenience of the respondent. The regional and national survey was seen as an efficient mechanism for enhancing the reliability of the study allowing flexibility in the treatment of the data.

# Chapter 4

## 4 Exploratory study

This chapter presents an exploratory case study conducted in 2004. After an initial literature review in Chapter 2 the first set of nine interviews with owners/managers were carried out. The purpose of this initial work was: (1) to test the findings from the literature review; (2) to analyse data collected in interviews and; (3) to propose a preliminary, but viable e-business model based on the literature and case studies. This exploratory study provided a level of understanding of SMEs' behaviour, their adaptability to the new economic demands and the possibility of creating competitive advantage by using e-business. In addition, this exploratory study was to check if the research methodology has been correctly thought through and to gather initial data to be expanded further. This study gave an opportunity to identify any problems and to modify the research method before embarking on the main study. Furthermore it provided, information whether or not the data collection tools had sufficient depth, range and quality of information required and consequently, increased the likelihood that the greater amount of data, later collected in the study, is usable.

In this exploratory study a qualitative research approach was adopted. This research was based on a multiple case study methodology (Yin, 2003) in which, semi-structured interviews were used to collect data from SMEs' owners/managers. The choice of companies in which to carry out the study was pragmatic and opportunistic, rather than purposive. Access to all companies was achieved via senior managers who were all personally known to the researcher. The role of the researcher was to interpret events (Yin, 2003).

The summary of this exploratory study is presented in Table 4.1. This chapter is divided into four parts: (1) medium sized enterprises – two case studies; (2) small enterprises – one case study; (3) micro enterprises – six case studies; and (4) discussion and conclusion of the exploratory study.



Table 4.1: Exploratory study summary table

Case company	Gripple Ltd	SMP Europe	Sheffield Motor Company Ltd	Aleksandria Sciences Ltd	Moving Image Research	Lovebytes Ltd	Occidental Ltd	Toni & Guy	Cave Studios Ltd
Start of business/First computer	1988/1988	1967 & 1996/1978	1998/2001	1997/97	2002/2002	1994/94	1997 & 2000/1997	1996/1999	1979/1985
Sales turnover	£14.6 m	£15m	£1m	£40k	N/A	£200k	£250k	£700k	£350k
No of employees	147 (Medium)	249 (Medium)	5 (Micro)	0 (Micro)	6 (Micro)	1 (Micro)	7 (Micro)	25 (Small)	2 (Micro)
Industry sector/cycle	Manufacturing/introductory & growth	Automotive manufacturer/introductory & decline	Motor trade/Growth	Consultancy service/Growth	Technology/introductory-hi-tech	Art service/Growth	Dentistry/Growth	Service – Hair dresser franchised studio /Growth	Music – Service broker/Growth
Organisational structure	Flat	Flat	Flat	Flat	Hierarchical	Flat	Flat	Hierarchical	Flat
Growth rate	High – entering new markets all the time	Medium	Low	Low	New start-up company	Medium	Medium	High	Medium
Markets	Global	Global	UK	Global	Global	UK	UK	UK	Global
IT infrastructure	High	High	Low	Low	High	Medium	Low	Low	Medium
Integration	Medium-High	Low-Medium	Low	Low	Medium-High	Low	Low	Low	Low
Core competence	Innovation	Innovation & copies	Customer responsiveness	Customer responsiveness	Innovation	Customer responsiveness	Customer responsiveness	Customer responsiveness	Customer responsiveness
R&D/Vision of the future	High/High	Medium/High	Low/Low	Low/Low	None/High	Medium/Medium	None/Medium	Low/Medium	Low/Low
Use of Government initiatives	High	Low	Low	Low	Low	Low	Low	Low	Low
IT experience	Positive	Positive	Positive	Positive	Positive	Positive	Negative	Positive	Positive

## 4.1 Medium-sized enterprises

In this section two medium-sized enterprises are analysed and discussed: The first case study looks at Gripple Ltd, based in Sheffield, and the second discusses SMP Europe, based in Nottingham.

### 4.1.1 Case study 1: Gripple Ltd

Gripple Ltd is a Sheffield based manufacturing company that employs 147 people and has an annual sales turnover of £14.6m. The “Gripple” is a device invented by the chairman of the company and is recognized as the world’s most innovative way of joining, tensioning, terminating and suspending wire and wire rope. The company is strategically driven and highly innovative in applying latest manufacturing technology to new products. Over the years, innovation through product development has remained the core of the company’s successful operation. Due to strategic and operational positioning, the company invested in technology right from the beginning. Now, the company is using an Enterprise Resource Planning/Just-in-Time (ERP/JIT) system, and has a very strong research and development (R&D) department. Their latest technological investment is in a cutting edge “Loadhog” (a re-usable device for securing boxes to a pallet instead of shrink wrap plastic). This forward thinking strategy and investment in the appropriate IT infrastructure has opened a wide global market to this company. In terms of ICT, the company is successfully using e-mails, as an efficient internal and external communication tool, a website, which positions them in the worldwide market, and e-commerce, where they are able to order and pay online and maximise accessibility and speed. Nevertheless, the company is disadvantaged in the area of supply chain integration with other supplier companies whose owners/managers are lacking the same enthusiasm about IT investment and are preventing Gripple from full e-business integration. For example, the company’s managers still need to use a telephone and fax machine to make sure that final material orders and deliveries are taking place as planned. This is due to a high percentage of human errors experienced in the past and the lack of appropriate IT infrastructure in their suppliers’ companies. To complete the chain, Gripple Ltd may need to help their business partners (suppliers/customers) by defining standard hardware/software/Internet service provider configurations, which would consequently emphasise the importance of close relationships between supply chain partners as a prerequisite to adopting e-business. In particular, the company may need to initiate the building of an electronic B2B and B2C relationship. These can be realised by using an Extranet that enables the company to share part of the business’s information or operations with suppliers, vendors, partners, customers, or other businesses. As a

result, this will enable business partners to develop a real appreciation of the power of the Internet.

### 4.1.2 Case study 2: SMP Europe

SMP Europe is a Nottingham-based motor vehicle parts manufacturing company. The company was formed in 1967, employs 249 people and has an annual sales turnover of £15m. For many years the company went from strength to strength and expanded gradually. However, in the early 1990s business started to decline due to the fact that the company's main products were copies of original vehicle parts. After that, the company went from winning to losing rather quickly. The management control of the company was poor, with low efficiency and high production costs. This was partially caused by the fact that the company ignored rapid advances in technology and they did not have the ability to generate new value through innovation. What is more, lack of investment in better technology and the declining stage of the industry life cycle (producing copies of original vehicle parts) forced the owner of the company into a joint venture with a firm in the USA. However, in the late 1990s the company took back a controlling interest in the firm because the owner of the company realised that their future is in innovation rather than in copies of original parts. As a result, the owner/manager made a decision to acquire another organisation – a manufacturer with an innovative marketing approach. In 2002 they invested £1m in a new IT infrastructure, staff training, a new telephone system, a new Enterprise Resource Planning (ERP) system and a new customer database. However, due to a previously poor IT infrastructure and legacy systems, the company has taken 18 months to come back to where they started from before the upgrade. In terms of ICT the company is successfully using e-mails and the website as means of communication, internally and externally. In the future, the company plans to engage more in e-commerce transactions that could maximise accessibility and speed. It is only a start for the company in terms of e-business applications, but they are willing to learn from their mistakes and try to keep up with the technological advances in the future.

### 4.1.3 Analysis of medium-sized enterprises

The advances in IT are anticipated to affect both organisations considerably and in a very different way. Although neither company is using e-business, as defined previously (Van Hooft and Stegwee, 2001), Gripple Ltd is more advanced in the use of the Internet technology in general. For both companies change became imperative, but in particular for SMP Europe. This change involved a new underlying philosophy behind the firm's planning and development strategies as promoted by the DTI (2003). Furthermore, such an adaptation to a new e-business infrastructure involved massive changes that affected core elements of an organisation,



including mission statements, vision, business strategies, goals, culture, technology, training and policies (Mukherji and Mukherji, 1998). For example, in the interview with SMP Europe it was confirmed that the changes and adaptation were very slow and consequently they resulted in stagnation of the business and loss of the ability to generate new value through innovation. Moreover, after initial investment in the new technology, the company was still employing low skilled staff and still was not using newly acquired IT infrastructure to its full potential as argued in studies of Poon and Swatman (1997), Hannon and Atherton (1998) and Bharadway (2000). It seems that both management and employees of SMP Europe should have played a more active role in implementing these changes. It should be noted that SMP Europe is a very good example which complements the study of Kalakota and Robinson (2001), and shows how managers of profitable companies must anticipate the need for self-transformation and change when there is an opportunity and not just when faced with difficulties.

Unlike SMP Europe, Gripple Ltd has a partially integrated system and it is now waiting for some suppliers and customers to participate in technological advances to complete the integration of their supply and distribution chain. However, Gripple Ltd needs another set of flexible and responsive strategies that will deal with those organisations in their supply chain which are reluctant to restructure, re-engineer and reinvent themselves. The point here is that the Internet technology and e-business strategies should be treated as simply another technique for reinventing or rather rejuvenating the business (Kalakota and Robinson, 2001). This study also shows that not only do companies need to anticipate and accept changes themselves, but they need to persuade their business partners (suppliers and customers) to appreciate the power of the Internet.

In addition to the appreciation of technological advances and staff involvement, companies need to look out for external support, which is provided by the UK Government (DTI, 2003). For example, Gripple Ltd is very much aware of the government initiatives in relation to improving SMEs' technological standards. In that respect, Gripple Ltd is involved in many initiatives run by the Government and they use the support and help available to their full advantage. Although Government policy has been formulated to promote ICT for all SMEs (DTI, 2003; DoH, 2000), the writer's impression was that SMP Europe did not use any government-related agencies. It can be argued that if they can change their attitudes towards these initiatives they could start taking advantage of them.

Even though for Gripple Ltd the e-business planning process appeared to be relatively straightforward, the experience of SMP Europe demonstrated some of the problems associated with the process of the e-business planning. Nevertheless, to implement an e-business strategy (described in Van Hooft and Stegwee, 2001) correctly requires an ongoing commitment of time

and other resources. This preliminary research shows that, despite the difficulties, both companies are willing to make that commitment at this moment in time. It should be noted that although they represent traditional companies, the owners/managers' belief was that the Internet technology has changed and will continue to change, the way they do business.

## 4.2 Small enterprises

In this section one small sized enterprise of 25 employees is analysed and discussed. The company is called Tony and Guy and is based in Sheffield.

### 4.2.1 Case study 3: Toni and Guy

Unintentionally, this case study includes a franchised company. Although it does not fit completely into the definition of SMEs that was provided and explained in detail in Chapter 2, it is run virtually as an SME. Nevertheless, the information received by one of the franchised company owners during the interview was just as valuable for this study as other cases.

Tony and Guy is a large international fashion and style organisation whose business model is franchising. The company is constantly evolving artistically and commercially. For more than 45 years, Toni and Guy has combined a reputation for quality with the pursuit of cutting-edge modernity. The company also emphasises education, product development and training, and values the importance of positioning the brand in the broader context of fashion and style.

The company currently comprises two global, franchised hair salon groups, Toni and Guy with 231 salons in the UK and 171 internationally, Essentials with 43 salons in the UK and 22 internationally, 28 Toni and Guy Academies globally, a professional product range, two retail product ranges, and an Italian-style deli-café chain. In order to facilitate this diversity in terms of product and service offer the company specialises in IT support, salon design, salon supplies and financial services. Heavy investments in IT infrastructure and support enable them to run their businesses successfully.

The two owners opened a first franchised Toni and Guy Salon in Sheffield in 1996 and have 25 employees. Although, as a franchisee, the company have to comply with rules and regulations of the main company because they are legally bound to do so, they also have some freedom to decide how much they want to invest in their IT infrastructure. They also have a freedom to decide if they want to use technology as a tool to enable their business. The interview with the first owner revealed that the investment in the Sheffield Toni and Guy salon is minimal as money is tight. They bought their first computer in 1999 when technology was developing

rapidly and during the hype of the dot.com industry. Even though the business is a very successful one, the owner's priority is in other fields of the business. This is because he believes that they can run the business without technology. However, there are plans for investments in the IT department if it proves to be valuable and if the company can improve employees' IT skills.

## 4.3 Micro enterprises

In this section six micro size enterprises are analysed and discussed. Four of these companies are based in Sheffield and two are based in Bristol.

**Sheffield:** Sheffield Motor Company Ltd, Aleksandria Science Ltd, Lovebytes Ltd, Occidental Ltd

**Bristol:** Moving Image Research Ltd, and Cave Studios Ltd.

### 4.3.1 Case study 4: Sheffield Motor Company Ltd

Sheffield Motor Company is a micro car dealership business which began 1998. The business premises are in the city centre of Sheffield, on Fitzwilliam Street, and consist of two offices and a garage where they service cars. For more complex work on cars they outsource skills and services offered by bigger companies in Sheffield. The interview was conducted with the owner of the company.

This is a typical micro organisation, employing five people and is run as a family business. The level of IT support is very minimal and the firm has two PCs. Computer applications used by the company are Microsoft Word, Excel spreadsheet and Access database for accounts and administrative purposes. Computer skills of employees are very minimal and the owner/manager is unaware of the Government support available for small businesses. It is interesting to note that at the time of the interview the owner of the business received post for that day that included UK Online (DTI, 2003) leaflets. In these leaflets the Government articulated the help available for SMEs in terms of acquiring better IT skills, financial help and their vision of the SMEs' future. However, the owner of the firm discarded leaflets in front of the researcher and initiated the discussion of the more general governmental support for SMEs' community. Overall the owner was not interested in what the Government had to say and in this company; all leaflets were treated as a junk mail.



### 4.3.2 Case study 5: Aleksandria Science Ltd

Aleksandria Science is a micro company that has no employees. In this company the owner is able to run the business on his own. The business opened in 1997 when the owner was made redundant. Being a nuclear physicist, the owner employed his knowledge and expertise and invested in his own business. He works as a freelance consultant and his job mainly focuses on providing expert advice to large Scandinavian institutions with regard to nuclear waste. The owner runs his business from home and has a PC. His IT skills are quite high and he was aware of the rapid speed of technological developments but he has no financial means to invest more in advanced technology. Instead, he uses a computer only for simple administrative purposes, accounts and research. However, he sees the opportunities the Web presents and would like to invest in setting up his own website. Unfortunately, at the time of interview the owner was unaware of any government help available to SMEs. Since his intention was to grow the business he would welcome any financial help that government offers to SMEs.

### 4.3.3 Case study 6: Moving Image Research Ltd

Moving Image Research started in 2002 just after the previous company UBUT Media was closed following the dot.com failure in 2001. Several colleagues from UBUT Media Company self-funded Moving Image Research as they saw the demand for a new product development in the aggressive agile technology that would save money in the film industry. The company employed six people and had offices in the UK – Bristol and Windsor, and in the United States – Los Angeles and Silicon Valley near San Francisco. Moving Image Research is a new hi-tech start-up micro company in which all employees have very high technical skills and knowledge. The company was connected internally using the Intranet facilities to enable the fast communication between offices and safe transfer of files. Since the company is self-funded and its strategy is innovation, the company's directors were very interested in funds that would enable them to complete the product they were developing. However, the Government's IT funds available for SMEs did not include investments in R&D but only purchase of computers and personnel's operating skills.

### 4.3.4 Case study 7: Lovebytes Ltd

Lovebytes is a not-for-profit digital arts organisation based in Sheffield, UK. Their business works with partner organisations to organise performances and workshops, and to provide a platform for both new and established artists in this innovative culture. The work is mainly commissioned, but due to the nature of the not-for-profit culture, payment is often in kind.

Small grants are received from the local government which help to maintain the business, and the two employees are paid directly through the local council.

Lovebytes was established in 1994 to explore the creative and cultural potential of digital technologies and to encourage people in Sheffield and the UK to engage with global creative digital culture. Lovebytes has grown to become an important international platform for new work and new ideas. The organisation commissions and promotes experimental and innovative new work by both new and established artists, designers, technologists and creative developers. The core programme of performances, talks and workshops provides a platform for international artists and a meeting place for creative professionals and anyone interested in leading edge digital art and culture.

The interview took place with one of the co-owners whose experience of IT is very positive; she would like to take her company to the next level. However, the firm is a non-profit organisation and is heavily relying on charities and the art and culture budgets run by local government. At the moment they employ two people and the firm is run from their own home using their own personal computers. The company also relies on the outsourcing of human resources, various equipments and any other technical support they may need. Their experience with the Government initiatives is limited and even though they want to change their strategies they do not know how. For them it would be useful if they could get some more information from the local council regarding the help to small businesses, but their experience is that the Government never listens to what practitioners have to say.

#### 4.3.5 Case study 8: Occidental Ltd

The practice owner, Michelle, has worked in Sheffield for over 20 years. Before Occidental Company she was, for nine years, a partner in S.T.A.N. Dental Care in Sheffield. Her bank of patients grew gradually and so she decided to open her own practice. Occidental opened in October 2000, in small premises on Glossop Road, Sheffield S10, and has seven employees. Since then, business has gone from strength to strength. During the interview, Michelle stated that in the dentistry industry it was not important to have computers. She also cited the Government's failure in NHS IT infrastructure investment (McCue, 2004) was partly to blame for her beliefs. Michelle is however, a strong supporter of IT technology and has experimented with computer technology while she was working at S.T.A.N in Sheffield. Unfortunately, health and hygiene of patients were the obstacles in much wider implementation of IT in her practice. This was because the staff constantly needed to change and remove protective gloves if they were to switch between their patients and their work on computers. Not only was that expensive but also very impractical. Consequently, at the time of interview Occidental was using

computers to process administration, book appointments, and keep a record of their growing number of patients through an Access database. Since the owner of the practice is a strong supporter of IT, she believes that she would be able to use more sophisticated technology in the future. Her aim is to provide an opportunity for patients to book their own appointments on-line. Her plan at the moment is to grow her practice and seize the opportunities when they come.

#### 4.3.6 Case study 9: Cave Studios Ltd

Cave Studio, in St Pauls in Bristol started in 1979 when two friends decided to build a studio. Previously, one of them was working as a professional musician in the USA and one was working in London as an engineer. Their only assets were equipment that were thrown out or sold off cheaply. Fortunately, one of the owners was able to repair most things. As the studio came together they discovered how good all this old gear sounded. The Cave was a very busy studio right up to the end in 1985 when it was forced to close due to a planning dispute. The owners decided to re-open a new studio which became the Cave Studios in 1989. All of the old and interesting gear that they had at the Cave came to the new studio along with a very extensive stock of old microphones.

At the moment they only have two employees and the studio is run as a family business. It is interesting to note that the owners of the company did not want their business to grow at a faster rate. Although the technology was on the rise, the owners aim for the new studio was to create not a state-of-the-art digital/analogue studio, but one which interestingly recaptured many forgotten and time-honoured recording technologies. Over a period of four years they rebuilt and extended the facilities and established it as a centre of excellence unsurpassed by any other enterprise of its type in the area.

In the early 2000s, the studio's main income was coming from the sales over the Internet as they were in a position to sell their goods online using e-commerce facilities. However they had no intention in investing any money in more IT facilities or to encourage the growth of the business. In the interview the manager mentioned that they were trying to seek some information from the Government agencies in Bristol, but were unsuccessful. The Government representatives were both unhelpful or did not have the information she needed. On the other hand, their experience with on-line business was positive and it allowed them to be more efficient and reach the target markets they would not be able to via traditional channels. The speed of information was at essence for the success of the company.



## 4.4 Analysis of small and micro enterprises

In the interviews with the seven small and micro owners/managers it was confirmed that they do not like to be pushed by anyone, especially the Government and DTI (2003), in terms of their technological and organisational readiness. The interviews revealed that companies would like to take a step at a time and incorporate e-business in their existing strategies gradually and when they feel they are ready. These findings support our earlier recommendation that a new e-business model is needed that will help SMEs in this transition period.

All seven owners/managers interviewed stated that they would like to change their business strategies but remain entangled in their old way of doing things. The reasons cited are: lack of appropriate skills and knowledge by owners/managers and the lack of information in regard to where to seek assistance for help. It can be argued that these findings support the challenge for Government to convince the generally reluctant SME owners/managers of the need to take external advice (Hankinson, 2000; Hankinson et al., 1997; Docherty and Simpson, 2003).

In addition, issues regarding government initiatives, skills, IT experience and willingness of SMEs to upgrade their existing technologies need to be emphasised. Although the Government policy has been formulated to promote information technology and communications for all SMEs (DTI, 2003) the writer's experience is that all seven organisations had never heard of UK Online for Business. The following statements collected from the interviewed SMEs illustrate this point:

*"I've never heard about UK online for business. Government should find better ways of communicating the information to local businesses, other than leaflets which we consider as junk mail".* (Sheffield Motor Company Ltd)

*"Not heard about UK online for business. Government never listen to what practitioners have to say. They do their business we do ours. We would like to change our strategy but don't know how".* (Lovebytes Ltd)

*"I don't know who UK online for business is. I am unaware of any help promoted by UK government. I would really welcome any Government initiative to help me, mainly financially to set up a web site".* (Aleksandria Sciences Ltd)

*"We used some government agencies but they are not useful. I tried to find some information about my business and the government representatives were very unhelpful. They send me to find information myself. They don't communicate their ideas and plans to us and they don't talk to us".* (Cave Studios Ltd)

Furthermore, this research confirms previous findings of the DTI (2003) that companies below £50k turnover found the cost of even basic IT equipment impossible to afford (as in the case of Aleksandria Science Ltd). The lack of broadband connections is reported to have frustrated small businesses. However, this preliminary research did not find any evidence to support these

assertions (FSB, 2002). Nevertheless, skills and organisational capabilities have come out as a potential problematic issue for SMEs. We found enough evidence to support Local Futures Group's (2001) findings that if SMEs increase the level of technical skills across the board, that will encourage further technological implementations. The following quote from one SME interviewee illustrates this:

*"We could do business without the Internet technology but we would like to get more out of it. It is expensive. We have some applications but they are not used properly, it is skill problem".* (Toni and Guy)

Positive experience with IT has been noticed throughout the case studies with only one exception. One SME representative (Occidental Ltd) disclosed that the organisation raced onto the Internet at an early stage only to discover quite painfully, that the Internet and technology did not spell automatic success. The company has been disadvantaged by a bad experience. However, the owner is very aware of the advances in Internet technology and is preparing a plan to implement some of the technological applications, which will be implemented in due course.

This research identifies that to implement e-business most of the companies interviewed are facing a complete overhaul of their existing strategies for which they were not ready. Some simply because of the unsuitability of the industry sector they trade in and others because they are not ready to take the next step. This study on the whole suggests that a new conceptual model is required which could be used as a general tool for creating competitive advantage in SMEs, providing that owners/managers are receptive towards the usefulness of an e-business strategy and its implementation. This complements Bharadway's (2000) study, who argues that the ICT skills of SME owners/managers plays a vital role and that IT capable firms outperform others on profit and cost-based performance measures. Although additional research in this area is needed, there is also some evidence that supports recent studies of Kalakota and Robinson (2001) that global reforms, technological transformations and socio-economic changes will continue to affect SMEs and the UK economy as a whole. In that respect this study confirms Coltman et al.'s (2001) findings which argue that traditional firms have found applications for Internet technologies. Our research shows that technology has indeed transformed the traditional business environment and impacts on how businesses perform.

## 4.5 Case study conclusion

The findings of the nine case studies open areas for further studies and discussion as no measurable evidence was found that e-business can create a competitive advantage in SMEs. However, the interviews conducted in two medium-sized companies show that there may be a possibility that when companies integrate the Internet into their overall strategy the new

technology will lead to a competitive advantage. On the other hand, the remaining seven case studies show that although they use some form of technology to run their businesses, they are far from creating a competitive advantage from it.

It can be concluded that: if SMEs are to create competitive advantage and win e-customers, it is absolutely essential for businesses to have a sound and well-resourced integration plan of new technologies. Finally, this multiple case study analysis supported the literature review and allowed the construction of a theoretical business model which will be presented in the following chapter.

# Chapter 5

## 5 Proposed conceptual e-business model CATE-b

The literature review in Chapter 2 and exploratory case studies in Chapter 4 identified that SMEs need to create and implement a plan that would allow them to make the transition from an old system to a new and forward looking e-business oriented organisation. To help SMEs manage this transition period, the '*Competitive Advantage Through E-business*' (CATE-b) conceptual model was created. It is important to stress that CATE-b model is novel and is seen as an adaptable solution where a company with an old legacy system uses existing IT applications and builds upon them at their own pace. This way companies both with and without external financial support (e.g. provided by the Government) can minimise risks associated with developing IT infrastructure which requires expensive planning and investment with uncertain returns. As a result this solution is considered suitable for SMEs with a traditional business structure as discussed in section 2.2.1. The CATE-b conceptual model is presented in Figure 5.1 and consists of three elements:

1. ***SMEs' internal structure and strategies*** – This includes a traditional approach to creating competitive advantage based on Porter's generic strategy approach (Porter, 1979, 1980, 1985); SMEs' distinctive features through resources and capabilities; SMEs' core business based on the product; and a theoretical framework is based on Porter's traditional value chain (Porter, 1980; Kalakota and Robinson, 2001). This element tests propositions  $P_1$ ,  $P_2$  and  $P_3$  through exploratory case study analysis.
2. ***SMEs external business environment*** – Theoretically underpinned by SMEs external business environment at micro level that includes Porter's Five Forces model (Porter, 1979, 1980) in which 'vertical' and 'horizontal' competition is acknowledged (Blili and Raymond, 1993). This element also covers the involvement of the UK Government and developments of IT and the Internet. This element tests propositions  $P_4$  and  $P_5$  through exploratory study analysis.



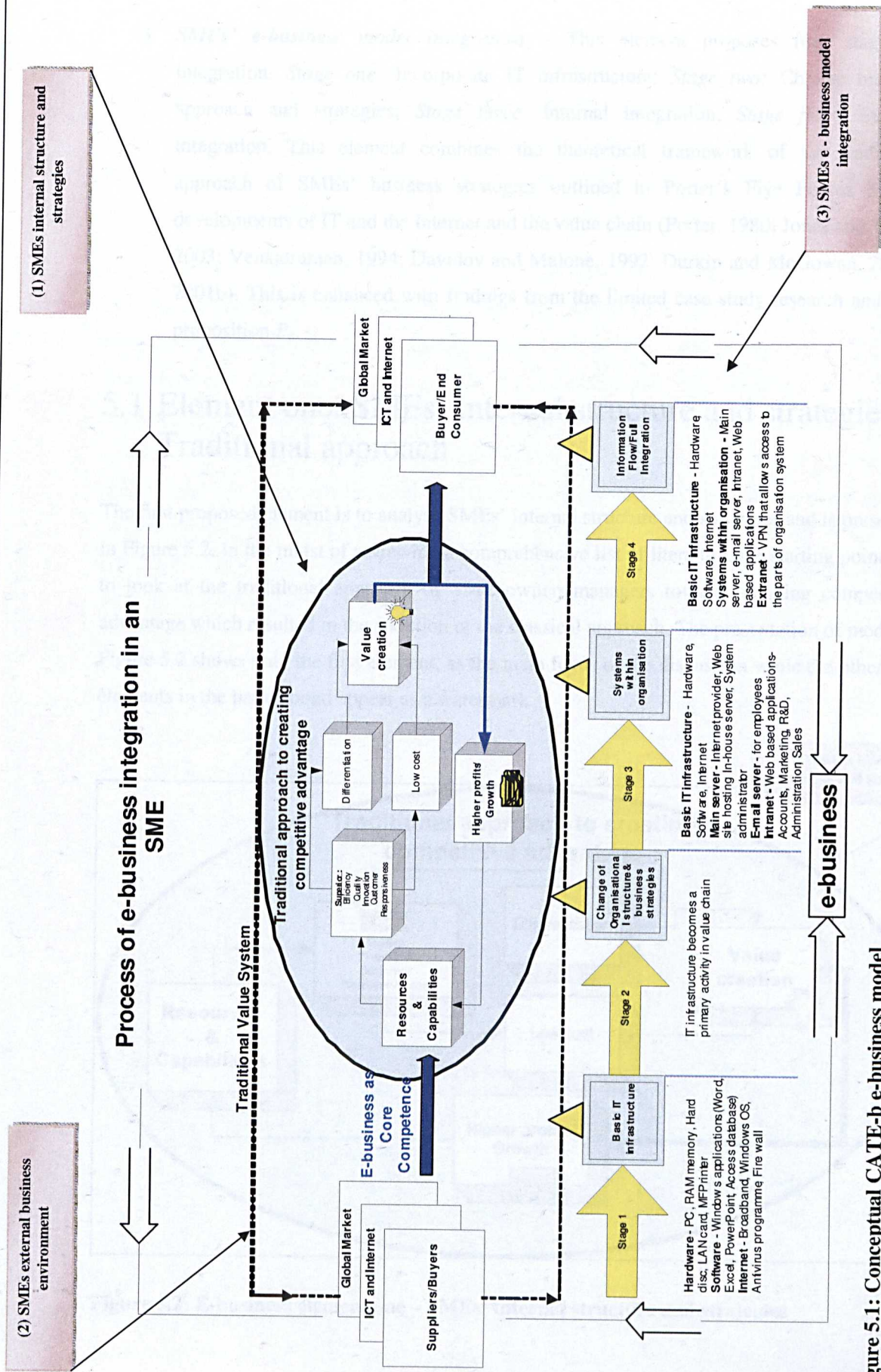


Figure 5.1: Conceptual CATE-b e-business model

Source: Pavic et al. (2007)



3. **SMEs' e-business model integration** – This element proposes four stages of integration: *Stage one*: Incorporate IT infrastructure; *Stage two*: Change business approach and strategies; *Stage three*: Internal integration; *Stage four*: External integration. This element combines the theoretical framework of the traditional approach of SMEs' business strategies outlined in Porter's Five Forces Model, developments of IT and the Internet and the value chain (Porter, 1980; Jones and Tilley, 2003; Venkatraman, 1994; Davidov and Malone, 1992; Durkin and McGowan, 2001a; 2001b). This is enhanced with findings from the limited case study research and tests proposition  $P_6$ .

## 5.1 Element one: SMEs' internal structure and strategies – Traditional approach

The first proposed element is to analyse SMEs' internal structure and strategies and is presented in Figure 5.2. In the midst of reviewing a comprehensive list of literature, the starting point was to look at the traditional approach of SME owners/managers towards creating competitive advantage which resulted in the adoption of the classical approach. The presentation of model in Figure 5.2 shows only the first element, as the main focus of the discussion while the other two elements in the background appear as a watermark.

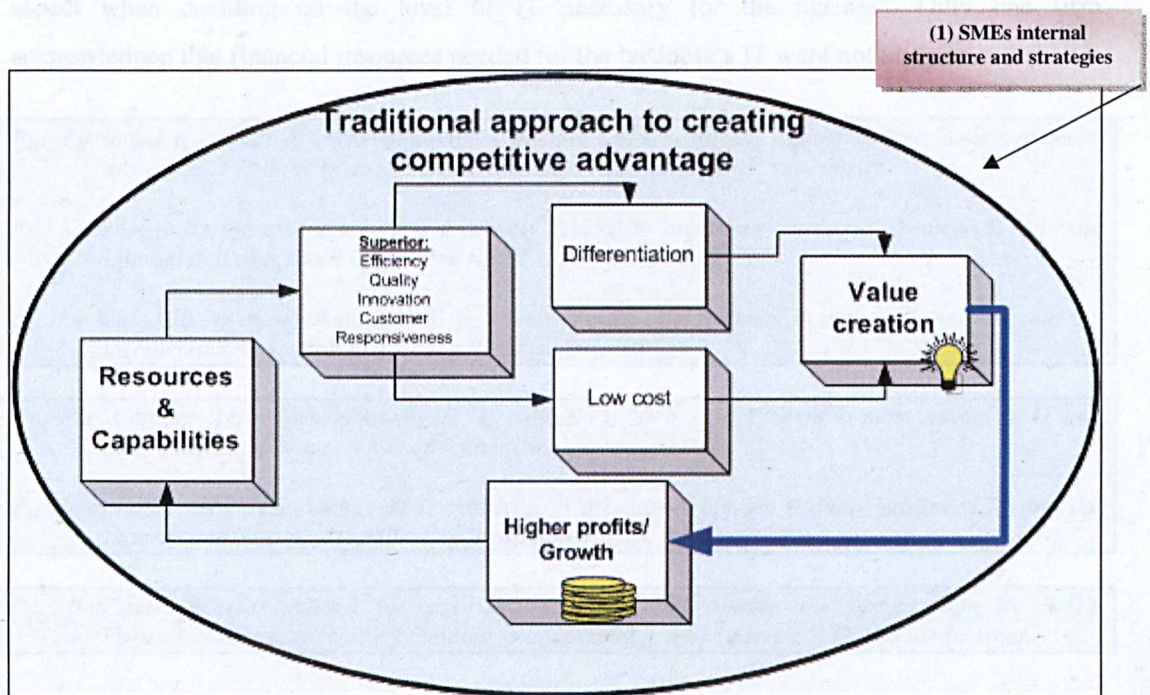


Figure 5.2: E-business element one – SMEs' internal structure and strategies

More specifically, the development of the first element in the proposed model was aided by Porter's generic strategy approach. Porter (1985) argues that a firm positions itself by leveraging its superiority through available resources and capabilities, which ultimately fall into categories of either cost advantage or differentiation. As this is a well known way of creating competitive advantage, especially in large organisations, this proposed conceptual model allows SMEs to keep their traditional organisational set-ups in the early stages of the transition period.

In addition to the theoretical underpinning, the interviews with nine SMEs were carried out to assist in the creation of the conceptual model. The interviews identified that these companies experienced problems with their internal structures and strategies which were preventing them from investing in more advanced IT and the Internet technology. Although most of the owners/managers of sampled SMEs agreed that they would like to keep their traditional structure and core business they would also like to invest and raise their firms' IT potential which would in return enable their strategies to change and adapt. This desire for gradual transformation was confirmed in the interviews with the seven out of nine SME owners/managers (Chapter 4). The remaining two medium-sized SMEs have already passed that stage and were ready to implement more advanced Internet technology.

In order to estimate the likelihood of investments into IT propositions  $P_{1,2,3}$  were examined. The eight out nine sampled firms recognised the lack of financial resources as the most influential aspect when deciding on the level of IT necessary for the business. Only one firm acknowledged that financial resources needed for the business's IT were not an issue.

*P<sub>1a</sub>. Financial resources of owners/managers in SMEs are positively related to purchasing of more advanced IT and the Internet and as a result are affecting firms' superiority.*

*P<sub>1b</sub>. Knowledge by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.*

*P<sub>1c</sub>. Lack of skills by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.*

*P<sub>2a</sub>. Focus on service by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.*

*P<sub>2b</sub>. Information by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.*

*P<sub>3a</sub>. Perceived benefits related to opportunities inside and outside the organisation by SMEs owners/managers is positively related to investment in more advanced IT and the Internet.*

In addition lack of knowledge at managerial level ( $P_{1b}$ ), skills ( $P_{1c}$ ), and lack of information ( $P_{2b}$ ) were all identified as barriers to further investments in more advanced IT and the Internet technology. Seven out of nine SMEs acknowledged that they needed to be better informed,



more skilled and have higher knowledge that will enable owners/managers to make decisions on what is required in terms of IT investment in their businesses. Interviews also revealed that the smaller the firm the more likely was to be affected.

Furthermore, lack of focus on service ( $P_{2a}$ ) and perceived benefits ( $P_{3a}$ ) related to opportunities that IT and Internet can bring to SMEs have also been recognised as barrier to further investments.

Overall, interviews with sampled SME owners/managers established that their superiority comes from their traditional approach to creating competitive advantage and depends on company's internal structure and strategies derived from resources and capabilities. Seven out of nine firms expressed their willingness to change and adapt their strategies as IT and the Internet technology develop in the future.

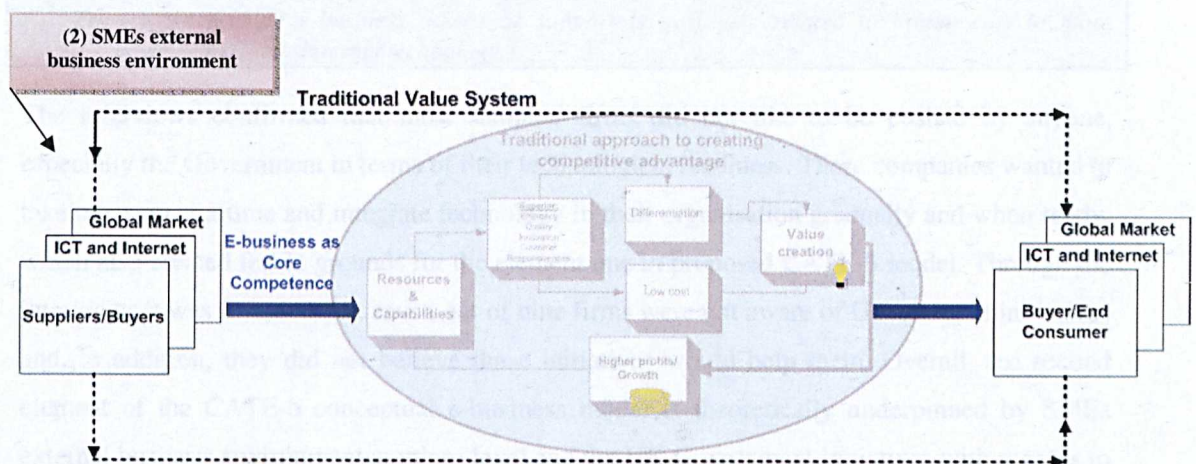
## 5.2 Element two – SMEs' external business environment

The second proposed element is also looking at both, the theory and practice and their influence in the construction of the CATE-b conceptual model. This proposed element is looking at SMEs' external business environment and is presented in Figure 5.3. The starting point was to look at the "value chain" (Porter, 1980), a basic tool for understanding the links between various activities within a firm and their contribution to competitive advantage. The literature reviewed identified that the traditional value chain provides a systematic way of 'disaggregating' the firm into its relevant units so that managers are better able to understand the nature of costs and potential sources of differentiation (Jones and Tilley, 2003). The CATE-b conceptual e-business model addresses the firm's value chain that links to the value chains of upstream suppliers and downstream buyers. The estimated result is a larger stream of activities known as the value system which was introduced by Porter in 1985 (see Figure 2.4). This is because the development of competitive advantage depends not only on the firm's specific value chain, but also on the value system in which the firm operates (Porter, 1985). In the interviews with the two manufacturing companies it was confirmed that the value system plays a vital role and that the companies' value systems are enhanced by the speed and efficiency created by utilising the Internet technology.

In the traditional value chain (see Figure 2.4), managers concentrate on being effective and competitive by initiating R&D (Step 1), putting well-understood products (Step 2) on the market (Step 3) and offering service to buyers (Step 4). These four steps form primary activities in a traditional value chain. However, the interviews identified two critical areas in a traditional value chain as shown in Figure 2.5. One is in a domain of primary activities where services and



buyers identified as Step 4 in the traditional value chain replaces R&D and becomes Step 1. This is because owners/managers of SMEs identified that customer service is seen a main driver for changes in their business. On that basis the traditional value chain should be reversed at this point as suggested by Venkatraman (1994) who argued that to invent value in the new environment, managers must reverse the traditional value chain thinking characteristics in which businesses define themselves in terms of the products they produce. The other critical area is related to the support activities. Based on the exploratory case study findings in Chapter 4 and in order for SMEs to integrate the Internet technology into their value system, it is proposed that their supporting activities become the primary activities (see Figure 2.5). As a result, the company's technological infrastructure and human resources will form the core of e-business planning (Davidov and Malone, 1992; Durkin and McGowan, 2001a) as shown in Figure 5.3.



**Figure 5.3: E-business element 2 – SMEs' external business environment**

This will enable SMEs to make the relationship between resources and opportunities offered inside and outside the organisation possible, so that it will be customer focused (Fahy and Hooley, 2002; Brorson, 1998), and would be expected to create value through innovation and integration.

In order to estimate the correctness of the proposed element in the conceptual CATE-b model  $P_{4a}$  and  $P_{4b}$  were looked in more details.

$P_{4a}$  Ability of owners/managers to see opportunities arising from the fast development of IT and the Internet when dealing with forces from 'horizontal' competition (threat of substitute products, threat of established rivals, and threat of new entries) is positively related to investment in more advanced IT and the Internet.

$P_{4b}$  Ability of owners/managers to see opportunities arising from the fast developments of IT and the Internet when dealing with forces from 'vertical' competition (bargaining power of suppliers, bargaining power of customers) is positively related to investment in more advanced IT and the Internet.



The interviews with owners/managers identified that one manufacturing company was thriving as a result of opportunities created by the rapid developments of IT and the Internet while others were lagging behind. This was directly influenced by the owners/managers ability to identify the changes in the environment caused by IT and the Internet influences.

At the time of the research these opportunities were also supported by UK Government initiatives however, only a small number of SMEs were taking advantage of them. Only one out of nine sampled SMEs was taking full advantage of the Government help ( $P_{5a}$ ,  $P_{5b}$  and  $P_{5c}$ ).

*$P_{5a}$ . Interest in UK Government initiatives related to support in SMEs is positively related to investment in more advanced IT and Internet technology.*

*$P_{5b}$ . Awareness of the Government initiatives related to the e-business advice is positively related to investment in more advanced IT and Internet technology.*

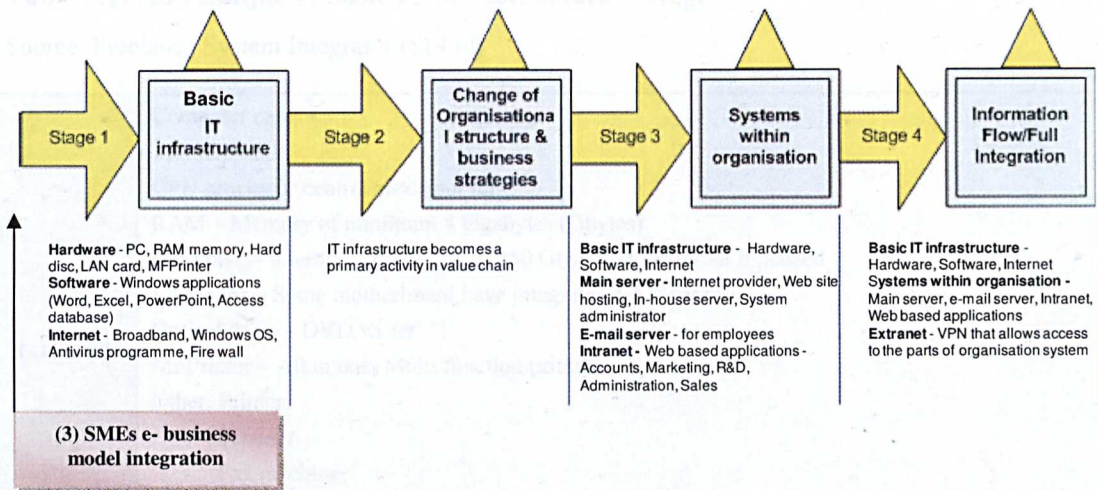
*$P_{5c}$ . Trust when seeking e-business advice or support is positively related to investments in more advanced IT and Internet technology.*

The interviews confirmed that most sampled firms did not like to be pushed by anyone, especially the Government in terms of their technological readiness. These companies wanted to take one step at a time and integrate technology in their organisation gradually and when ready, which also created fertile grounds for the element one in proposed CATE-b model. Through the interviews it was revealed that seven out of nine firms were not aware of Government initiatives and, in addition, they did not believe these initiatives would help them. Overall, the second element of the CATE-b conceptual e-business model is theoretically underpinned by SMEs external business environment at micro level and the UK Government initiatives with regards to the development of IT and the Internet. On the whole, the findings from the interviews provided some evidence which indicated that there may be a possibility for SMEs to create competitive advantage when companies integrate the Internet into their overall strategy (Pavic et al., 2007).

### 5.3 Element three: SMEs' e-business model CATE-b integration

The third and final element of the CATE-b conceptual model is also based on the theoretical underpinnings outlined in the first two elements and is supported by the exploratory case study interviews. This is presented in Figure 5.4.





**Figure 5.4: E-business element 3 – SMEs’ e-business model CATE-b integration**

Figure 5.4 shows four elements of SMEs e-business model integration (1) *Stage one*: Incorporate IT infrastructure, (2) *Stage two*: Change business approach and strategies, (3) *Stage three*: Internal integration, (4) *Stage four*: External and full integration. It is important to stress that all four basic elements of e-business integration should not be seen as a linear process but rather as the ‘building blocks’ of various factors helping SMEs to take a step at a time and when ready.

This is because all four elements of e-business integration have been seen as key enablers of a full e-organisational integration that will allow free information flow between suppliers, the organisation and customers. It is believed that in exchange this would create profitable growth that provides the customer with a tailored product and service, and adds superior value to the firm. These four elements of integration are discussed in more detail in the following sections 5.3.1, 5.3.2, 5.3.3, and 5.3.4.

### 5.3.1 Stage one: IT infrastructure

Stage one: IT infrastructure integration combines theories and practice in which the interview feedback was used to address  $P_{6a}$ .

$P_{6a}$ . IT and Internet infrastructure are positively related to a successful e-business strategy.

*Stage one* proposes integration that requires implementation of an appropriate IT infrastructure, which is seen as a starting element of an e-business strategy for SMEs. An SME needs to provide and invest in the hardware and software required for the business to work. An example of this is presented in Table 5.1. It seems clear that the first step in a successful e-business strategy is having the company’s own systems in order (Feller, 2000; Porter, 2001; Chaston, 2004).



**Table 5.1: An example of basic IT infrastructure – Stage 1**

Source: Freelance System Integrator (SI Ltd)

<b>Hardware</b>	Computer case Motherboard CPU processor central processor unit RAM – Memory of minimum 4 gigabytes (Gbytes) Hard disc – Internal with minimum 250 Gbytes and external if needed LAN card – Some motherboard have integrated LAN cards Optical drive – DVD writer MFPrinter – All in one: Multi function printer Other: Printer Scanner Fax machine Monitor Keyboard Mouse
<b>Software</b>	Windows applications Word processor Excel spreadsheet PowerPoint presentations Access database
<b>Internet</b>	Broadband connection Windows application operating system (Windows OS) Antivirus program Firewall can be integrated in Windows OS or bought separately – Companies providing it are: AVG, Kaspersky or SET-nod Wireless router – The connection between two or more PCs if required for more employees. Can connect at least 4 PCs via cable and up to 10 PCs wirelessly. E-commerce and B2C– Via web-based catalogues
<b>Price</b>	Minimum of £2,000

The exploratory case studies also indicated that companies who are highly IT capable and employ more skilled staff ( $P_{6a}$ ) outperformed others in terms of profit (Chapter 4). As a result of the literature review and the exploratory case study findings, the researcher recommends that SMEs need to acquire a minimum IT infrastructure and support in hardware, software and the Internet.

### 5.3.2 Stage two: Changing strategies

Stage two: Changing strategies combines theories and practice in which the interview feedback was used to address  $P_{6b}$ .

**$P_{6b}$  IT and Internet infrastructure are positively related to changing business strategies.**

Stage two proposes integration that requires changes of business strategies and changes in organisational structure. In particular, this is looking at structural changes within organisations.



At this stage a company accepts that the Internet technology becomes their integral part and the value chain is reversed. This is seen as an important element of sustaining value creation by firms in the future. As a result, SMEs need a systematic strategic plan for a minimum of three years. This is because organisations need an integrated and coordinated approach towards knowledge, technology and relationship management (Walters et al., 2002a, 2002b). In the literature review (Chapter 2) it was identified that companies which refuse to change and adapt to the new environment when necessary experience many difficulties (Whittington, et al., 1999; Grant, 1998; Whittington, 1999; Spanos and Spyros, 2001), and this was later confirmed in the interviews with owners/managers (Chapter 4). These recommended structural changes in organisations are related to the overall success which includes profit and growth.

This approach also has its roots in Porter's (1985) value chain. Scholars such as Kalakota and Robinson (2001); Davidov and Malone (1992); Durkin and McGowan (2001a); Fahy and Hooley (2002) and Brorson (1998) are all maintaining that value chain needs to be reversed as a direct impact of technological developments and customer demands. As a result this would create a value chain through an e-business design (Figure 2.5).

### 5.3.3 Stage three: Internal integration

Stage three: Internal integration combines theories and practice in which the interview feedback was used to address  $P_{6c}$ .

*$P_{6c}$  IT and Internet infrastructure are positively related to the internal integration of SMEs.*

*Stage three* proposes integration within an organisation. This is a complete internal integration in which the Intranet is used. The business goal is to focus on cost reduction and internal efficiency (Cheng et al., 2001). The literature review identified that SMEs who are able to integrate internally are more successful and employ more skilled and knowledgeable staff (Ghoshal and Bartlett, 1988; Grant, 1996a, 1996b; Afuah and Tucci, 2001, 2003; Chaston, 2004; Lynn et al., 1999; Cheng et al., 2001). This was later confirmed in the interviews which addresses  $P_{6c}$ . In order to support the internal integration additional IT infrastructure is needed by SMEs. An example of this is presented in Table 5.2.

**Table 5.2: An example of IT infrastructure to support internal integration – Stage 3 integration**

Source: Freelance System Integrator (SI Ltd)

<b>PC, hardware, software and www</b>	As listed in previous table
<b>Main server</b>	<p>Internet provider – To buy a space from an Internet provider – minimum of 100Mbytes at cost £50 pcm.</p> <p>or</p> <p>Website hosting – To buy from a person who creates the company's website. Company only pays for the service and can have unlimited space.</p> <p>or</p> <p>Company's own server – Beneficial for larger SMEs. Company would need: Windows server operating system or UNIX server System administrator – A professional who will be able to maintain the system Web designer – Design website (can be outsourced) Price: minimum £1,000</p> <p>or</p> <p>Other providers – Other Internet server providers</p>
<b>E-mail server</b>	To provide company e-mails for employees
<b>Intranet</b>	<p>Virtual Private Network (VPN)</p> <p>VPN server</p> <p>Remote desk connection (company's own server would be recommended and system administrator)</p>
<b>Web-based applications</b>	<p>Accounts</p> <p>Marketing</p> <p>R&amp;D</p> <p>Administration</p> <p>Sales</p>

Table 5.2 shows that in the internal integration, SMEs continue to build upon their original basic IT infrastructure and add main server, e-mail server, Intranet and web-based applications. This will now depend on the financial resources of the organisation and their strategic positioning. The final recommendations based on companies' requirements will be discussed later in Chapter 8.

### 5.3.4 Stage four: External and full integration

Stage four: External and full integration combines theories and practice in which the interview feedback was used to address  $P_{6d}$ .

*$P_{6d}$  IT and Internet infrastructure are positively related to the external integration of SMEs.*

*Stage four* proposes the final external and full integration with free information flow between suppliers, organisation and customers. At this stage the business goal is to create market value and competitive advantage by using Internet technology. This stage enables supply chain



integration and more effective in-sourcing and outsourcing. It also allows for sophisticated online business to interrelate internally as well as externally. Many scholars supported full integration (Van Hooft and Stegwee, 2001; DTI, 2000; Lynn et al., 1999; Seybold and Marshak, 1998; Chaston, 2004; Porter, 2001; Venkatraman, 1994; Fahy and Hooley, 2002; Afuah and Tucci, 2003). As far as the exploratory case study is concerned, the SMEs examined have not yet reached this stage of full integration which addresses  $P_{6d}$ . However, this stage is seen as an essential part of implementing an e-business strategy and needs to be supported by the Extranet.

To complete the cycle, SMEs would need to be integrated internally as well as externally. In terms of technological requirements SMEs would need the entire technological infrastructure listed in Table 5.3 as well as an Extranet connection that will enable B2B and B2C transactions.

**Table 5.3: An example of IT infrastructure to support external and full integration – Stage 4 integration**

Source: Freelance System Integrator (SI Ltd)

<b>PC, hardware, software and www</b>	As listed in previous table
<b>Main server, e-mail server, Intranet, Web-based applications</b>	As listed in previous table
<b>Extranet</b>	VPN – Extranet needs the same applications as Intranet which allows access via protective password to the relevant parts of the organisation system

Here SMEs would need the Internet connection between two businesses. This would enable a paperless and electronic supply and distribution chain. SMEs continue to build upon their IT infrastructure. External integration will again depend on the financial resources of the organisation and their strategic positioning. Since no SME in the sampled exploratory case study was externally integrated, these ultimate elements of IT infrastructure will be examined further in the national survey and longitudinal case studies. The final recommendations for the extranet infrastructure based on companies' requirements will be provided in Chapter 8.

## 5.4 Summary of conceptual e-business model CATE-b

The literature review in Chapter 2 and an exploratory case study in Chapter 4 recognised that SMEs need to implement a strategic plan that would create grounds for e-business integration. To help SMEs manage the transition from an old system to a new technologically enhanced system, a conceptual CATE-b e-business model is proposed in Figure 5.1.



By using an exploratory multiple case study approach, the issues of Internet and e-business uptake among a group of selected UK SMEs were highlighted. The results of these studies indicate that SMEs use some form of Internet technology in running their day-to-day businesses but most of them are not creating value by using e-business. Even though there was no firm evidence that these SMEs could create a competitive advantage by using e-business, this study unveiled some evidence that demonstrates the potential for creating a competitive advantage in SMEs by using e-business. However, existing models and frameworks seem insufficient for SMEs adopting e-business (Afuah and Tucci, 2003; Jelassi and Enders, 2005). The literature review and exploratory study indicated that the challenges for SMEs are in realising the importance of the Internet technology, its early adoption and effective use. In addition, the literature reviewed and exploratory study recognised that there are no existing frameworks or models which address big differences between SMEs in the way they adopt and use various Internet technologies. Because of these differences and the limitations of existing business models it is believed that a new e-business model is needed to help SMEs make the most of the opportunities offered by e-business and the Internet. In that respect a conceptual e-business model CATE-b has been constructed. This new e-business model emphasises the close relationship between business partners (suppliers and customers) which needs to be established in order to attain a competitive advantage.

However, the proposed conceptual CATE-b model has yet to be tested, refined and improved. The main emphasis of the proposed model is that SMEs should use the advances of the geographically open boundaries and the power of the Internet to gain a competitive advantage in those areas that once belonged to large firms with significantly greater financial resources. The technology is now cheaper and cost effective so that opportunities for SMEs to compete effectively against larger firms are greater than ever before, despite the fact that the UK is the second most expensive country within the G8 group for Internet access (DTI, 2003). Therefore SMEs should try to use these technological advances to position themselves in those areas previously thought to be too difficult to enter. These areas include innovation, marketing, efficiency improvements, better quality and customer responsiveness. This new e-business conceptual model offers greater strategic advances and opens markets to SMEs in the area where traditional business models and methods do not.

In order for this conceptual model to work, the exploratory study recognised that SMEs need external support (i.e. the UK Government) and highly skilled and knowledgeable staff. However, the reality is that SMEs are facing difficulties in this particular area. Although the UK Government has many supporting mechanisms in place the main criticism from SMEs is that it still needs to improve the communication networks that will help their businesses in the future. Nevertheless, SME owners/managers are aware that they also need to be a little more proactive

and take advantage of the government initiatives that already exist. Individual organisations should prepare themselves for an inevitable change and anticipate the equal importance of people management and technology management. The speed with which SMEs will adopt e-business is uncertain. However, the UK Government is eager to see SMEs benefit from e-business adoption, which means that there is hope that SMEs will not miss out on this opportunity.

From the literature reviewed and the limited case study analysis it was identified that SMEs need a sound and well-resourced integration plan in the form of a new e-business model if they are to create competitive advantage and win e-customers. The proposed conceptual CATE-b model was created with the intention that it will allow SMEs to make the transition from an old system to a new, e-business organisation. Further development of this model includes a large national survey that is presented in Chapter 6 and the follow-up longitudinal case studies (Chapter 7) of sampled SMEs. The purpose is to test the validity of current findings and to address the various research gaps identified in this study. This would achieve a better understanding of SMEs, their heterogeneous nature and complexity including the attitude of owners/managers and their employees towards e-business.

# Chapter 6

## 6 Survey data analyses

This chapter presents the survey data analyses in which a variety of techniques were used. It broadly covers four areas:

1. **Descriptive statistics:** The presentation of results begins with descriptive statistics in which frequencies and crosstabulation were used.
  - *Frequencies:* Frequency distribution describes how regularly a particular variable occurred. Bar charts and tables are used to present this information. All survey questions are examined in this section.
  - *Crosstabulation:* This section provides information with regard to the 'if and how', analysing the way in which two variables from different questions interrelate. To establish this, a chi-square test of independence was conducted.
2. **Compare means:** The presentation of results continues with a paired sample t-test which was used to compare the mean value of two variables in scale/rank data and to determine whether there was a significant difference between the two values. In addition, non-parametric Wilcoxon signed rank test and Mann-Whitney U test were used as back-up for results of the paired sample t-tests.
3. **Correlation:** Finally, relationship testing was performed by using:
  - *Spearman's rank correlation:* To test relationships between two variables in ordinal data.
4. **Discussion of results:** Synthesising survey results with information from the literature review (Chapter 2), exploratory study (Chapter 4) and a proposed e-business model CATE-b (Chapter 5).

### 6.1 Descriptive statistics

Table 3.5 shows that in this research 2,400 questionnaires were sent to micro and small organisations which yielded 4% of valid data, while 5.5% were responses from medium organisations which received 600 questionnaires. In response to the national statistics from Office for National Statistics (2007) and DTI (2008) the profile of the sample (Q1, 2 and 3)



overall demonstrates a reasonable spread of companies by number of employees (see Table 6.1 and Figure 3.4).

**Table 6.1: Q1, 2 and 3 – Profile of the data sample**

<b>Q1 - UK spread by region</b>	<b>Frequency</b>	<b>% (N=135)</b>
Scotland	3	2.2%
North-East England	52	38.6%
North-West England	14	10.3%
Wales	2	1.5%
Midlands	11	8.1%
Eastern Counties	18	13.4%
South-East England	21	15.6%
South-West England	13	9.6%
Northern Ireland and Isle of Man	1	0.7%
<b>Total</b>	<b>135</b>	<b>100%</b>
<b>Q2 - Industry sector</b>	<b>Frequency</b>	<b>% (N=135)</b>
Manufacturing	16	11.9%
Electronics, IT, computing	21	15.6%
Agriculture, food, fisheries	8	5.9%
Engineering, construction	12	8.9%
Service	15	11.1%
Leisure, hospitality, travel, tourism	17	12.6%
Dealers	1	0.7%
Other	35	25.9%
<b>Total</b>	<b>125</b>	<b>92.6%</b>
<b>Missing</b>	<b>10</b>	<b>7.4%</b>
<b>Q3 - Number of employees</b>	<b>Frequency</b>	<b>% (N=135)</b>
0–9	46	34.1%
10–49	49	36.3%
50–249	33	24.4%
<b>Total</b>	<b>128</b>	<b>94.8%</b>
<b>Missing</b>	<b>7</b>	<b>5.2%</b>

### 6.1.1 Frequencies

Question 1 was related to demographics and provided general information about the company. This included the name of the person who answered questions, the position held in the company and their address details (Table 6.1). It was not surprising that the highest proportion of answers (38.5%) came from respondents whose company addresses are registered in the North-East England since one of the databases used in this research was covering Yorkshire and



Humberside region alone (see also Figure 3.4). This was followed by 15.6% answers that came from the South East of England. Others were in the region of 8% to 13%.

Question 2 (Table 6.1) best described the industry sector a firm was operating in, with the possibility to add the industry if it was not listed. Although there was no particular attempt to target a particular industry sector one of the four databases was from the Tourism and Hospitality industry. The response rate from that industry was, however, only 12.6%. This was discussed in more details in Chapter 3, section 3.4.3.5. Out of the other industries, the biggest proportion of respondents belonged to electronics, IT and computing (15.6%). This is probably not surprising considering the nature of companies in this study and their relationship to the IT so companies felt interested in responding to it.

Question 3 (Table 6.1) was aimed at identifying the size of the organisation. Taking into consideration the fact that the largest proportion of UK SMEs is micro organisations, most questions were targeting those. However it was disappointing to see that the responses were not in proportion with this national trend as most respondents worked in *small* firms (10–49 employees) rather than *micro* organisations (0–9).

Question 4 asked about the company's turnover. All respondents attempted to answer this question (Table 6.2).

**Table 6.2: Q4 – Summary table of SMEs' turnover**

Q4: SMEs Turnover (£)	Frequency	% (N=135)
< 100k	17	12.6%
110k –990k	22	16.3%
1m–10m	46	34.1%
11m–99m	16	11.9%
100m–300m	4	3.0%

Overall 105 respondents reported various turnovers ranging from £13k to £300m. The remaining 30 respondents who did not want to disclose this information declared their assets as “worth £350m”, “confidential”, “not applicable”, “first year of trading” or simply declined to provide the information.

This was followed by Question 5 which discusses year the firm started trading; this was also well received as all respondents answered the question. Interestingly, one company stated that its business began in the 18<sup>th</sup> century, 1770. Five companies started trading in the 19<sup>th</sup> century between 1830 and 1880. One hundred companies covered most of the 20<sup>th</sup> century, between 1908 up to 1999. Twenty-six organisations started trading in 21<sup>st</sup> century and up to the year



2006. A further three companies did not specify their exact date with one respondent saying it was “*too long to remember*”.

Table 6.3 includes a summary of the answers for Questions 6, 7 and 8 in which respondents were asked to identify their main competitors, suppliers and customers.

**Table 6.3: Q6, 7 and 8 - SMEs main competitors, suppliers and customers**

Q6: Main competitors		Frequency	% (N=135)
Micro	1–9	32	23.7%
Small	10–49	66	48.9%
Medium	50–250	66	48.9%
Large	250+	39	28.9%
Other		11	8.1
Q7: Main suppliers		Frequency	% (N=135)
Micro	1–9	40	29.6%
Small	10–49	70	51.9%
Medium	50–250	61	45.2%
Large	250+	51	37.8%
Other		4	3.0%
Q8: Main customers		Frequency	% (N=135)
Micro	1–9	52	38.5%
Small	10–49	68	50.4%
Medium	50–250	70	51.9%
Large	250+	70	51.9%
Other		11	8.1%

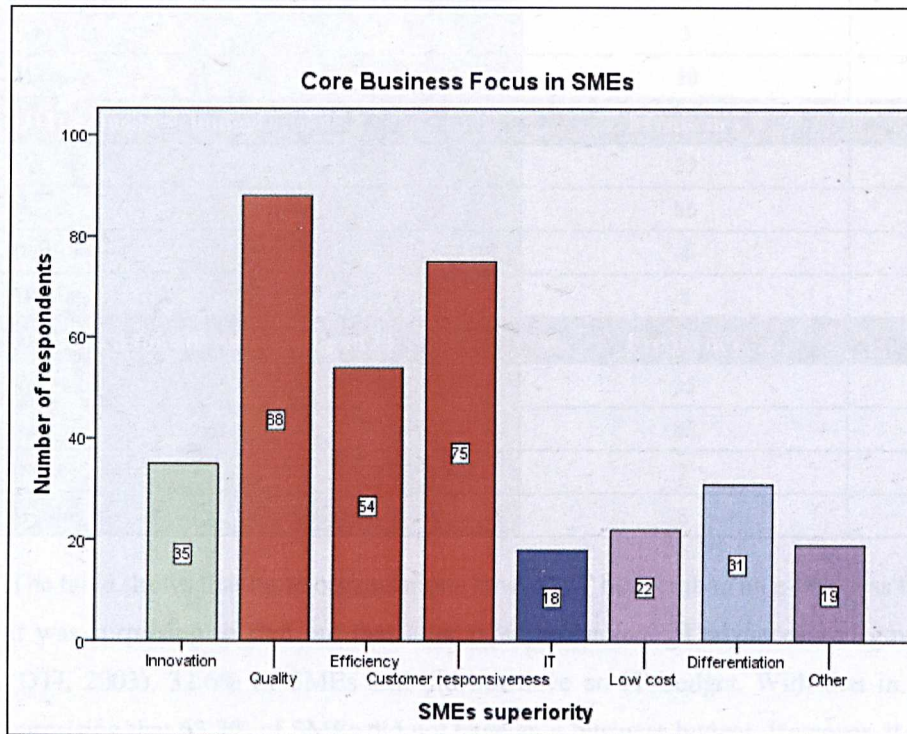
The table indicates that more than half of SMEs’ competitors (48.9%) are also SMEs themselves. Of these, 23.7% were micro companies and 28.9% of SMEs compete with companies employing more than 250 employees. While most of respondents (91.9%) were very specific in their identification of competitors, a minority (8.1%) stated that their competitors were in the range of “*freelancers*”, “*global foreign market*” and “*niche business*”, or even that “*there is no competition for them*”.

Furthermore, the table shows that, similar to the competitors of SMEs, the main suppliers of SMEs fit into the category of small and medium organisations; ‘small’ accounting for 51.9% followed closely by medium organisations at 45.2%. Only four SMEs (3%) stated that their suppliers “*did not fit the available categories*”. Intriguingly, the description of suppliers went to the extent in which one respondent identified that “*the size was not relevant*”, another said “*it did not have any except for stationery supply*”, one identified their supplier as “*freelancers*”



and one answered “*manufacturers with no particular size*”. In terms of main customers of SMEs, most of them trade with companies of all sizes as well as individual end consumers.

Question 9 asked respondents about the focus of their core business and the responses to this question are summarised and presented in Figure 6.1.



**Figure 6.1: Q9 - Focus of core business for sampled SMEs**

Figure 6.1 shows that the quality of SMEs’ products and services was the strongest category, with 88 out of 135 respondents (65.2%) selecting this answer. This was closely followed by customer responsiveness at 55.6% and efficiency at 40%. It is interesting to note that some SMEs did not have a clearly defined core business. These SMEs are categorised as ‘Other’ and they account for 15.6%. These companies act “ad-hoc” to various offers. People in charge answered that “*their companies are small enough to be able to change their strategies as and when required, or as and when wanted*”.

Question 10 asked respondents if they had an IT budget in their organisation and was followed by Question 11 asking if they had a budget for developing e-business. The data received are presented in Table 6.4 (Q10 and Q11).



**Table 6.4: Q10, 11 and 12 – SMEs' IT, e-business budget and need for advice/training in IT**

<b>Q10: IT budget</b>	<b>Frequency</b>	<b>% (N=135)</b>
Yes	78	57.8%
No	44	32.6%
Don't know	3	2.2%
Missing	10	7.4%
<b>Q11: e-business budget</b>	<b>Frequency</b>	<b>% (N=135)</b>
Yes	37	27.4%
No	86	63.7%
Don't know	4	3.0%
Missing	8	5.9%
<b>Q12: Need for advice/training in IT</b>	<b>Frequency</b>	<b>% (N=135)</b>
Yes	35	25.9%
No	85	63.0%
Don't know	7	5.2%
Missing	8	5.9%

The table shows that more organisations have an IT budget than an e-business budget. However, it was surprising to find out that after rapid technological advances and government support (DTI, 2003), 32.6% of SMEs still did not have an IT budget. With that in mind it was not surprising that 63.7% of SMEs did not have an e-business budget. However, it was encouraging to see that 27.4% of sampled SMEs did have this budget. To clarify the existence of a relationship between these two variables in Q10 and Q11 crosstabulation was carried out later in section 6.1.2.1.

Question 12 investigated the areas in which SMEs felt they require advice or training in the use of IT to support their business and 63% of respondents claimed they did not require any help (Table 6.4). This was followed by answers to Question 13 (Figure 6.2) about the areas of business requiring IT technical support which identified '*managing relationship with customers*' as most needed, followed by finance and accounts.



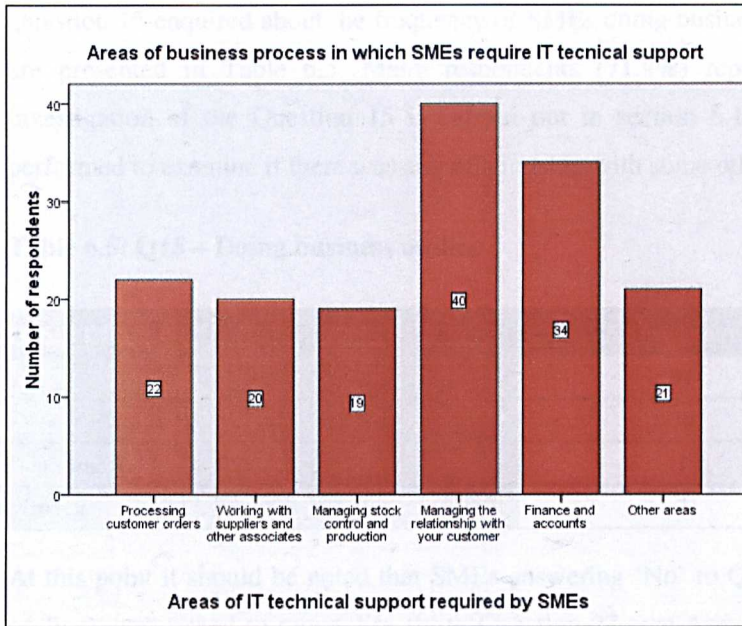


Figure 6.2: Q13 – Areas of business in which SMEs require IT and technical support

Question 14 focused on the internal IT resources within the sampled companies. Figure 6.3 indicates that more than 40% of SMEs had dedicated IT personnel in their company. This was closely followed by the existence of an IT enthusiast. In addition, less than 30% of SMEs answered that they had an IT department and around 25% of respondents did not have any resources at all. The resource mentioned by the respondents reported under “Other” was the requirement and desire for external help.

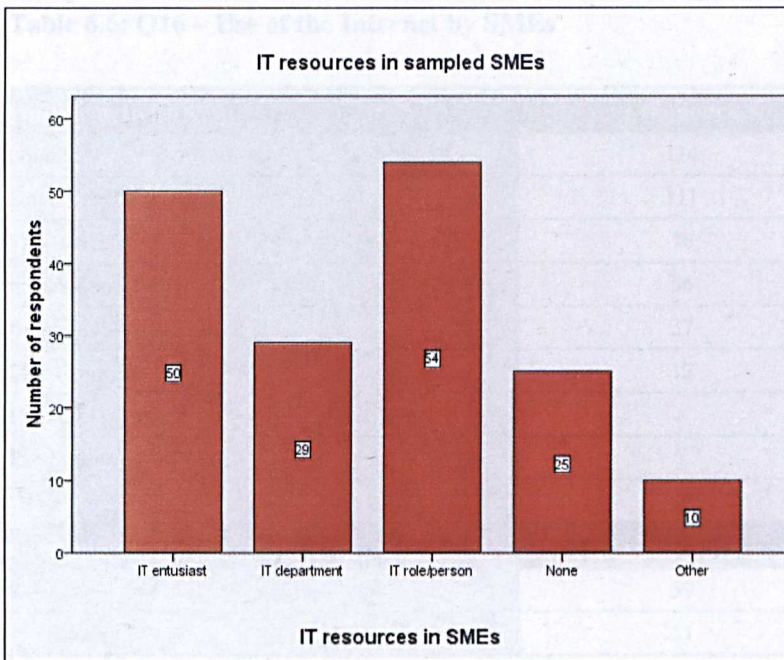


Figure 6.3: Q14 - IT resources in SMEs



Question 15 enquired about the frequency of SMEs doing business on-line, the results of which are presented in Table 6.5. Many respondents (71.9%) reported trading on-line. Further investigation of the Question 15 is carried out in section 6.1.2 in which crosstabulation is performed to examine if there was any relationship with some other variables.

**Table 6.5: Q15 – Doing business on-line**

Q15: IT budget	Frequency	% (N=135)
Yes	97	71.9%
No	30	22.2%
Don't know	1	0.7%
Missing	7	5.2%

At this point it should be noted that SMEs answering 'No' to Question 15 (not doing business on-line) were asked to move directly to Question 27 (see Appendix A) as Questions 16 to 27 were specifically related to the nature of on-line trading of SMEs. They covered areas including questions regarding the specific use of hardware and software in SMEs, what initiated the introduction of Internet technology, the organisation's experience with the use of the IT and the expectation of the use of the Internet before and after their introduction. This is further discussed in section 6.1.2.

Question 16 was enquiring about the level of use of Internet technologies and answers are presented in Table 6.6.

**Table 6.6: Q16 – Use of the Internet by SMEs**

On-line activities	Frequency	%
e-mails	114	84.4%
Have website	111	82.2%
Marketing	76	56.3%
Order quotation	56	41.5%
Invoicing	37	27.4%
Stock control	12	8.9%
Logistics planning	7	5.2%
Production scheduling	7	5.2%
Other	2	1.5%
e-commerce	Frequency	%
Sales	59	43.7%
Purchasing	51	37.8%



e-business	Frequency	%
Partially integrated with customers	30	22.2%
Partially integrated with suppliers	21	15.6%
Fully integrated with customers	4	3%
Fully integrated with suppliers	0	0%

It is interesting, and probably not surprising, to note that over 80% of sampled SMEs use e-mails and websites. This is followed by over half of the respondents using the Internet for marketing, over 40% for preparing order quotations and over a quarter for invoicing. Also, less than 10% of respondents use the Internet for logistics planning, stock control, production scheduling and other unspecified activities.

Table 6.6 further shows that a good proportion of sampled companies use the Internet for e-commerce purposes with just over 40% of companies are selling on-line while just less than 40% use the Internet for purchasing. In addition, the sample shows that some firms use e-business as well. Of those, 22.2% are partially integrated with customers, 15.6% with suppliers and only 3% are fully integrated with customers. It is interesting to note that none of the sampled companies are fully integrated with suppliers.

Questions 17, 18 and 19 asked respondents to identify what software and hardware their companies were using as well as what type of on-line connection they use to support their on-line business. This is summarised in Table 6.7.

**Table 6.7: Q17, 18 and 19 – SMEs' on-line applications that support their on-line business**

Software package/system	Frequency	%
Package: Excel	78	57.8%
Package: Access database	45	33.3%
System: CRM	26	19.3%
System: B2B	22	16.3%
System: EDI	12	8.9%
System: B2C	9	6.7%
Other	9	6.7%
System: ERP	7	5.2%
System: SCM	4	3%
System: MRP	3	2.2%
System: SRM	2	1.5%
System: RFID	2	1.5%
System: MRP II	0	0%



Hardware/network	Frequency	%
LAN	78	57.8%
Independent/outsourcing ISP	78	57.8%
In-house managed server	56	41.5%
WAN	31	23%
POP	20	14.8%
Other	1	0.7%
Type of on-line connection techniques	Frequency	%
ADSL	59	43.7%
WNC	38	28.1%
ISDN	30	22.2%
DSL	18	13.3%
Dial-up	15	11.1%
Cable modem	12	8.9%
SDSL	9	6.7%
Other	3	2.2%

Not surprisingly, Microsoft Excel was identified by 58% of respondents followed by 33% corresponding to Access database. Other similar applications used were: Safe, Sage, Summit internal software, Oracle, SQL database, Trade Plus and bespoke software tailored for individual companies. Answers to Question 17 also identified that some companies were using Intranets and Extranets as means of personal connection and communication with their customers and suppliers (B2B and B2C).

In terms of hardware, as the highest percentages of SMEs in the UK are micro organisations, 58% of all selected answers identified using a Local Area Network (LAN). This is to be expected as LAN is most suitable for a computer network covering a small physical area, such as home or office. Also, 58% of selected answers indicated use of independent Internet Service Provider (ISP). However, a good proportion of all answers (42%) invested in in-house managed servers.

As to the type of computer connections used by SMEs, Table 6.7 also shows that 44% of respondents indicated an ADSL (Asymmetric Digital Subscriber Line). This is associated with smaller companies who require a passive Internet connection. This type of connection enables small companies to use a higher download speed without the requirement of running servers which need a high speed connection in the other direction. However some answers (28%) indicated companies taking advantage of the wireless network connection (WNC) while others (22%) still use Integrated Services Digital Network (ISDNs) i.e. slow speed modems.



Questions 20 and 21 enquired into the level of SMEs' integration with suppliers and customers. Figure 6.4 shows that 49 out of 135 SMEs were not integrated at all, or were integrated very little. However, three SMEs identified a full integration with customers while none had a full integration with suppliers.

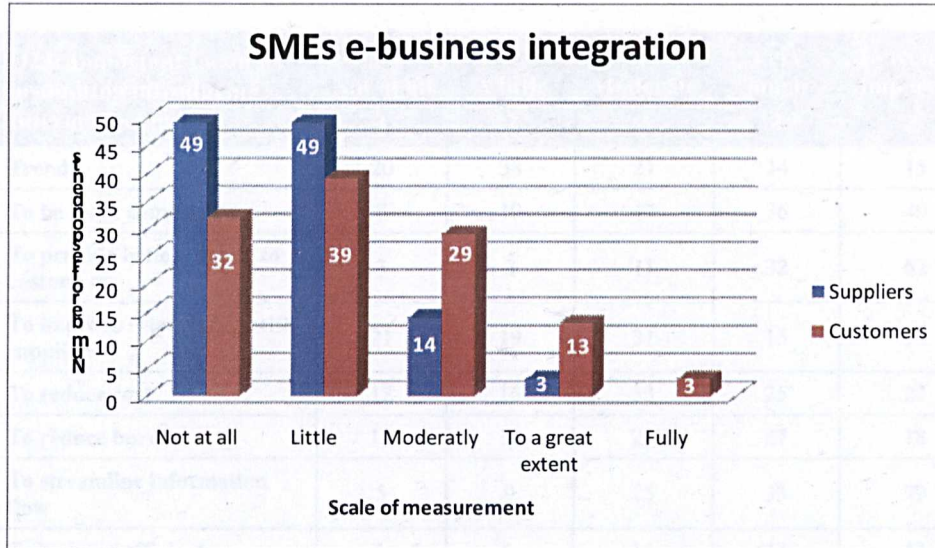


Figure 6.4: Q20 and 21 – SMEs' business integration with their supplier and customers

Question 22 asked respondents to specify the date that the Internet was first introduced into their organisation. It is interesting to see in Figure 6.5 that the introductions peaked in the late 1990s when the Internet became widely available and the world experienced the developments of e-commerce 3.0, e-business 1.0 and web 2.0 (see also Table 2.10) as well as the dot.com boom and bust. The results also indicate that at the end of the 1980s there were no companies which had introduced Internet technology.

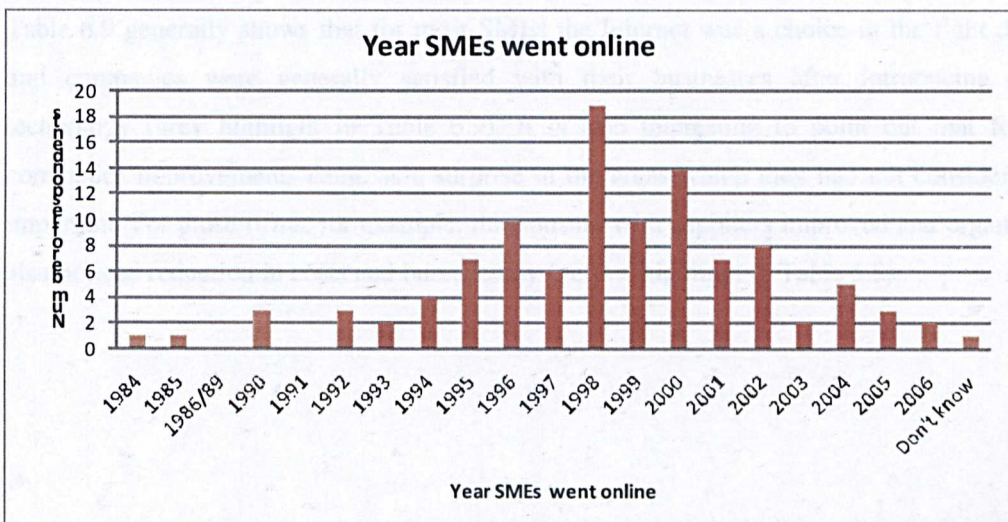


Figure 6.5: Q22 – SMEs' first introduction to Internet technology



Question 23 asked the respondents to identify reasons for introducing the Internet in their organisations. Table 6.8 displays the very high hopes of SMEs about the introduction of Internet technologies to their businesses.

**Table 6.8: Q23 – Factors influential in the decision to introduce Internet technology**

<b>Q23: Important factors prompting introducing Internet technology</b>	<b>Not at all 1</b>	<b>A little 2</b>	<b>Moderate 3</b>	<b>Very much 4</b>	<b>Extremely important 5</b>	<b>Mean</b>
<b>Trendy</b>	20	38	21	14	15	2.7
<b>To be more competitive</b>	8	10	17	36	40	3.8
<b>To provide better service to customers</b>	3	3	11	32	62	4.3
<b>To improve relationship with suppliers</b>	21	19	37	15	18	2.9
<b>To reduce cost</b>	12	16	33	25	23	3.3
<b>To reduce bureaucracy</b>	18	19	29	27	18	3.1
<b>To streamline information flow</b>	5	9	25	33	39	3.8
<b>To be more efficient</b>	1	6	14	47	43	4.1
<b>To increase turnover</b>	7	11	24	21	46	3.8
<b>To improve quality</b>	7	12	25	29	38	3.7
<b>Other</b>	2	0	0	3	8	4.2

Most SMEs started using the Internet with the desire to improve their customer service, provide better quality of product/service, increase their turnover, have better communication channels in their organisations and become more competitive. All of these factors were extremely important to SMEs.

Question 24 asked about the changes following the introduction of the Internet. The data in Table 6.9 generally shows that for most SMEs the Internet was a choice in the right direction and companies were generally satisfied with their businesses after introducing Internet technology (grey highlight in Table 6.9). It is also interesting to point out that for some companies improvements came as a surprise in the areas which they had not considered very important. For those firms, for example, relationship with suppliers improved and organisations also noticed reduction in costs and bureaucracy (yellow highlight in Table 6.9).



**Table 6.9: Q24 – Changes after the introduction of Internet technology**

Q24: Changes after introducing Internet technologies	Strongly disagree/Disagree 1/2	Neutral 3	Agree/Strongly agree 4/5	Mean
None	76	21	7	1.9
Became more competitive	8	37	63	3.6
Improved customer service	4	18	87	4.0
Improved relationship with suppliers	12	51	44	3.3
Reduced cost	13	40	55	3.4
Reduced bureaucracy	15	43	51	3.4
Streamlined information flow	4	30	71	3.9
Became more efficient	6	23	78	3.9
Increased turnover	7	42	58	3.6
Increased quality	11	40	56	3.5
Other	0	2	2	3.8

Both questions (Q23 and Q24) were also mean tested; firstly to identify the important factors and secondly to back up the information when looking at the numbers in each category. This is similar to non-parametric tests which offer a back-up to the parametric tests and show broadly similar results. The mean in each category identified similar results to frequencies. To investigate these findings further the data were examined by using crosstabulation and correlation in sections 6.1.2.5 and 6.3.

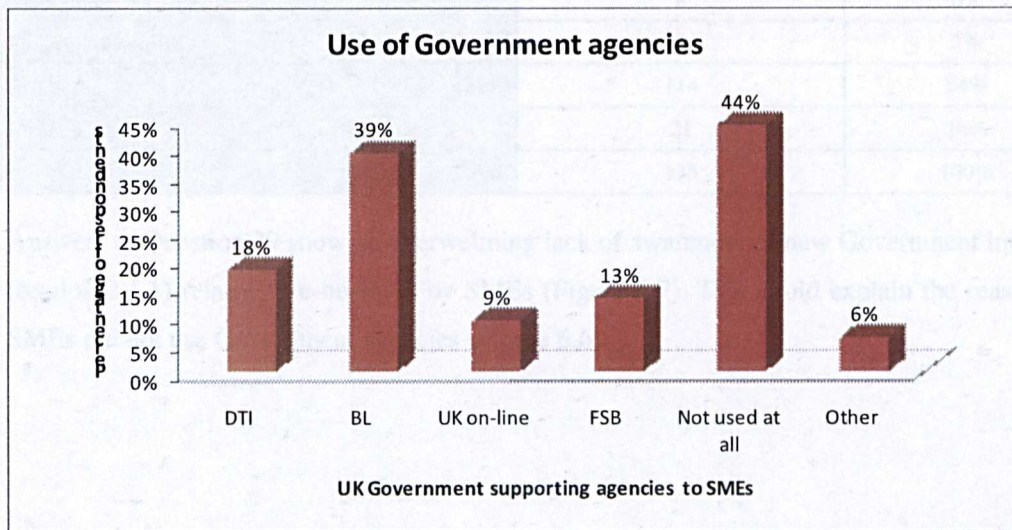
Responses to Questions 25 and 26 indicated that product, marketing, ICT and HR were all quite important to SMEs before introducing the Internet technology (grey highlight). The results (Table 6.10) show that after the Internet was introduced, most changes were noticed in the R&D, ICT and HR (yellow highlight). However, marketing and customer service were among the most influenced by changes in the company's technological infrastructure. Similarly to Q23 and Q24 for Q25 and Q26 mean and standard deviation were calculated to identify the important factors and to back up the results when looking at the numbers in each category.



**Table 6.10: Q25 and 26 – The important factors in organisation before and after introducing Internet technology**

Q25: Before	The least important					The most important	Mean	sd
	1	2	3	4	5			
R&D	22	29	26	15	13	2.7	1.3	
Product	8	6	20	39	32	3.8	1.1	
Marketing/sales	4	6	36	42	18	3.6	1.0	
Service/customer	4	2	11	37	52	4.2	1.0	
Company's ICT	7	20	42	28	9	3.1	1.0	
HR	11	23	29	30	12	3.1	1.2	
Q26: After	Not at all important					Extremely important	Mean	sd
	1	2	3	4	5			
R&D	15	16	27	27	21	3.2	1.3	
Product	12	6	23	29	34	3.7	1.3	
Marketing/sales	2	2	18	46	40	4.1	0.9	
Service/customer	1	1	7	31	67	4.5	0.7	
Company's ICT	4	7	30	31	35	3.8	1.1	
HR	9	19	28	31	20	3.3	1.2	

Question 27 enquired about the level of Government support SMEs used. The response was that almost half of the SMEs did not use any of Government or non-government agencies (Figure 6.6) despite their investments in various initiatives (DTI, 2003, 2006). The other half was using Business Link (BL) most of the time together with DTI and Federation for Small Businesses (FSB).



**Figure 6.6: Q27 – The use of Government and non-Government agencies by SMEs**



Although Figure 6.6 indicates some usage of Government agencies, Table 6.11 shows that the SMEs most likely to take advantage of those services were micro and small firms. This is despite the fact that the literature surveyed indicated that micro businesses were falling behind in the use of technology because they did not use help that was available (DTI, 2003; Dynamic Markets, 2007; NSO, 2007; ONS, 2008). However, more worrying was the number of SMEs who did not take advantage of these services at all. In fact, Table 6.11 shows that larger SMEs were less likely to use them.

**Table 6.11: Government and non Government services used, by size of SMEs**

Size of SMEs by number of employees	No. of respondents	DTI	BL	UK online	FSB	Not at all used
1-9	46	5	20	4	8	21
10-49	49	15	26	7	8	17
50-249	33	4	7	1	1	21

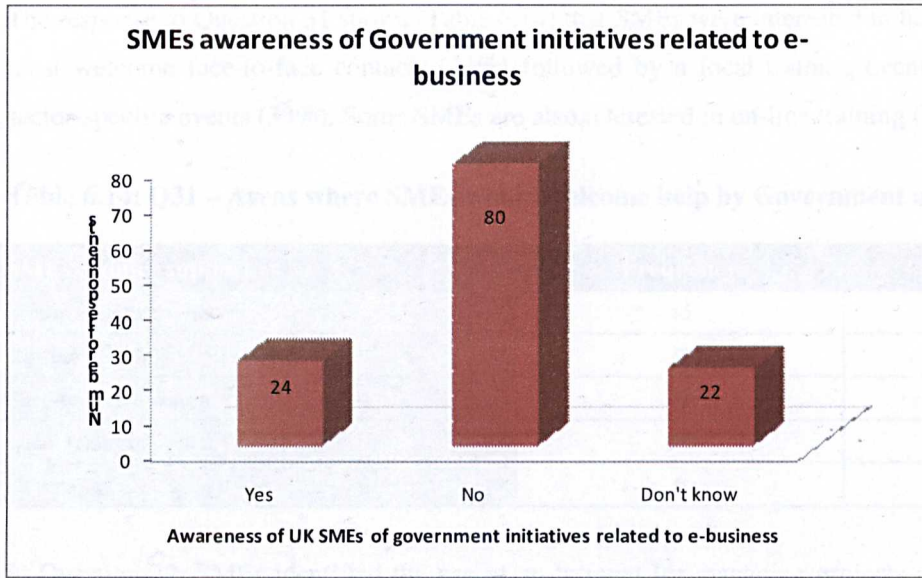
Table 6.12 presents answers to Question 28 indicating that 51% of sampled SMEs do not find Government particularly helpful. Only 2% of SMEs use them to their full satisfaction.

**Table 6.12: Q28 – The helpfulness of Government on-line support offered to SMEs**

Government helpfulness	Frequency	% (N=135)
Not at all	41	30%
A little	28	21%
Moderately	34	25%
Very much	8	6%
Extremely helpful	3	2%
<b>Total</b>	114	84%
Missing	21	16%
<b>Total</b>	135	100%

Answers to Question 29 show an overwhelming lack of awareness of new Government initiatives (section 2.1.1) related to e-business by SMEs (Figure 6.7). This could explain the reason why SMEs did not use Government agencies (Figure 6.6).





**Figure 6.7: Q29 – SMEs’ awareness of Government initiatives related to e-business advice and support**

The answers to Question 30 indicated that SMEs were most affected by the lack of financial resources and the high cost of technology they require (grey highlight in Table 6.13). Other factors such as the lack of skilled staff and knowledge at managerial levels followed by security and trust were not identified as a problem (yellow highlight).

**Table 6.13: Q30 – Factors affecting implementation of Internet technology in SMEs**

Factors affecting implementation of Internet technology	Not at all affecting	A little	Moderate	Very much affecting	Extremely affecting
Lack of skilled human resources	29	34	41	12	5
Lack of knowledge at management level	36	33	36	11	4
Lack of financial resources	23	24	31	29	12
Poor security	49	37	21	11	1
High cost of technology	21	25	47	25	3
Lack of trust	58	24	30	6	3
Other	1	0	0	4	0

Question 30 also included a free text option and provided a good source of interesting points for a qualitative data analysis. This will be discussed further in the Section 6.4, where a final discussion of the data and analysis of results is presented.



The response to Question 31 shows (Table 6.14) that SMEs were interested in help. They would most welcome face-to-face contacts (41%) followed by a local training events (39%) and a sector-specific events (33%). Some SMEs are also interested in on-line training (24%).

**Table 6.14: Q31 – Areas where SMEs would welcome help by Government agencies**

SMEs require support	Frequency	% (N=135)
Sector specific events	45	33%
On-line training	32	24%
Face-to-face meeting	55	41%
Local training events	52	39%
Other	6	4%

In Question 32, SMEs identified the use of an Intranet for managing projects and as a tool to communicate with their employees. However, the most popular way of communication is still only via e-mail (Table 6.15).

**Table 6.15: Q32 – Use of Intranet by SMEs**

Use of Intranet by SMEs	Frequency	% (N=135)
e-mail for communication	75	56%
Intranet to manage projects	24	18%
Provide information to employees	49	36%
Distribute data and information internally	40	30%
Other	3	2%

Question 33 was reserved for any further comments SMEs wanted to add to the survey questionnaire. Here are some examples of this qualitative feedback:

*“The UK government comes out with so many initiatives that I have completely lost confidence with trying ANY of them. The time taken to find out what any particular scheme might offer - and then it is superseded - is a complete waste of our management time. R&D in particular is something we do a lot of, and have never claimed a penny in over 20 years, for the simple reason that the rules for being eligible are totally counterproductive to any timely or relevant R&D effort. But the bureaucratic incomprehension of the realities of business life in this area of government Machismo Semblance of Action (sorry)”*

*“Ours is a small consultancy partnership consisting of myself and my wife. We do not have any staff and have no intention of employing any. We each have a computer, linked through a router to a cable modem, to which I can also connect my laptop. We share some information on our hard discs. Does this count as an Intranet? Our business is primarily concerned with advising organisations on the organisation of information, concentrating on data content rather than technology, but I am a professional member of the British Computer Society (MBCS, CITP) and feel confident in being able to provide all the IT support that we need. Many of the questions in your questionnaire therefore seem irrelevant or inappropriate for us, and I think it would be misleading for you to include them in your analysis. I have therefore left some unanswered.”*

*“We still talk to our staff rather than use the intranet and internal e-mails!”*

*“As some companies and Universities are experts in the field of electronic e-business systems we are experts in to tool required to run such systems to any scale. To use a metaphor a solicitor charges £100.00 per hr to sort your will. You can read up on the Internet and after a couple of days you can probably sort your own out. To implement a true hardware solution for e-business would be like a barrister sorting out a law-suit against another colleague in high court. You would not be able to read up on the Internet and do this yourself. So why do companies believe they can?”*

*“E-mail or internet marketing is received and reacted on sporadically; nothing has more effect than sending a sample someone can hold. In our tests e-mail samples get 80% less business than live samples”.*

Although the examples presented speak for themselves, it is interesting to note that the UK Government is regarded as a topic of great interest for SMEs. Others indicate some gaps in what is regarded as ‘the Internet’ and how and for what IT is used. This probably provides some additional insight as to what caused problems with the way in which respondents behaved after answering Question 15, as described earlier in this chapter. It is interesting to see that people working in SMEs do prefer traditional ways of communicating. Others rather sarcastically commented that without sufficient knowledge, staff should not engage in more challenging ways of doing business.

Question 34 was reserved for those who wanted to receive results from this survey. In total, 78 out of 135 respondents requested to receive the results of this survey with one taking that opportunity even further by complementing the survey questionnaire itself with the phrase *“Great questionnaire. Can you please forward on your findings? Thank you.”*

The data analysis now moves to crosstabulation between paired questions that have been regarded as potentially relevant to provide additional information about the impact IT and the Internet have on sampled SMEs.

### 6.1.2 Crosstabulation

To understand if and how the use of the technology influences various elements of SMEs business, pairs of different questions/answers (i.e. variables) of this survey were cross-tabulated. This provided an insight into causes and consequences of various policies and decisions made by SMEs. To do this, a strategy was developed for pairing questions (given in Appendix A) in cross tabulations, as shown in Table 6.16.



**Table 6.16: Strategy for pairing of survey questions for crosstabulation**

Pair no.	Questions paired	Rationale
1	Q10 and Q11	To check if there is a significant association between “having IT budget” and “having e-business budget”.
2	Q15 and Q3	To check if there is a significant relationship between doing business on-line and the size of SME.
3	Q15 and Q11	To check if there is a significant relationship between doing business on-line and e-business budget.
4	Q15 and Q24.1	To check if there is a significant relationship between doing business on-line and a “None” answer to Q24.
5	Q15 and Q24.2	To check if there is a significant relationship between doing business on-line and “The organisation became more competitive”.
6	Q15 and Q24.3	To check if there is a significant relationship between doing business on-line and “Improved customer service”.
7	Q15 and Q24.4	To check if there is a significant relationship between doing business on-line and “Improved relationship with suppliers”.
8	Q15 and Q24.5	To check if there is a significant relationship between doing business on-line and “Reduced cost”.
9	Q15 and Q24.6	To check if there is a significant relationship between doing business on-line and “Reduced bureaucracy”.
10	Q15 and Q24.7	To check if there is a significant relationship between doing business on-line and “Streamlined information flow”.
11	Q15 and Q24.8	To check if there is a significant relationship between doing business on-line and “Became more efficient”.
12	Q15 and Q24.9	To check if there is a significant association between doing business on-line and “Increased turnover”.
13	Q15 and Q24.10	To check if there is a significant association between doing business on-line and “Increased quality”.
14	Q15 and Q30.1	To check if there is a significant association between doing business on-line and “Lack of skilled human resources”.
15	Q15 and Q30.2	To check if there is a significant association between doing business on-line and “Lack of knowledge at managerial level”.
16	Q15 and Q30.3	To check if there is a significant association between doing business on-line and “Lack of financial resources”.
17	Q15 and Q30.4	To check if there is a significant association between doing business on-line and “Poor security”.
18	Q15 and Q30.5	To check if there is a significant association between doing business on-line and “High cost of technology”.
19	Q15 and Q30.6	To check if there is a significant association between doing business on-line and “Lack of trust”.
20	Q23.i and Q24.i (i from 2 to 10)	To check if there is a significant association between “the decision to introduce the Internet in organisations” and the results “following that decision”.



### 6.1.2.1 Crosstabulation Q10 vs. Q11

Q10: "Do you have an IT budget"?

Q11: "Do you have an e-business budget"?

Q10 and Q11 asked respectively: "Do you have an IT budget in your organisation?" and "Do you have an e-business budget in your organisation?" with one of the answers: "Yes", "No" and "Don't know" offered in both cases. Due to low counts of "Don't know" answers they were grouped together with "No" answers and re-coded to avoid the low count problem when calculating Chi-square statistics. Therefore this first crosstabulation clarifies if there is a relationship between having IT budget and having e-business budget in sampled SMEs. For this the following null hypothesis has been formulated:

$H_0$ =There is no association between having IT budget and having e-business budget.

It is interesting to note that the four respondents who had e-business budgets did not have or did not know if they have IT budget. A chi-square test of independence was conducted to determine whether there was any association between having an IT budget and e-business budget. The Chi-square test statistic was 14.051 (df=1, p-value 0.000). As the p-value is lower than 0.05,  $H_0$  can be rejected, which means there is significant difference in the frequencies with which the answers to the existence of the IT budget question came from those who do and do not do have e-business budget. The null hypothesis is rejected as there is evidence of association between having IT and e-business budgets. The data are presented in Figure 6.8.

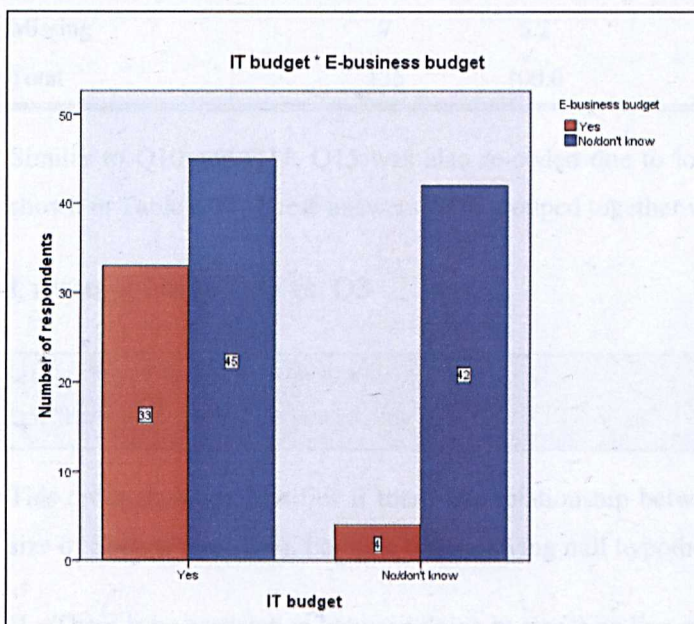


Figure 6.8: Q10 vs. Q11 – sample frequencies



### 6.1.2.2 Crosstabulation using Q15

Q15: "Do you do business on-line"?

There were three answers offered to this question: "Yes", "No" and "Don't know". In the case of the "No" answer it asked the respondent to skip all questions Q16–Q26 and move directly to Q27. Q16–Q26 are related to software and hardware used by the company and it was assumed that they would not be applicable to respondents who do not do business on-line. With hindsight, this assumption was probably wrong as many respondents who answered "No" in Q15 went on and answered Q16–Q26, because there was no trap built in the software to prevent them from doing this. For example, in Q22 almost all respondents (132 out of 135) specified the year when they introduced 'Internet technology' in their company. This indicates that the term 'business on-line' did not mean the same as 'using Internet technologies' to all respondents. This issue has been discussed previously under questionnaire development in Section 3.4.3.3. Table 6.17 shows basic statistics for Q15 which is important to consider when analysing the following crosstabulation.

**Table 6.17: Q15 – frequencies and statistics pertinent to data shown in Table 6.5**

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Yes	97	71.9	75.8
	No	30	22.2	99.2
	Don't know	1	.7	.8
	Total	128	94.8	100.0
Missing	7	5.2		
Total	135	100.0		

Similar to Q10 and Q11, Q15 was also re-coded due to low count of "Don't know" answers shown in Table 6.17. These answers were grouped together with the "No" answers.

#### Crosstabulation Q15 vs. Q3

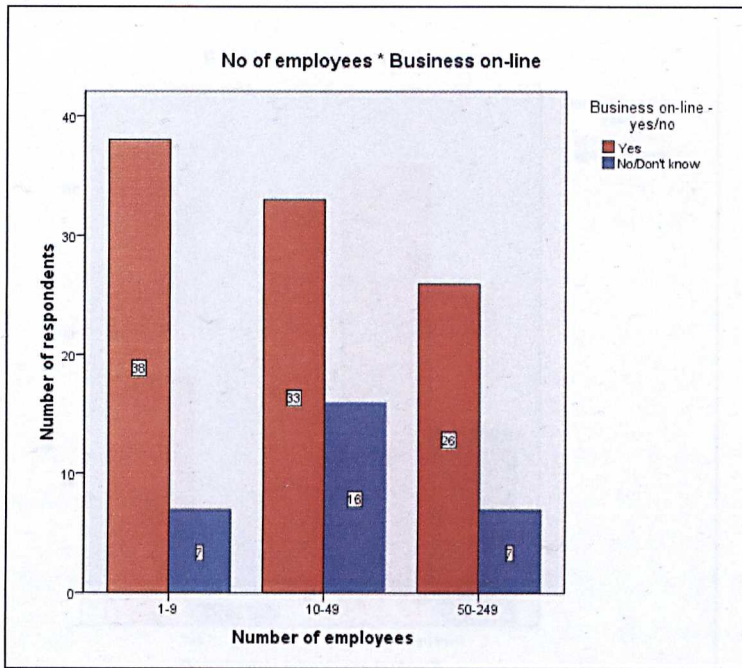
Q15: "Do you do business on-line"?

Q3: "How many people do you employ"?

This crosstabulation clarifies if there is a relationship between doing business on-line and the size of SME (Figure 6.9). For this, the following null hypothesis has been formulated:

$H_0$ =There is no association between doing business on line and the size of the SME.





**Figure 6.9: Q15 vs. Q3 – sample frequencies**

In total, there were 127 owners/managers who responded to both questions. Figure 6.9 indicates that 97 SMEs were doing business on-line while 29 were not doing it or did not know. This indicates the trend that is different from what was reported in the literature. Relative to medium-sized organisations, the micro organisations show higher ratio of companies who are and who are not doing business on-line. However, National Statistics Online (2008) would suggest that micro organisations with up to nine employees are lagging behind small and medium enterprises in doing on-line business. A chi-square test of independence was calculated to determine whether there was any association between the size of a company and whether or not it was perceived to be doing business online. There was no evidence of an association (chi-square=3.94, df=2, p=0.139).

### **Crosstabulation Q15 vs. Q11**

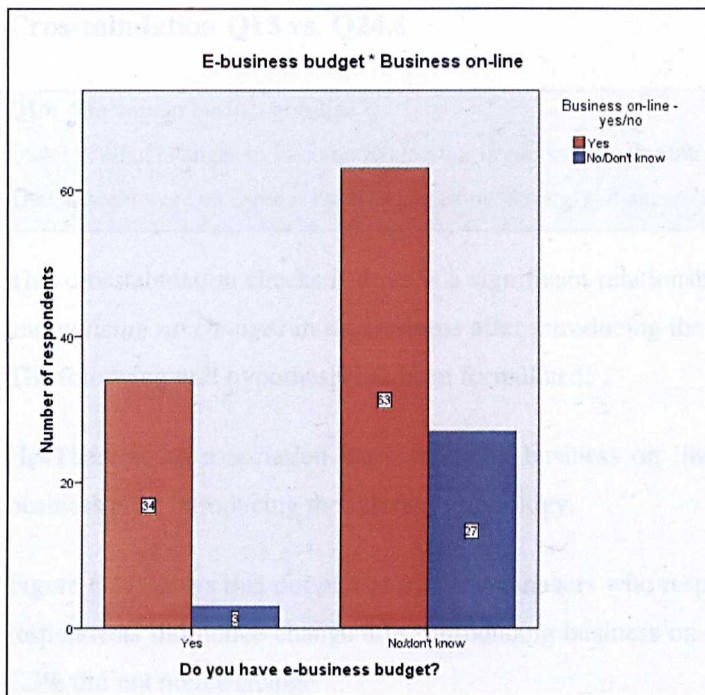
Q15: "Do you do business on-line"?

Q11: "Do you have an e-business budget in your organisation"?

This crosstabulation verifies if a relationship exists between doing business on-line and SMEs having e-business budget (Figure 6.10). The following null hypothesis has been formulated:

$H_0$ =There is no association between doing business on line and having e-business budget.





**Figure 6.10: Q15 vs. Q11 – sample frequencies**

A chi-square test of independence was calculated to determine whether there was any association between SMEs which have e-business budget and whether or not it was perceived to be doing business online. There was evidence of an association (chi-square=5.804, df=1,  $p=0.016$ ). As the p-value is smaller than 0.05,  $H_0$  can be rejected, which means that there is significant difference in the frequencies with which the answers to the existence of the e-business budget came from those who do and do not do business on-line. Therefore, having e-business budget is dependent of doing business on line. To the best knowledge of the researcher, this finding is not widely reported in the literature.

### 6.1.2.3 Crosstabulations and two sample hypothesis tests Q15 vs. Q24 – Independent sample t-test and Mann-Whitney U test

Q24 examined the changes noticed after introducing “Internet technology” and offered a 5-point Likert scale of responses from “Strongly disagree” to “Strongly agree”. Similar as for other previously mentioned questions, the recoding was performed for all 10 sets of responses in Q24 to reduce the problem of low count in some cells when calculating crosstabulations. This was done by reducing the five groups of responses to the following three groups: “Strongly disagree/Disagree”, “Neutral” and “Agree/Strongly agree”. The “Neutral” option was kept separately due to high number of such responses.



### Crosstabulation Q15 vs. Q24.1

Q15: "Do you do business on-line"?

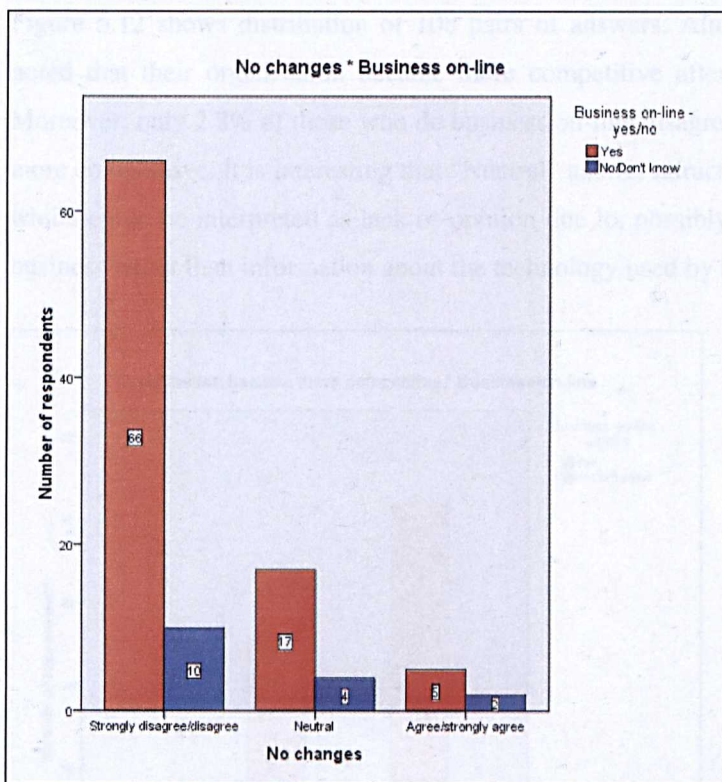
Q24.1: "What changes did you notice in your organisation after introducing Internet technology - None"?

The answers were on 5-point Likert scale from 'Strongly' disagree to 'Strongly agree'.

This crosstabulation checks if there is a significant relationship between doing business on-line and *noticing no changes* in the business after introducing the Internet technology (Figure 6.11). The following null hypothesis has been formulated:

$H_0$ =There is no association between doing business on line and noticing no changes in the business after introducing the Internet technology.

Figure 6.11 shows that out of 104 owners/managers who responded to both questions, 63.5% of respondents did notice change after introducing business on-line, 16.3% were neutral and only 6.3% did not notice change.



**Figure 6.11: Q15 vs. Q24.1 - Doing business on-line crosstabulation with no changes in SMEs after introducing the Internet technology**

The test reported chi-square 1.441, df=2, p=0.487. As the p-value is greater than 0.05,  $H_0$  cannot be rejected, which means that there is no significant difference in the frequencies with which the



answers to “not noticing changes” came from those who do and do not do business on-line. Therefore, there is no association between “not noticing changes” and doing business on line.

**Crosstabulation Q15 vs. Q24.2**

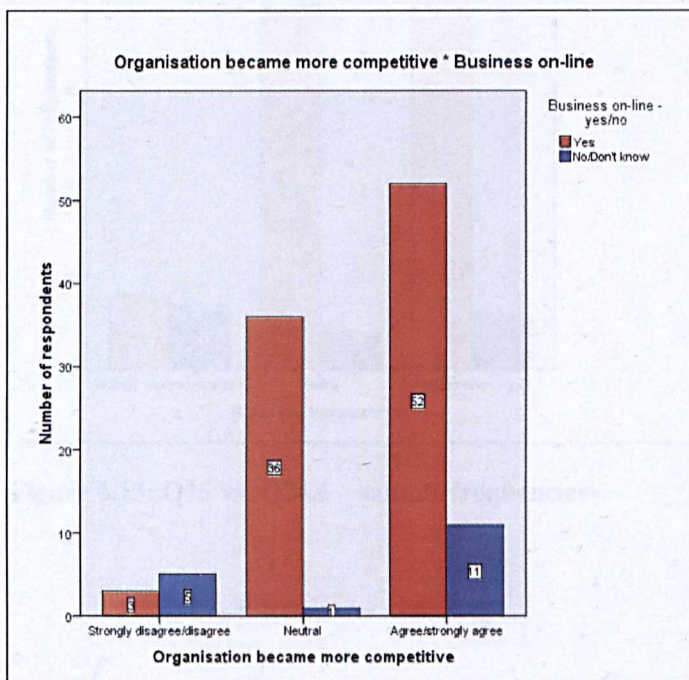
Q15: “Do you do business on-line”?

Q24.2: “What changes did you notice in your organisation after introducing Internet technology – The organisation became more competitive”? The answers were on 5-point Likert scale from ‘Strongly’ disagree to ‘Strongly agree’.

This crosstabulation checks if there is a significant relationship between doing business on-line and organisation becoming more competitive after introducing Internet technology. The following null hypothesis has been formulated:

$H_0$ =There is no association between doing business on line and organisation becoming more competitive after introducing the Internet technology.

Figure 6.12 shows distribution of 108 pairs of answers. Almost half of respondents (48.1%) noted that their organisation became more competitive after starting to do business on-line. Moreover, only 2.8% of those who do business on-line disagreed that their organisation became more competitive. It is interesting that “Neutral” answer attracted quite a few responses (33.3%) which could be interpreted as lack of opinion due to, possibly, lack of information about their business rather than information about the technology used by their business.



**Figure 6.12: Q15 vs. Q24.2 – sample frequencies**

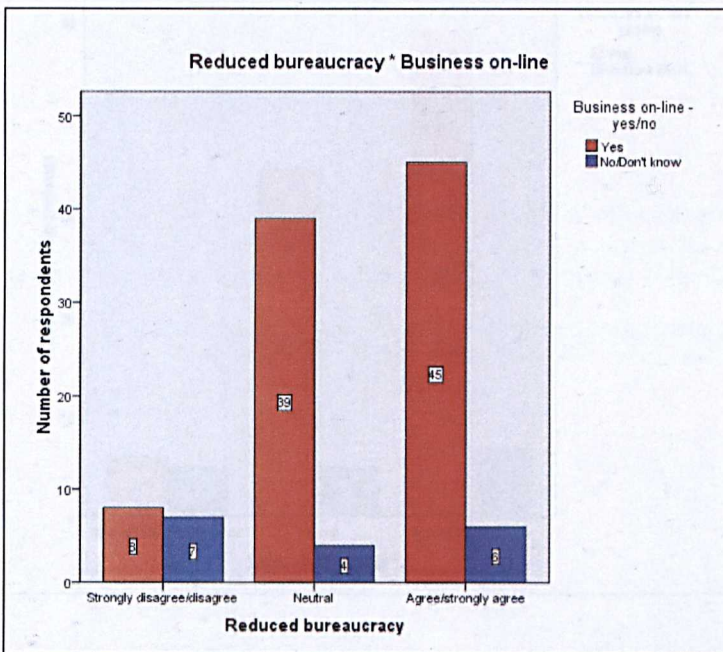


The test reported chi-square, 18.071, df=2, p=0.000. As the p-value is less than 0.05,  $H_0$  can be rejected, which means that there is significant difference in the frequencies with which the answers to “organisation becoming more competitive” came from those who do and do not do business on-line. Hence, there is evidence of association between doing business on line and organisation becoming more competitive.

**Crosstabulation Q15 vs. Q24.1, 2, 3, 4, 5, 6, 7, 8, 9, 10**

Q15: “Do you do business on-line”?  
 Q24: “What changes did you notice in your organisation after introducing Internet technology”?  
 (24.1) None, (24.2) Became more competitive (24.3) Improved customer service, (24.4) Improved relationship with suppliers, (24.5) Reduced cost, (24.6) Reduced bureaucracy, (24.7) Streamlined information flow, (24.8) Became more efficient (24.9) Increased turnover, (24.10) Increased quality  
 The answers were on 5-point Likert scale from ‘Strongly disagree’ to ‘Strongly agree’.

Following similar procedure, crosstabulations between Q15 and questions between Q24.3 and Q24.10 were performed. The examples of results are presented in Figure 6.13, Figure 6.14 and Figure 6.15,



**Figure 6.13: Q15 vs. Q24.6 – sample frequencies**



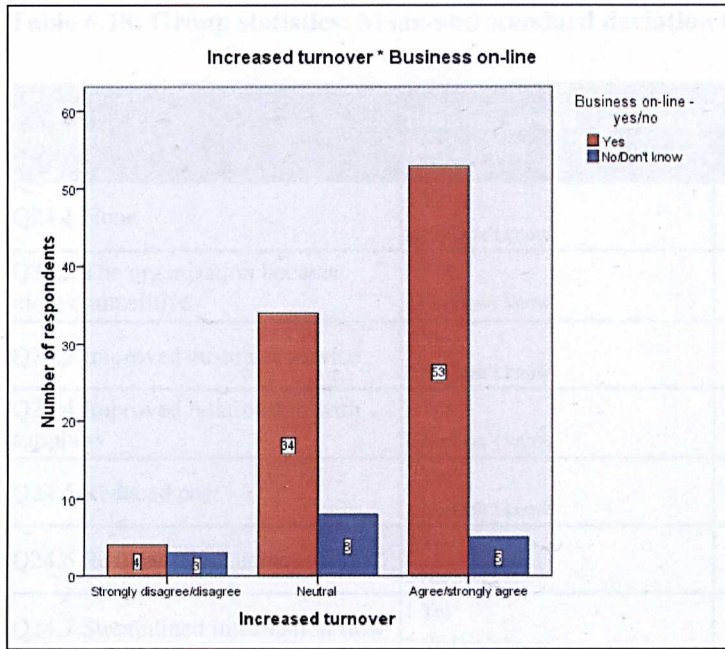


Figure 6.14: Q15 vs. Q24.9 – sample frequencies

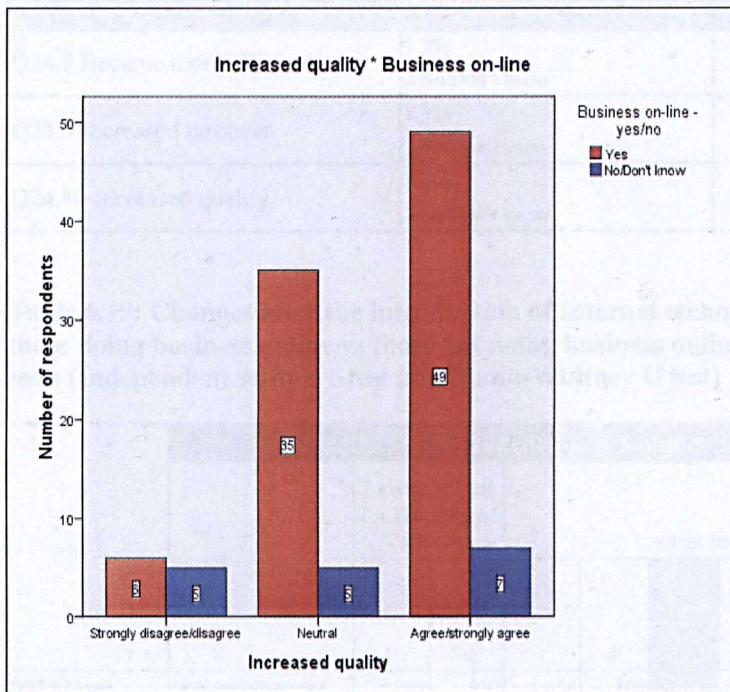


Figure 6.15: Q15 vs. Q24.10 – sample frequencies

Similar to previous calculations chi-square test of independence was calculated. Some very interesting results were indicated, however due to frequencies being too small for categories 'No/Don't know' frequencies could not be formally tested. Therefore only mean and standard deviation are reported in Table 6.18. In addition, this is followed up with parametric independent sample t-test and non-parametric Mann Whitney U-test is performed (Table 6.19).



**Table 6.18: Group statistics: Mean and standard deviation to question 24.1–10**

Question	Business on-line - yes/no or don't know	n	Mean	Std. Deviation	Std. Error Mean
Q24.1 None	1 Yes	88	1.81	.981	.105
	2 No/Don't know	16	2.25	1.000	.250
Q24.2 The organisation became more competitive	1 Yes	91	3.67	.790	.083
	2 No/Don't know	17	3.29	1.213	.294
Q24.3 Improved customer service	1 Yes	92	4.01	.703	.073
	2 No/Don't know	17	3.71	.985	.239
Q24.4 Improved relationship with suppliers	1 Yes	90	3.38	.894	.094
	2 No/Don't know	17	3.00	1.118	.271
Q24.5 Reduced cost	1 Yes	91	3.49	.887	.093
	2 No/Don't know	17	3.18	1.015	.246
Q24.6 Reduced bureaucracy	1 Yes	92	3.49	.819	.085
	2 No/Don't know	17	2.88	1.166	.283
Q24.7 Streamlined information flow	1 Yes	88	3.90	.788	.084
	2 No/Don't know	17	3.71	.920	.223
Question	Business on-line - yes/no or don't know	n	Mean	Std. Deviation	Std. Error Mean
Q24.8 Became more efficient	1 Yes	90	3.96	.778	.082
	2 No/Don't know	17	3.53	1.068	.259
Q24.9 Increased turnover	1 Yes	91	3.67	.804	.084
	2 No/Don't know	16	3.19	1.047	.262
Q24.10 Increased quality	1 Yes	90	3.53	.837	.088
	2 No/Don't know	17	3.06	1.144	.277

**Table 6.19: Changes after the introduction of Internet technology – Comparison between those doing business online vs those not doing business online – two sample hypothesis tests (Independent sample t-test and Mann-Whitney U test)**

	Independent Samples Test										Mann-Whitney U test	
		Levene's Test for Equality of Variances		t-test for Equality of Means						Sig. (2-tailed)		
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. Error difference	95% Confidence Interval of the Difference			
									Lower			Upper
Q24.1 None	Equal variances assumed	.008	.930	-1.658	102	.100	-.443	.267	-.974	.087	.071	
	Equal variances not assumed			-1.635	20.599	.117	-.443	.271	-1.007	.121		
Q24.2 The organisation became more competitive	Equal variances assumed	9.542	.003	1.643	106	.103	.376	.229	-.078	.830	.490	
	Equal variances not assumed			1.231	18.614	.234	.376	.306	-.264	1.017		
Q24.3 Improved customer service	Equal variances assumed	2.479	.118	1.536	107	.127	.305	.199	-.089	.699	.306	
	Equal variances not assumed			1.220	19.124	.237	.305	.250	-.218	.828		
Q24.4 Improved relationship with suppliers	Equal variances assumed	.552	.459	1.533	105	.128	.378	.246	-.111	.866	.352	
	Equal variances not assumed			1.316	20.047	.203	.378	.287	-.221	.977		
Q24.5 Reduced cost	Equal variances assumed	.062	.804	1.327	106	.187	.318	.240	-.157	.793	.351	
	Equal variances not assumed			1.209	20.815	.240	.318	.263	-.229	.865		



	Independent Samples Test										Mann-Whitney U test
		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. Error difference	95% Confidence Interval of the Difference		
<b>Q24.6 Reduced bureaucracy</b>	Equal variances assumed	4.840	.030	2.614	107	.010	.607	.232	.147	1.067	.036
	Equal variances not assumed			2.054	19.018	.054	.607	.295	-.012	1.225	
<b>Q24.7 Streamlined information flow</b>	Equal variances assumed	.802	.373	.894	103	.374	.192	.215	-.234	.618	.494
	Equal variances not assumed			.805	20.790	.430	.192	.238	-.304	.688	
<b>Q24.8 Became more efficient</b>	Equal variances assumed	3.899	.051	1.945	105	.054	.426	.219	-.008	.861	.151
	Equal variances not assumed			1.569	19.333	.133	.426	.272	-.142	.994	
<b>Q24.9 Increased turnover</b>	Equal variances assumed	.452	.503	2.114	105	.037	.483	.228	.030	.936	.048
	Equal variances not assumed			1.756	18.236	.096	.483	.275	-.094	1.060	
<b>Q24.10 Increased quality</b>	Equal variances assumed	2.339	.129	2.014	105	.047	.475	.236	.007	.942	.106
	Equal variances not assumed			1.630	19.366	.119	.475	.291	-.134	1.083	

Changes to the business after the introduction of Internet technology are examined in Table 6.19 which presents the series of hypothesis tests comparing those perceiving themselves as doing business online with those not perceiving themselves to do business online. In each case a parametric independent sample t-test and a non parametric Mann Whitney U-test were performed. There is some evidence of differences between the 2-groups in changes related to reduced bureaucracy ( $p=0.054$ ), increased turnover ( $p=0.037$ ) and increased quality ( $p=0.047$ ). In each case the group perceiving themselves as doing business online were in stronger agreement that these changes had taken place than those not doing business online. These findings were backed up by the results of non parametric Mann-Whitney U test with the exception of increased quality where there was no evidence of a difference.

#### 6.1.2.4 Crosstabulation and two sample hypothesis tests Q15 vs. Q30.1, 2, 3, 4, 5 and 6 – Independent sample t-test and Mann-Whitney U test

Q15: "Do you do business on-line"?

Q30: "Can you indicate how the following factors are affecting implementation of the Internet technology in your organisation"?

(30.1) Lack of skilled human resources, (30.2) Lack of knowledge at managerial level, (30.3) Lack of financial resources, (30.4) Poor security, (30.5) High cost of technology, (30.6) Lack of trust

The answers were on 5-point Likert scale from 'Not at all affecting' to 'Extremely affecting'.

Question 30 examined factors affecting implementation of online business in the SMEs surveyed (Appendix A). Crosstabulations between the question about doing business on-line (Q15) and all questions between Q30.1 and Q30.6 were performed. Similarly as for other previously mentioned questions, the recoding was performed for all 6 sets of responses in Q30 to reduce the problem of low count in some cells when calculating crosstabulations. This was

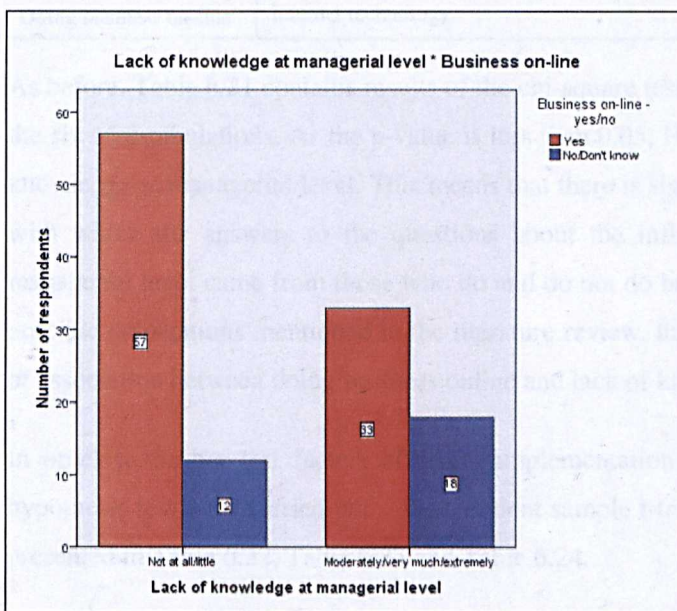


done by reducing the five groups of responses to the following two groups: “Not at all/A little affecting”, “Moderately/Very much/Extremely affecting” (Table 6.20).

**Table 6.20: Summary of crosstabulations between Q15 and Q30–1, 2, 3, 4, 5, 6**

Questions	Cases		Chi-Square Test with continuity correction		
	Valid		Value	df	Asymp.sig. (2-sided)
	n = 135	%			
Lack of skilled human resources* Doing business on-line	121	89.6%	0.000	1	1.000
Lack of knowledge at managerial level* Doing business on-line	120	88.9%	4.103	1	.043
Lack of financial resources* Doing business online	119	88.1%	0.174	1	.677
Poor security* Doing business on-line	119	88.1%	0.310	1	.578
High cost of technology* Doing business on-line	121	89.6%	0.304	1	.581
Lack of trust* Doing business on-line	121	89.6%	2.444	1	.118

The number of valid responses is similar to the previous crosstabulations, varying between 119 and 121. The p-values calculated are shown in the last columns of in Table 6.20 and the grey-highlighted boxes show values lower than 0.05. Somewhat surprisingly, the table demonstrates that the implementation of online business in most organisations surveyed was not or was little affected by all six factors offered. The only evidence of association was found between doing business on-line and lack of knowledge at managerial level. The distribution of pertinent answers is given in Figure 6.16.



**Figure 6.16: Q15 vs. Q30.2 – sample frequencies**



The literature review identified that a lack of skilled human resources, knowledge at managerial level (Martin and Matley, 2001; Barry and Milner, 2002; Taran, 2006; Kotey and Folker, 2007; Balestrin, 2008; Dibrell et al., 2008), the high cost of technology (DTI, 2003; Oftel, 2003; ONS, 2008) and lack of financial resources (Cragg and King, 1993; Lynn et al., 1999; Taran, 2006) frustrated many SMEs. These reasons governed the formulation of the null hypotheses shown in Table 6.21.

**Table 6.21: Q15 vs. Q30 – Null hypotheses for six crosstabulations**

Pairs of questions	H <sub>0</sub> null hypothesis	Hypothesis outcome	Outcome
Q15 vs. Q30.1: Lack of skilled human resources* Doing business on-line	There is no association between doing business on line and lack of skilled human resources after implementation of Internet technology.	Fail to reject	No association
Q15 vs. Q30.2: Lack of knowledge at managerial level* Doing business on-line	There is no association between doing business on line and lack of knowledge at managerial level after implementation of Internet technology.	Reject	Evidence of association
Q15 vs. Q30.3: Lack of financial resources* Doing business online	There is no association between doing business on line and lack of financial resources after implementation of Internet technology.	Fail to reject	No association
Q15 vs. Q30.4: Poor security* Doing business on-line	There is no association between doing business on line and poor security after implementation of Internet technology.	Fail to reject	No association
Q15 vs. Q30.5: High cost of technology* Doing business on-line	There is no association between doing business on line and high cost of technology after implementation of Internet technology.	Fail to reject	No association
Q15 vs. Q30.6: Lack of trust* Doing business on-line	There is no association between doing business on line and lack of trust after implementation of Internet technology.	Fail to reject	No association

As before, Table 6.21 contains results of the chi-square test statistic and p-value calculations for the six crosstabulations. As the p-value is less than 0.05, H<sub>0</sub> can be rejected only for the lack of knowledge at managerial level. This means that there is significant difference in the frequencies with which the answers to the questions about the influence of the lack of knowledge at managerial level came from those who do and do not do business online. Therefore, out of four possible associations mentioned in the literature review, this sample only shows some evidence of association between doing business online and lack of knowledge at managerial level.

In order to further test factors affecting implementation of Internet technology two sample hypothesis test were carried out – Independent sample t-test and Mann-Whitney U-test. This is presented in Table 6.22, Table 6.23 and Table 6.24.



**Table 6.22: Factors affecting the implementation of Internet technology – mean calculation**

Q30 Factors affecting the implementation of Internet technology	Not at all 1	A little 2	Moderate 3	Very much 4	Extremely 5	Mean
Q30.1 Inhibitor – lack of human resources	29	34	41	12	5	2.4
Q30.2 Inhibitor – lack of knowledge at managerial level	36	33	36	11	4	2.3
Q30.3 Inhibitor – lack of financial resources	23	24	31	29	12	2.9
Q30.4 Inhibitor – poor security	49	37	21	11	1	2.0
Q30.5 Inhibitor – high cost of technology	21	25	47	25	3	2.7
Q30.6 Inhibitor – lack of trust	58	24	30	6	3	1.9

**Table 6.23: Group statistics for Q30.1–30.6**

Question	Business on-line - yes/no or don't know	n	Mean	Std. Deviation	Std. Error Mean
Q30.1 Inhibitor – lack of human resources	1.00 Yes	91	2.40	1.042	.109
	2.00 No/Don't know	30	2.50	1.225	.224
Q30.2 Inhibitor – lack of knowledge at managerial level	1.00 Yes	90	2.14	1.045	.110
	2.00 No/Don't know	30	2.70	1.149	.210
Q30.3 Inhibitor – lack of financial resources	1.00 Yes	90	2.77	1.218	.128
	2.00 No/Don't know	29	3.14	1.407	.261
Q30.4 Inhibitor – poor security	1.00 Yes	89	1.96	.988	.105
	2.00 No/Don't know	30	2.03	1.129	.206
Q30.5 Inhibitor – high cost of technology	1.00 Yes	90	2.63	.988	.104
	2.00 No/Don't know	31	2.90	1.248	.224
Q30.6 Inhibitor – lack of trust	1.00 Yes	90	1.82	.978	.103
	2.00 No/Don't know	31	2.29	1.270	.228



**Table 6.24: The impact of inhibitors – Comparison between those doing business online vs those not doing business online - two sample hypothesis test (independent samples t-test and Mann-Whitney U test)**

Question	Assumption	Independent Samples Test									Mann-Whitney U test
		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
							Lower	Upper			
Q30.1 Inhibitor – lack of human resources	Equal variances assumed	.804	.372	-.455	119	.650	-.104	.229	-.559	.350	.864
	Equal variances not assumed			-.419	43.696	.677	-.104	.249	-.606	.397	
Q30.2 Inhibitor – lack of knowledge at managerial level	Equal variances assumed	.028	.866	-2.460	118	.015	-.556	.226	-1.003	-.108	.022
	Equal variances not assumed			-2.345	46.037	.023	-.556	.237	-1.033	-.079	
Q30.3 Inhibitor – lack of financial resources	Equal variances assumed	1.226	.271	-1.373	117	.172	-.371	.270	-.907	.164	.188
	Equal variances not assumed			-1.275	42.380	.209	-.371	.291	-.959	.216	
Q30.4 Inhibitor – poor security	Equal variances assumed	1.125	.291	-.362	117	.718	-.078	.216	-.507	.350	.871
	Equal variances not assumed			-.339	44.902	.736	-.078	.231	-.544	.387	
Q30.5 Inhibitor – high cost of technology	Equal variances assumed	1.129	.290	-1.223	119	.224	-.270	.221	-.707	.167	.257
	Equal variances not assumed			-1.092	43.673	.281	-.270	.247	-.768	.228	
Q30.6 Inhibitor – lack of trust	Equal variances assumed	5.292	.023	-2.122	119	.036	-.468	.221	-.905	-.031	.075
	Equal variances not assumed			-1.870	42.909	.068	-.468	.250	-.973	.037	

Factors influencing the introduction of Internet technology are examined in Table 6.24 which presents the results of a series of hypothesis tests comparing those perceiving themselves doing business online with those not perceiving themselves to do so. In each case a parametric independent sample t-test and nonparametric Mann Whitney U-test were performed. There is some evidence of differences between the two groups in changes related to lack of knowledge at managerial level ( $p=0.015$ ). This finding was backed up by the results of non-parametric Mann-Whitney U test.

#### 6.1.2.5 Crosstabulation Q23 vs. Q24

Q23: "How important are each of the following factors in the decision to introduce the Internet technology in your organisation"? The answers were on 5-point Likert scale from 'Not at all' to Extremely important'

Q24: "What changes did you notice in your organisation after introducing Internet technology"?

For both questions the answers were on 5-point Likert scale from 'Strongly disagree' to 'Strongly agree'.



Q23 examined 10 factors influencing the decision to introduce “Internet technology” and offered a 5-point Likert scale of responses as to the importance of these factors from “Not at all” to being “Extremely important” (Table 6.25).

**Table 6.25: Summary of crosstabulations between Q23 and Q24**

Questions	Cases (n=135)		Chi-Square Test		
	Valid		Value	df	Asymp.sig. (2-sided)
	n	Percentage			
To be more competitive * Became more competitive	107	79.3%	25.168	2	.000
To provide better service to customers * Improved customer service	107	79.3%	4.593	2	.101
To improve relationship with suppliers * Improved relationship with suppliers	105	77.8%	21.237	2	.000
To reduce cost * Reduced cost	105	77.8%	9.469	2	.009
To reduce bureaucracy * Reduced bureaucracy	106	78.5%	26.472	2	.000
To streamline information flow * Streamlined information flow	103	76.3%	30.371	2	.000
To be more efficient * Became more efficient	106	78.5%	37.636	2	.000
To increase turnover * Increased turnover	104	77.0%	21.895	2	.000
To improve quality * Improved quality	105	77.8%	21.646	2	.000

This question is linked with its successor Q24 which examines the changes observed in the organisation after the introduction of “Internet technologies”. The recoding was performed for all 10 sets of responses in Q23 to reduce the problem of low count in some cells when calculating crosstabulations. This was done by reducing the five groups of responses to the following two groups: “Not at all/A little” and “Moderately/Very much/Extremely”. The changes in companies were as expected and as illustrated in Table 6.25, with the exception of improved customer service where there was no evidence of a difference. Overall, the table demonstrates that the introduction of Internet technology in general produced the desired outcomes in the majority of examined cases.

## 6.2 Comparing means between Q25 and Q26

Q25: “Can you indicate how important were the following in your organisation before the Internet introduction?”

(1) R&D; (2) Product; (3) Marketing/Sales; (4) Service/Customers; (5) Company’s ICT; (6) HR



Q26: "Can you indicate how important are the following in your organisation after you introduced the Internet technology?"

(1) R&D; (2) Product; (3) Marketing/Sales; (4) Service/Customers; (5) Company's ICT; (6) HR

The paired sample t-test compares the means of two variables. It calculates the difference between the two variables for each case, and tests to see if the average difference is significantly different from zero, with zero meaning that there is no significant difference between the means of two variables. This test paired answers to Questions 25 and 26 using SPSS which performed three types of calculations to compare means: (1) Paired sample t-test statistics, (2) Paired samples correlation and (3) Paired sample t-test.

### 6.2.1 Paired sample t-test descriptive statistics

Table 6.26 first presents the descriptive statistics for the two variables. The issue was how important were: R&D, product, marketing, customer service, company's ICT and human resources to the owners/managers, before and after the introduction of the Internet. For interpreting data in this table, the following mapping method was used:

For pre-test questions: 1=The least important to 5=The most important

For post-test questions: 1=Not at all important to 5=Extremely important

**Table 6.26: Paired samples statistics**

		Mean	n	Std. deviation	Std. error mean
Pair 1	R&D before	2.71	104	1.290	.126
	R&D after	3.23	104	1.309	.128
Pair 2	Product before	3.78	102	1.149	.114
	Product after	3.66	102	1.286	.127
Pair 3	Marketing before	3.60	106	.963	.094
	Marketing after	4.11	106	.876	.085
Pair 4	Customer service before	4.24	105	.986	.096
	Customer service after	4.50	105	.748	.073
Pair 5	ICT before	3.13	105	1.010	.099
	ICT after	3.83	105	1.078	.105
Pair 6	HR before	3.11	104	1.165	.114
	HR after	3.31	104	1.183	.116

The table shows that the mean values of all answers are generally greater than mean of 3, with R&D before the introduction of the Internet being the only exception. Based on this sample, the most important aspects were marketing and customer service, and the least important was R&D.



## 6.2.2 Paired sample t-test – changes and Wilcoxon signed rank test

The aim of the paired sample T-test and Wilcoxon signed rank test is to check if there is a significant change in the perception of importance before and after the introduction of the Internet. This is presented in Table 6.28.

**Table 6.27: Summary of the results of a series of paired hypothesis tests comparing the importance before and after the introduction of Internet technology**

Factor	Correlations			Paired Differences – Paired t-test							Wilcoxon signed rank tests	
	n	r	Sig.	Mean	sd	se	95% CI of the Difference		t	df	Sig. (2-tailed)	Sig. (2-tailed)
							Lower	Upper				
R&D	104	.759	.000	.519	.903	.089	.695	.344	5.865	103	.000	.000
Product	102	.673	.000	.127	.992	.098	.067	.322	1.298	101	.197	.252
Marketing/sales	106	.471	.000	.509	.949	.092	.692	.327	5.529	105	.000	.000
Service/customer	105	.539	.000	.267	.858	.084	.433	.101	3.185	104	.002	.002
Company's ICT	105	.621	.000	.695	.911	.089	.871	.519	7.823	104	.000	.000
HR	104	.842	.000	.202	.659	.065	.330	.074	3.124	103	.002	.004

Table 6.27 presents the results of a series of paired hypothesis tests comparing the importance of various factors within the organisation before and after the introduction of Internet technology. In each case a null hypothesis of no change in average importance was tested against an alternative of some change. There was very strong evidence against the null hypothesis for R&D, Marketing/sales, Service/customer, Company's ICT and HR ( $p < 0.01$ ). In each case there was evidence of an increase in importance after the introduction of Internet technology. The exception was for Product where there was no evidence of a change in importance (average importance = 3.8). The non-parametric Wilcoxon signed rank test gave similar results.

## 6.3 Correlation

So far, questionnaire data analysis indicated that there were considerable changes in organisations after they introduced Internet technology. To investigate these changes further, a correlation was calculated between answers to various sub-questions in Q24 and Q26 which, in general, dealt with the effects of these changes *after* the introduction of Internet technology.



To establish the level of significance and the relationship between two variables, depending on the type of variable, Spearman's correlation ( $\rho$ ) for Q24 and Q26 were calculated on chosen samples. In both cases a value of zero shows no correlation and a value of 1 or  $-1$  shows a perfect correlation. The significance of the value obtained provides an indication of the accuracy of the relationship. Low values of  $\rho$  shows a poor correlation. Negative values indicate an inverse relationship.

### 6.3.1 Spearman's rho correlation for Q24 and Q26

Q24: "What changes did you notice in your organisation after introducing Internet technology"? Answers were on 5-point Likert scale from 'Strongly disagree' to 'Strongly agree'

Q26: "Can you indicate how important the following are in your organisation after you introduced internet technology? Answers were on 5-point Likert scale from 1 being 'Not at all important – 5 being 'Extremely important'

For Q24, correlations were calculated between all questions between Q24.2 and Q24.10, resulting in a  $9 \times 9$  matrix of 81 Spearman correlation results. Out of these, the three correlations with the highest correlation coefficients above 0.500 were picked out and are shown in Table 6.28. The t distribution was used to test if a correlation coefficient  $\rho$  between two variables is significantly different from zero. Thus, null hypothesis was formulated as follows:

$H_0: \rho = 0$  i.e. there is no correlation between the two variables.

**Table 6.28: Q24 – Spearman's rho correlation**

		Improved customer service	Became more efficient	The organisation became more competitive
Became more efficient	Correlation Coefficient	.560*		
	Sig. (2-tailed)	.000		
	n	107		
Increased turnover	Correlation Coefficient			.533*
	Sig. (2-tailed)			.000
	n			107
Streamlined information flow	Correlation Coefficient		.557*	
	Sig. (2-tailed)		.000	
	n		104	

\*. Correlation is significant at the 0.05 level (2-tailed).



Assuming the significance level of 0.05, for all three pairs, the significance values are lower than 0.05 which means that  $H_0$  can be rejected. Therefore, the calculated correlation coefficients are significantly different from zero and there is a positive linear relationship between the pairs of answers. This means that the way answers were given on noticing changes in having streamlined information flow are of value in explaining the variability of answers on noticing changes in becoming more efficient as well as improved customer service. There is a similar link between noticing changes in increased turnover and the organisation becoming more competitive.

For Q26, a 6×6 matrix with 36 correlations was calculated and there were no coefficients above 0.500. The highest Spearman's correlation coefficient was 0.494 and significant at the 0.05 level (2-tailed). This coefficient corresponded to the correlation between the importance of ICT and marketing after introducing Internet technology. As before, the null hypothesis has to be rejected which means that the calculated coefficient is significantly greater than zero and that the way answers were given on the importance of ICT after the introduction of the Internet are of value in explaining the variability of answers on the importance of the marketing.

## 6.4 Survey discussion

This section discusses the results of the survey presented so far in this chapter and synthesises them with the literature reviewed (Chapter 2) and exploratory study (Chapter 4). The results of the survey are also assessed in conjunction with the propositions outlined in Chapter 1 and 2:

$P_{1a,b,c}$ ,  $P_{2a}$ ,  $P_{4b}$ ,  $P_{5b}$ ,  $P_{6a,b,c,d}$ .

The intention for this survey was to test the proposed conceptual e-business model CATE-b discussed in Chapter 5, (Figure 5.1). For that reason, the discussion is organised around three elements of the proposed model. (1) *Element one*: SMEs internal structure and strategies; (2) *Element two*: SMEs external business environment; and (3) *Element three*: SMEs' e-business model integration. The third element of the model is discussed in the order of its four stages of integration. *Stage one*: Basic IT infrastructure, *Stage two*: Changing strategies in SMEs, *Stage three*: Internal integration of SMEs; and *Stage four*: External and full integration of SMEs. At the end of the chapter the summary of the survey will be provided.

### 6.4.1 Element one: SMEs' internal structure and strategies – Traditional approach

The starting point in the creation of a conceptual CATE-b e-business model was recognition of the traditional approach to competitive advantage in UK SMEs (Chapter 2) and their horizontal

organisational structure in which the role of the owner/manager plays an important part (Das, 1994; De Toni and Nassimbeni, 2001; Jennings and Beaver, 1998; Knight, 2000; Schindehutte and Morris, 2001; Venkataraman and Van de Ven, 1998). It is believed that these entrepreneurial attitudes have great influence on determining firms' culture, strategic directions and core focus (Fröhlich and Pichler, 1998; Van Gelderen and Frese, 1998) and in return form the basis for creating the competitive advantage through innovation, quality, efficiency or customer responsiveness.

Building upon that belief, the survey identified that the core business focus in sampled SMEs is indeed in quality, efficiency and customer responsiveness (see Figure 6.1). This in return supports element one of CATE-b model which underpins SMEs' traditional approach to creating competitive advantage based on Porter's generic strategy (Porter, 1979, 1980, 1985). Element one also includes SMEs' distinctive features based on firms' resources and capabilities which were identified as critical and affecting long-term strategies and superiority in the way of firms investing in more advanced IT and Internet technology (Chapter 2). Therefore, proposition  $P_1$  was tested and the results are presented in Table 6.29.

**Table 6.29: Testing of  $P_1$  proposition**

<b><math>P_1</math> proposition</b>	<b>Test</b>	<b>Outcome</b>
<b><math>P_{1a}</math></b> – Financial resources of owners/managers in SMEs is positively related to purchasing of more advanced IT and the Internet and as a result is affecting firms' superiority.	Fail to reject	No evidence of association
<b><math>P_{1b}</math></b> – Knowledge by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.	Reject	Evidence of association
<b><math>P_1</math> proposition</b>	<b>Test</b>	<b>Outcome</b>
<b><math>P_{1c}</math></b> – Skills by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.	Fail to reject	No evidence of association

The results of  $P_1$  can also be viewed in Table 6.21 of this chapter in which crosstabulation was performed between Q15 and Q30. The results show that  $P_{1a}$  and  $P_{1c}$  failed to be rejected as statistical results from the SPSS analysis provided no evidence of association between the implementation of IT and the Internet, and lack of skills or financial resources in sampled organisations. However,  $P_{1b}$  was rejected as the results from SPSS provided some evidence of relationship between knowledge at managerial level and implementation of IT and the Internet in sampled firms.

On the whole, there is an indication the survey that SMEs should keep their traditional organisational set-up at the beginning of the transition period as proposed in the CATE-b model. However, to enable superiority, firms should consider making changes in order to



improve managerial skills and financial resources. In turn, this would allow them to follow the rapid developments of IT and the Internet.

## 6.4.2 Element two: SMEs' external business environment

The second element of the conceptual CATE-b model was looking at SMEs' external business environment. As a part of that environment, two areas were included in the discussion: (1) The general response and attitude from sampled SMEs towards UK Government initiatives in which proposition  $P_{5a,b,c}$  was tested; (2) The investigation included scholars' general belief that lack of entrepreneurial ability in SMEs impacts on their perception of fast developments of IT and the Internet when dealing with forces from vertical competition (Jennings and Beaver, 1997; Jones, 2003). This discussion built upon Porter's Five Forces Model (Porter, 1979, 1980) which was used as a platform for development of the CATE-b model to acknowledge vertical and horizontal competition (Blili and Raymonds, 1993). As a response to that the proposition  $P_{4b}$  was tested.

Firstly, the survey findings identified that an overwhelming number of sampled SMEs did not take advantage of Government and non-governmental agency support (Figure 6.6). This is despite the vast investment of financial resources and initiatives on the part of the UK Government in the early 2000s (DTI, 2003). For many years it was evident that SMEs did not take advantage of (Jones and Tilley, 2003; Curran, 1999; Hankinson et al., 1997; Hankinson et al., 2000; Docherty and Simpson, 2003) or respond quickly enough to these initiatives (DTI, 2003, 2007). In addition, the number of SMEs who did use of Government and non Government agencies (such as BL, DTI, UK online, FSB) they found them very unhelpful (Table 6.12). The survey further identified that most of SMEs were not aware of these Government services (Figure 6.7). As a response to that the proposition  $P_{5b}$  was tested. The results are presented in Table 6.30.

**Table 6.30: Testing of  $P_{5b}$  proposition**

$P_5$ proposition	Test	Outcome
$H_{5b}$ – Lack of awareness of the Government initiatives related to the e-business advice is positively related to investment in more advanced IT and the Internet technology.	Fail to reject	No evidence of association

Although Figure 6.7 identified that 76% of surveyed companies were not aware or did not know about Government initiatives related to e-business, Table 6.30 shows that the  $P_{5b}$  failed to be rejected as there was no evidence of association for these claims.



Previous research also stressed that a special concern was with micro businesses (0–9 employees) as figures indicate that they were still a long way behind their larger counterparts with only 28% increase over the past five years (DTI, 2003; Dynamic Markets, 2007; NSO, 2007; and ONS, 2008). However, figures from this survey have shown that smaller businesses were more likely to seek Government support (Table 6.11).

Even though the UK Government is influential and plays an important role in the SMEs' external environment, the second key aspect that helps SMEs to be successful in their ever-changing environment is the possession of an entrepreneurial orientation. This is essential because it manifests SMEs' commitment to achieve their strategic objectives by a particular system of values, risk-seeking, and innovation. In return, entrepreneurial orientation may produce certain advantages because it is related to opportunity seeking or creation (Knight, 2000). These entrepreneurial opportunities are seen to be arising from the constant developments in IT and Internet technology and impacting on vertical competition ( $P_{4b}$ ). In order to estimate the correctness of the proposed element in the conceptual CATE-b model,  $P_{4b}$  was tested. The result is presented in Table 6.31.

**Table 6.31: Testing of  $P_{4b}$  proposition**

<b><math>P_4</math> proposition</b>	<b>Test</b>	<b>Outcome</b>
$P_{4b}$ – Ability of owners/managers to see opportunities arising from fast developments of IT and the Internet when dealing with forces from 'vertical' competition (bargaining power of suppliers and bargaining power of customers) is positively related to investment in more advanced IT and the Internet.	Reject	Evidence of association

The results in Table 6.31 show that there is evidence of the relationship between the entrepreneurial ability to perceive the opportunities arising from IT and the Internet and the forces from vertical competition. It is interesting to note that sampled SMEs are aware of the opportunities arising from fast developing IT and the Internet and it is the motivation for them to implement Internet technology in their organisation. However, Table 6.25 shows that while sampled companies have seen their relationship with suppliers improved after introducing the Internet in their companies, they noticed very few improvements in relationships with their customers.

On the whole, scholars argue that the external environment is partly manifested in small firm's inability to control the business environment at the micro level (Buzzell and Gale, 1987; Venkatraman and Van de Ven, 1998). In addition it is believed that the 21<sup>st</sup> century digital environment is not influencing SMEs towards the adaptation to this environment (Jennings and Beaver, 1997; Jones, 2003). In this study however, it is identified that sampled SMEs are generally motivated by the developments of IT and the Internet which resulted in  $P_{4b}$  being

rejected. The Government initiatives on the other hand, were not well received as many sampled SMEs were not aware of them. However,  $P_{5b}$  failed to be rejected as there was no evidence of association for that claim. In conclusion, the results from SPSS analysis show that the second element in the proposed conceptual CATE-b model is important for SMEs and that implementation of e-business as a core competence may bring some beneficial advantages to SMEs with or without Government assistance.

### 6.4.3 Element three: SMEs' e-business model CATE-b integration

The third element of the conceptual CATE-b model was looking at the integration strategy in which its four stages are discussed: (1) *Stage one*: Incorporate IT infrastructure; (2) *Stage two*: Changing business approach and strategies; (3) *Stage three*: Internal integration; (4) *Stage four*: External and full integration. Each stage is also used to present and discuss the test results of hypothesis  $P_6$ .

#### 6.4.3.1 Stage one: IT infrastructure

Implementation of an appropriate IT infrastructure was proposed as *Stage one* integration in the CATE-b model. This proposition was seen as a starting element of an e-business implementation strategy for SMEs. The proposition was based on studies of Feller (2000), Porter (2001) and Chaston (2004) and supported by an exploratory case study. This study indicated that companies who have high IT capabilities and more skilled employees were more likely to outperform others in terms of profit (Chapter 4).

The findings from this survey confirm those propositions since all SMEs surveyed have on-line facilities. However, the big difference between the usages of these facilities was identified. Most SMEs still have a basic IT infrastructure (Table 6.7) proposed as a starting point for CATE-b model in Appendix C and the most common form of communication remains e-mails and company websites (Table 6.6). The high level usage of e-mails and websites did not come as a surprise as the studies of Ramsey et al. (2003), Kula et al. (2003), Stone (2003), Yorkshire Forward (2006), DTI (2003), and DTI (2007) reported similar findings. However, this survey in conjunction with other studies indicates that an appropriate business model supporting the basic IT infrastructure could improve business for SMEs who still do not own a computer (DTI, 2007; Yorkshire Forward, 2007; UK Online 2008). This was tested in hypothesis  $H_{6a}$  and presented in Table 6.32.



**Table 6.32: Testing of P<sub>6a</sub> proposition**

P <sub>6</sub> proposition	Test	Outcome
P <sub>6a</sub> – IT and Internet infrastructure are positively related to a successful e-business strategy.	Fail to reject	No evidence of association

No statistical evidence was found that would suggest P<sub>6a</sub> was the true reflection of the situation in sampled SMEs. This is because all sampled firms use the Internet on a daily basis, however, at different levels. These findings provide some evidence which suggests SMEs have the potential to build upon their existing IT and the Internet infrastructure as proposed in the CATE-b model which is in line with findings of the DTI (2007), Yorkshire Forward (2007), and UK Online (2008).

The proposed CATE-b model, in addition, integrated primary and secondary activities from Porter's (1985) traditional value chain (Figure 2.4). In the traditional value chain primary activities concentrate on a manager's effectiveness when initiating R&D (Step 1), putting well-understood products (Step 2) on the market (Step 3) and offering service to buyers (Step 4). In contrast, supporting activities provide an input allowing primary activities to take place. They consist of material management, company infrastructure and human resources (Porter, 1985).

Since the development of Internet technology, many scholars (Venkatraman, 1994; Davidov and Malone, 1992; Brorson, 1998; Durkin and McGowan, 2001a; Fahy and Hooley, 2002) supported the need for the classical value chain to be reversed (Figure 2.5). As the development of the CATE-b model was influenced by these recommendations this was tested in the survey. The study identified that before the Internet introduction R&D (Step 1) was not of a great importance to SME owners/managers (Table 6.13). However, the importance slightly increased after the introduction of Internet facilities (Table 6.13). Given that findings from the survey are inconclusive the proposition for traditional value chain to be reversed cannot be supported. Quite the opposite, the survey findings actually indicate that the value chain should keep all their initial primary activities in the same order. However, it is suggested that IT and the Internet infrastructure should be added to an initial first step (Step 1) which would increase the number of value chain steps from four to five. Other findings in the survey identify that respondents rated their product development (Step 2) highly before the introduction of the Internet (Table 6.10) which supports O'Brien (1998) study of new product development as a value creation for SMEs.

Furthermore, marketing (Step 3) and customer service (Step 4) were highly supported by surveyed SMEs (Table 6.8). This was not surprising considering marketing and customer responsiveness have been recognised for a long time as a means of value creation in SMEs (Freel, 2000; Hoffman and Novak 1996; Verity and Hof, 1994; Simpson et al., 2006). However,



the results suggest that the difference between the mean values of answers before and after the Internet introduction is significantly different than zero (Table 6.27).

Overall, the majority of respondents in this survey identified their core businesses to be in quality, efficiency and customer responsiveness (Figure 6.1). Not only does this support element one of the CATE-b model, but also it suggests that SMEs should place their core values first in the value chain and not last, as proposed by Kalakota and Robinson (2004), and support these core values with Internet technology. This, indeed, needs to be addressed at the development of a new e-business model in Chapter 8.

#### 6.4.3.2 Stage two: Changing strategies

This survey also investigated the impact of the Internet on organisation's information flow, the level of bureaucracy, skills of the human resource and knowledge at managerial level. This was because the CATE-b model proposes the second stage of integration to be of changing business strategies and organisational structure (Kalakota and Robinson, 2001). At this stage a company accepts that Internet technology becomes an integral part of business operation and the value chain is reversed. However, the company's core values would not need to change, but only be supported by the Internet technology (as it was recognised and acknowledged at stage two, in Figure 5.3). This was seen as an important element of sustaining value creation by an organisation in the future. In this approach a company needs to have a clear focus on the development for three to five years in advance. This is because ICT and the Internet have the potential to dramatically influence and enhance coordination and control activities throughout the firm (Grant, 1998). This would consequently improve organisational information flow and reduce bureaucracy (Scot Morton, 1991). However, some studies identified that the decision-making process in SMEs is intuitive, rather than based on detailed planning and exhaustive studies (Baker et al., 1993; Reynolds et al., 1994; Bunker and MacGregor, 2000).

In contrast, the survey findings demonstrate that more than half of the sampled SMEs did have strategic plans for the future of IT in their companies. Approximately 58% of respondents claimed to have an IT budget (Table 6.4). However, disappointing figures were detected in the area of an e-business budget as it exists in only 27% of surveyed cases. It can be suggested that if SMEs are to be more successful in their IT integration they would need to rethink their strategies again and invest in their IT and e-business budgets more (Scot Morton, 1991; Kalakota and Robinson, 2001). In particular, the Internet demonstrated improvements in all areas of SME business that were tested in this survey (Table 6.9). However, when these findings were tested via two-sample hypothesis tests (Independent sample t-test and Mann-Whitney U

test) it was implied that doing business online may indeed impact on the reduction of bureaucracy and has potential to increase firms' turnover and quality.

Although many positive changes were noticed by the sampled SMEs the main use of the Internet still remains e-mail at 84%. These findings also in line with earlier studies (Walczuch et al., 2000; Dennis, 2000; MacGregor and Bunker, 1996; Poon and Swatman, 1999; Yorkshire Forward, 2006) in which scholars argue that SMEs were more reluctant to spend on more advanced IT and the Internet and therefore had a more limited use of technology.

Planning budgets are not the only investment SMEs need to consider. Investments in IT need to be accompanied by a corresponding emphasis on human resources because control and coordination of information flow translates into influencing individual behaviour. Human resources are considered by many as a central element in the making of new forms of organisations (Ghoshal and Barlett, 1988; Whittington and Mayer, 1997; Gunasekaran et al., 2001), and more generally, one of the most important determinants of sustainable competitive advantage (Grant, 1996a, 1996b).

This survey also identified that there were variations in answers that identified factors affecting implementation of the Internet in sampled SMEs (Table 6.13). To have a more inclusive representation of these answers crosstabulation (Table 6.20 and Table 6.21) were performed and identified that there may be evidence of association between doing business on line and lack of knowledge at managerial level. These findings were backed up with independent sample t-test and Mann-Whitney U test (Table 6.24). A number of owners/managers from the sampled SMEs required no help at all or very little help at managerial levels (Table 6.13 and Figure 6.16). In theory, an emerging knowledge-based view of the firm (Grant, 1996a, 1996b) argues that where knowledge is embedded in the skills and tacit know-how of employees it constitutes a critical dimension of an organisation's competencies (Hall, 1992; Leonard-Barton, 1995). In practice, many scholars argue that a lack of skilled human resources and knowledge at managerial level (Martin and Matle, 2001; Barry and Milner, 2002; Taran, 2006; Kotey and Folker, 2007; Balestrin, 2008; Dibrell et al., 2008) frustrated many owners/managers of SMEs. Between the two, this survey indicates that sampled SMEs' human resources had a slightly higher level of required skills (Table 6.13 and Figure 6.16) than anticipated in earlier studies. However, these SMEs also agreed that their skills could be improved. This was presented in Table 6.20 which showed that there is some association between lack of knowledge at managerial level and performing business online. These findings are in line with theories of embedded skills and tacit knowledge of employees which ultimately have an impact on organisational performance and competence (Hall, 1992; Leonard-Barton, 1995). Investigation regarding the proposition P<sub>6b</sub>

was taken holistically and included results for information flow, bureaucracy, lack of skills and knowledge at managerial level. The findings are presented in Table 6.33.

**Table 6.33: Testing of  $P_{6b}$  proposition**

$P_6$ proposition	Test	Outcome
$P_{6b}$ – IT and the Internet infrastructure is positively related to changing business strategies	Fail to reject	No evidence of association

The discussion in this section identified many areas that are influential when looking at firms' strategies. Since no evidence of association was found in relation to changing business strategies and IT and the Internet infrastructure,  $P_{6b}$  failed to be rejected. Taken as a whole, this survey suggests that sampled SMEs should increase their IT and e-business budgets and creates an environment where skills and knowledge of human resources would continue to improve. The survey also suggests that SMEs strategies are dependent not only on the level of IT and the Internet use by the organisation but also on companies' resources and capabilities. Ultimately, this creates a good base for element two (Figure 5.3) of the proposed CATE-b model but provides a question mark for the stage two integration proposed in element three (Figure 5.4).

Overall, the survey identified that all sampled SMEs use IT and the Internet, but at different levels. Therefore, it can be suggested that stage two (Figure 5.4) is not required since the changes of organisational structure and strategies would occur during the implementation of element two (Figure 5.3) of the proposed CATE-b model. This is investigated further in Chapter 7 and 8.

#### 6.4.3.3 Stage three: Internal integration

In addition to the use of e-mails and websites, studies identified that the higher level of integration was required by SMEs owners/managers (Daniel et al., 2002; Ramsey et al., 2003; Xu et al., 2007). These studies support internal integration which is also *Stage three* of integration proposed in CATE-b model. The foundation for this integration was found in Cheng et al., (2001) who argue that the business goals need to focus on cost reduction and internal efficiency. The model was further underpinned by studies which claim that SMEs able to integrate were more successful and employed skilled and knowledgeable staff (Ghoshal and Barlett, 1988; Grant, 1996a, 1996b; Afuah and Tucci, 2001, 2003; Chaston, 2004; Lynn et al., 1999; Cheng et al., 2001).

Following the same direction, this survey also identified that SMEs were more likely to employ skilled and knowledgeable staff (Table 6.13 and Figure 6.16). It also implies that the core business of many SMEs is in quality, efficiency and customer responsiveness (Figure 6.1). This



was followed by the claim that companies' bureaucracy was reduced and turnover and quality was increased significantly after the introduction of Internet (Table 6.8 and Table 6.19).

The survey further identified that in terms of internal connection and communication only 18% of SMEs use the Intranet to manage projects, 36% use it for communication with employees, and further 30% use Intranet for the distribution of data and information internally. Overall, this accounts for around 30% of SMEs using Intranets as a tool for internal communication and project management. Nevertheless, the most popular use of the Internet (56%) was still via e-mail (Table 6.15). Therefore  $H_{6c}$  failed to be rejected as no evidence of association was found between firms' internal integration and the lack of IT and the Internet infrastructure (Table 6.34).

**Table 6.34: Testing of  $P_{6c}$  proposition**

$P_6$ proposition	Test	Outcome
$P_{6c}$ – IT and the Internet infrastructure is positively related to the internal integration of SMEs	Fail to reject	No evidence of association

Further internal integration would however, require higher investments in hardware and software resources (Appendix C) that would need to be justified by increased turnover. This survey shows that there was a potentially viable justification in that direction since most SMEs noticed the increase in turnover after the introduction of the Internet (Table 6.8). This was also confirmed in crosstabulation calculations (Table 6.19).

Overall figures that would support stage three's integration of the proposed conceptual CATE-b model show that SMEs were still in their infancy in regards to the internal integration. However, the 30% of internally integrated SMEs provided a glimmer of hope and suggested that companies were going in the right direction and that most SMEs experienced noticeable improvements in their efficiency.

#### 6.4.3.4 Stage four: External and full integration

Final tests in the survey were conducted in the area of full integration and were proposed in the CATE-b model as *Stage four* (Figure 5.4). This final and full integration consists of free information flow between suppliers and customers. The ultimate goal for organisations would be to create market value and competitive advantage through Internet technology. Many scholars support full integration and many believe that SMEs could create competitive advantage via e-business operations (Van Hooft and Stegwee, 2001; DTI, 2000; Lynn et al., 1999; Seybold and Marshak, 1998; Chaston, 2004; Porter, 2001; Venkatraman, 1994, Kalakota and Robinson, 2001; Fahy and Hooley, 2002; Afuah and Tucci, 2003). However these claims



have long been difficult to prove as a measurable example has yet to be found. The attempt to provide some measurable evidence in this area was made via proposition P<sub>6d</sub> the results of which are presented in Table 6.35.

**Table 6.35: Testing of P<sub>6d</sub> proposition**

P <sub>6</sub> proposition	Test	Outcome
P <sub>6d</sub> – IT and the Internet infrastructure is positively related to the external integration of SMEs.	Fail to reject	No evidence of association

Although evidence of no association was acknowledged in the H<sub>6d</sub> this survey identified that, although around 50% SMEs use e-commerce for sales and purchasing and around 30% use e-business for partial integration with suppliers (B2B) and customers (B2C), as shown in Table 6.6 and Table 6.7. Since this survey identified high improvements in SMEs' business processes (i.e. improved efficiency, increased turnover, improved quality, improved marketing and relationship with suppliers) it provides a good base for assumptions that e-business has a potential to create competitive advantage in SMEs, but more robust tests would need to be performed.

## 6.5 Survey summary

This survey identified several important factors that influence the usage of IT and the Internet in SMEs which will be summarised in this section. First of all, the survey began with an overview of statistical information related to the questionnaire journey. This was complemented by the fact that the online survey and information was stored on the server at the University of Sheffield. Furthermore, the survey recognised that the geographical location of firms reflected the data directories used for this study. For that reason most of responses were from the region of Yorkshire and Humberside (Chapter 3).

This survey identified that most SMEs focus on quality, customer responsiveness and efficiency. This is in line with the literature in which it was recognised that most SMEs create competitive advantage by serving niche markets, exploiting their small size and adapting quickly to market changes (Yoo, 1998).

The adoption of e-business technology in SMEs was examined further. While some SMEs assigned a low level of importance to e-business others preferred e-mail and websites. Overall findings identified that companies were using technology in various ways; however, e-mails and websites were still the most common ways of communication. This did not come as a surprise considering previous studies reported similar findings (Ramsey et al., 2003; Kula et al., 2003; Yorkshire Forward, 2006, DTI, 2003, 2007). It is interesting to note that no company was fully

integrated and therefore, there was no representative sample of an e-business organisation and the full integration that would support the fourth stage integration proposed in the CATE-b model. However, the positive outcome of the data sample demonstrated that some SMEs were using e-business. Therefore, this study shed light on the level of e-business usage and identifies that SMEs were using e-business to some extent for their operational use.

It is evident that this study confirms findings previously reported by other researchers that SMEs use technology primarily to send e-mails and have websites for marketing and promotional purposes (Ramsey et al., 2003; Stone, 2003). However, this study also identified some higher levels of Internet usage in SMEs which are in line with other scholars (Daniel et al., 2002; Ramsey et al., 2003; Xu et al., 2007). On that basis it is possible to make an assumption that e-business technology could potentially make a difference if companies invest in the high-level IT proposed in the CATE-b model - *Stage one* integration.

Furthermore, this survey also recognised that the purpose of using e-business was to become more competitive, to improve relationship with customers, to reduce costs, become more efficient and to improve quality of products and services. All SMEs noticed a high level of changes which reflected on the original reasons why they introduced the technology. This survey also illustrates that those SMEs who use e-commerce and e-business technology normally create competitive advantage for their businesses in comparison to those who do not. Researchers in this area argue that technology in SMEs were primarily used as an additional marketing tool to display a company's products and services as information rather than as a platform for e-commerce and e-business which would in turn enable online transactions and organisational transformation. In contrast, the survey findings predict that it may be possible to create competitive advantage in SMEs by using e-business technology.

Finally, this survey's findings highlighted that those SMEs who take advantage of the resources offered by the UK Government and have the right attitude towards investment in high-level technology could be market leaders in the 21<sup>st</sup> century. This is simply because e-business is perceived as an underlining necessity of the future. However, this study is not robust enough to provide more concrete evidence for creation of competitive advantage through e-business.



# Chapter 7

## 7 Longitudinal case study analysis

This chapter presents the results, findings and analysis of the longitudinal case study. The process began in 2004 as an exploratory study in which nine interviews with owners/managers were carried out (Chapter 4). To establish the changes in these organisations over a period of five years, companies were revisited in 2009. The purpose of this work was to: (1) verify findings from the national survey; (2) analyse data collected in interviews; (3) test the conceptual e-business model proposed in Chapter 5; and (4) propose a new e-business model based on the theory collected from the literature reviewed, national survey and longitudinal case studies.

The longitudinal case study provided a level of understanding of SMEs' behaviour over the period of five years, their adaptability to the new economic demands and the possibility of creating competitive advantage by using e-business. The evidence in this study was gathered via interviews with company managers as well as examining companies' websites. This approach strengthened the survey (Chapter 6) and provided additional data for the development of a new e-business model. This was over and above what would have been achieved if the survey technique was used on its own (Yin, 2003).

In this longitudinal case study analysis, a qualitative research approach was adopted. This research was based on multiple case study methodologies (Yin, 2003) in which semi-structured interviews were used to collect data from a chosen sample of SMEs. The opportunistic choice of companies was outlined and discussed in Chapter 3. Access to all companies was achieved via senior managers or owners who were all personally known to the researcher. The role of the researcher was to interpret events (Yin, 2003).

This study is divided into eight parts describing: (1) type of analysis performed; (2) findings presented using NVivo 8; (3) large enterprises – one case study; (4) medium-enterprises – one case study; (5) small enterprises – two case studies; (6) micro enterprises – five case studies; (7) discussion of all of the nine case studies; and (8) summary of the longitudinal case studies. The summary of and the reference to this longitudinal case study is presented in Table 7.1.

Table 7.1: Summary and comparison table for nine case studies

Case company	Gripple Ltd	SMP Europe	Sheffield Motor Company Ltd	Aleksandria Sciences Ltd	Moving Image Research Ltd	Lovebytes Ltd	Occidental Ltd	Toni & Guy Franchised	Cave Studios Ltd
Start of business/First computer	1988/1988	1967 & 1996/1978	1998/2001	1997/97	2002/2002	1994/94	1997 & 2000/1997	1996/1999	1979/1985
Sales turnover	£14.6 m N/A	£15m £26m	£1m	£40k £45-£50k	N/A	£200k £100k	£250k £950k	£700k £660k	£350k
No of employees	147 200+	249 250+	5 Closed	0 0	6 Closed	2 1	7 25	25 24	2 Closed
Industry sector/cycle	Manufacturing/introductory & growth	Automotive manufacturer/introductory & decline	Motor trade/Growth	Consultancy service/Growth	Technology/introductory-hi-tech	Art service/Growth Art service/Decline	Dentistry/Growth	Service – Hair dresser franchised/ Growth	Music – Service broker/Growth
Organisational structure	Flat	Flat	Flat	Flat	Hierarchical	Flat	Flat	Hierarchical	Flat
Growth rate	High – entering new markets all the time	Medium	Low	Low	New start-up company	Medium Low	Medium	High Medium	Medium
Markets	Global	Global	UK	Global	Global	UK	UK	UK	Global
IT infrastructure	High	High	Low	Low Low	High	Medium Low	Low High	Low Medium	Medium
Integration	Medium-High High	Law-Medium	Low	Low	Medium-High	Low Low-Medium	Low Low-Medium	Low Low-Medium	Low
Core competence	Innovation	Innovation & copies Customer responsiveness & Quality	Customer responsiveness	Customer responsiveness	Innovation	Customer responsiveness Differentiation	Customer responsiveness Innovation & Quality	Customer responsiveness Customer responsiveness & Quality	Customer responsiveness
R&D/Vision of the future	High/High	Med/High Low	Low/Low	Low/Low	None/High	Med/Med None	None/Med None	Low/Med None	Low/Low
Use of Government help	High	Low	Low	Low None	Low	Low None	Low None	Low None	Low
IT experience	Positive	Positive	Positive	Positive	Positive	Positive	Negative Positive	Positive	Positive



Table 7.1 presents important information related to all of the nine case studies. It needs to be noted that the columns highlighted in blue correspond to the micro companies which stopped trading in the past five years. This will be examined in more details in section 7.2.

## 7.1 Introduction to NVivo 8 analysis

In this section the data gathered are analysed using a variety of techniques offered by NVivo 8. The software enhanced analysis and enabled coding of non-numerical and unstructured data collected in interviews. The software allowed sorting of text and examined to some extent relationships in the data. Table 7.2 presents NVivo components used in this research.

**Table 7.2: NVivo components used in longitudinal study**

Component	Description
Sources	<b>Internals:</b> Primary source material transcribed from audio interviews was used.
Nodes	<b>Free Nodes:</b> Two types of coding were used: 'stand-alone' nodes which have no clear logical connection and other nodes which do not easily fit into a hierarchical structure. <b>Cases:</b> Coding based on a number of attributes for each node was created.
Queries	<b>Queries:</b> enabled the interrogation of the data, finding patterns and pursuing ideas gathered in interviews.
Classifications	<b>Cases:</b> allowed the setting up of attributes for each source. <b>Relationship:</b> setting up relationship types.

The primary information in this analysis was gathered in interviews conducted in nine organisations. NVivo classified these as 'Internal Sources' and allowed their automatic stand-alone coding as well as coding of nodes that could not easily fit into the hierarchical structure. Overall, nine cases were created, one for each organisation, and each case had 28 questions and answers. In addition, queries were used to interrogate the data gathered in interviews by identifying similar patterns between cases. Finally, attributes were assigned to cases, such as size of the organisation, importance of technology, integration of government initiatives, and success of the organisation. These attributes were based on general patterns and the researcher's interpretation of the data. Relationships between attributes and cases were then examined.

## 7.2 Case studies and their findings

The interviews with owners/managers of nine organisations took place in 2009. These interviews were recorded and transcribed. The data transcription is available in Appendix B. An NVivo screenshot showing an example of sources is presented in Figure 7.1.



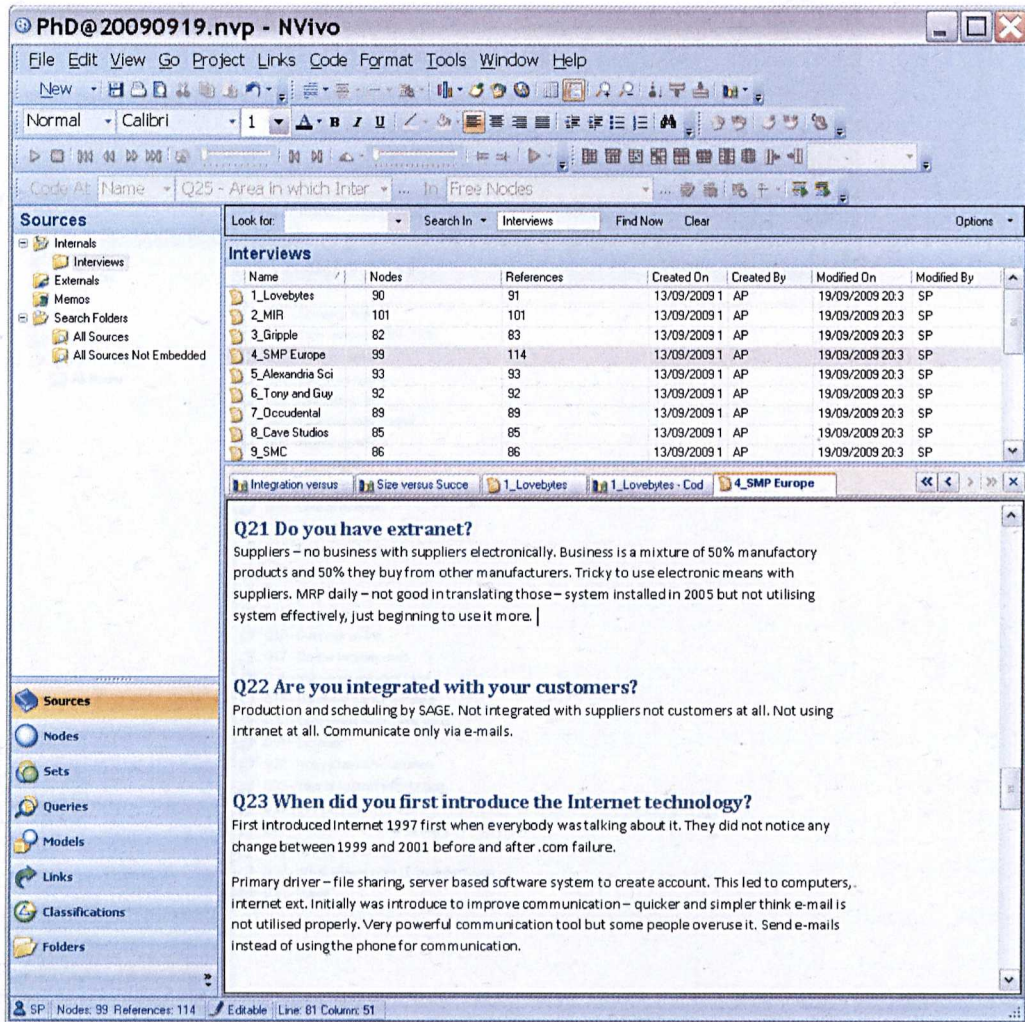
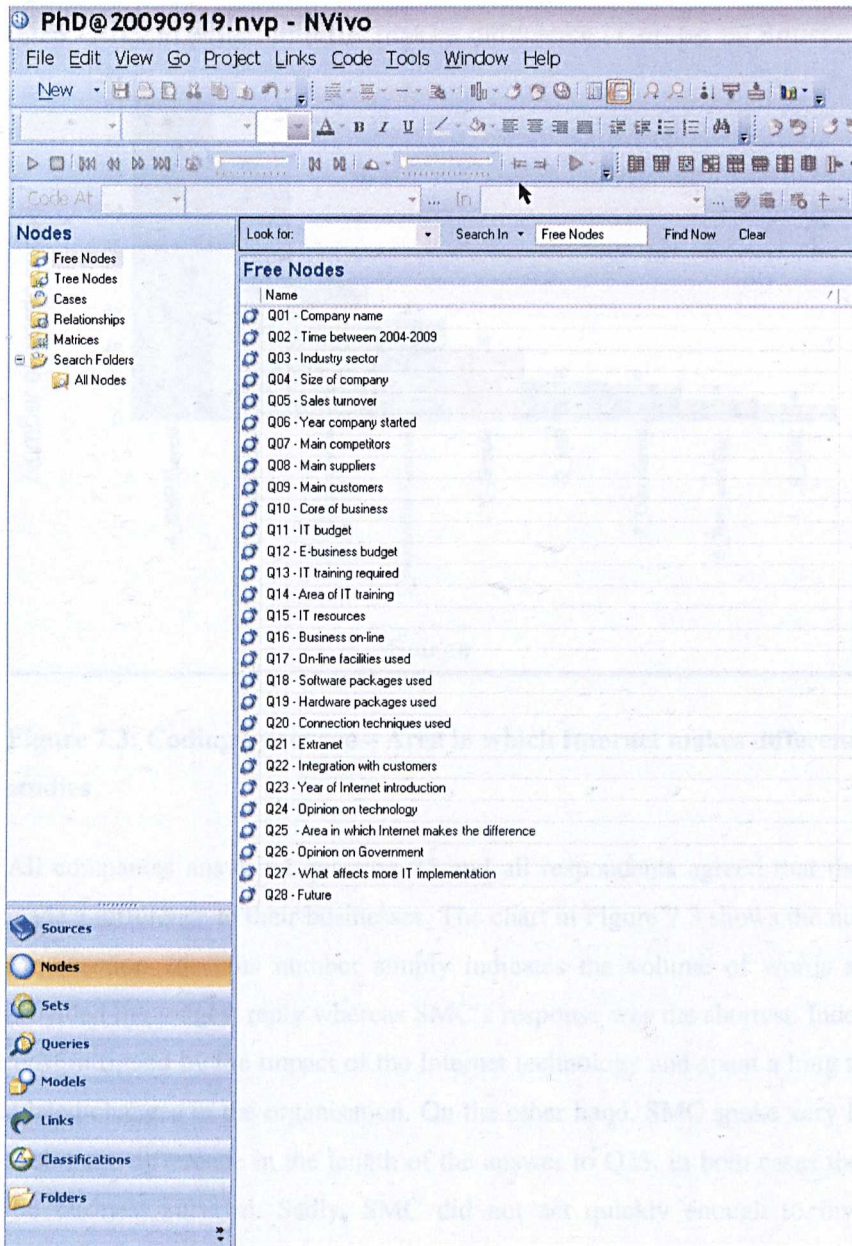


Figure 7.1: Sample screenshot of ‘Sources’ imported in NVivo

The sample screenshot presents sources (see navigation panel on the left in Figure 7.1) followed by cases in the list panel and sample question/answer in the detail panel on the right.

The 28 questions were coded as ‘Free Nodes’ a sample screenshot of which can be viewed in Figure 7.2.

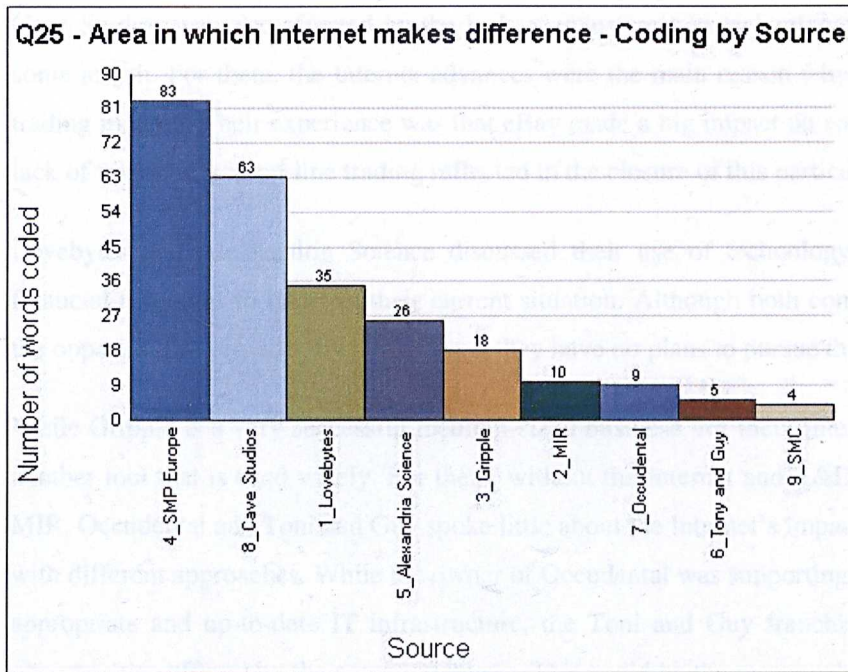




**Figure 7.2: Sample screenshot of 'Free Nodes'**

To make the length of questions more manageable in NVivo, a shorter version was created with a full version of manuscript available in Appendix B. In addition, charting of 'Free Nodes' is presented in Figure 7.3. Organisations were presented as 'Sources' and Question 25 (area in which Internet makes the difference - Figure 7.1) was selected as most suitable to measure how many words each company used to describe the difference the Internet made to them.





**Figure 7.3: Coding by source – Area in which Internet makes difference in nine case studies**

All companies answered question 25 and all respondents agreed that the Internet technology made a difference to their businesses. The chart in Figure 7.3 shows the number of words coded for question 25. This number simply indicates the volume of words spoken. SMP Europe provided the longest reply whereas SMC's response was the shortest. Indeed, SMP Europe was most intrigued by the impact of the Internet technology and spent a long time talking about the related changes in the organisation. On the other hand, SMC spoke very little about it. Despite such huge difference in the length of the answer to Q25, in both cases the Internet is linked to the business survival. Sadly, SMC did not act quickly enough to invest into the Internet technology and therefore the owner closed the business in 2008. SMP Europe, however, represents a much more successful story. The company realised the change was imminent and put some measures in place to improve not only the IT in the company but also the technology required in the production line. This change, however, came with the price and resulted in SMP Europe becoming the wholly-owned subsidiary of a large American firm. Although for many years SMP Europe invested heavily into their IT infrastructure, it was not utilised properly. The company's human resources lacked the knowledge, skills and enthusiasm required for taking advantage of the existing technology. As SMP Europe did not have a long-term plan towards improving human resources skills, they took the opportunity created by another company and became part of them.



Cave Studios was also affected by the lack of investment in technology and spoke about it in some length. For them, the Internet advances were the main reason why the company stopped trading in 2008. Their experience was that eBay made a big impact on small businesses and the lack of investment in on-line trading reflected in the closure of this particular micro business.

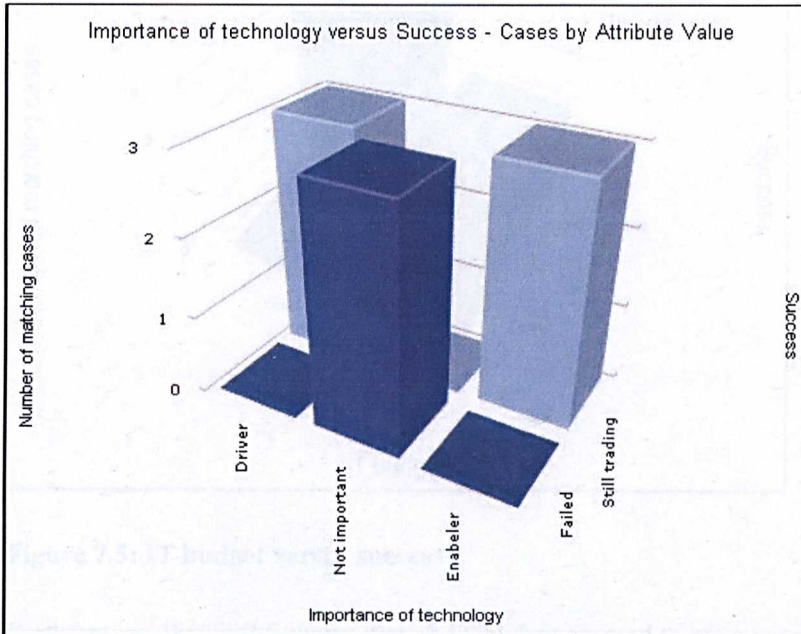
Lovebytes and Aleksandria Science discussed their use of technology, but neither had the financial resources to improve their current situation. Although both companies were aware of the opportunities provided by the Internet, they have no plans to pursue them.

While Gripple is a very successful medium-sized business, for them Internet technology is just another tool that is used wisely. For them, without the Internet and R&D, there is no business. MIR, Occidental and Toni and Guy spoke little about the Internet's impact on their business but with different approaches. While the owner of Occidental was supporting their business with an appropriate and up-to-date IT infrastructure, the Toni and Guy franchise was not taking the opportunities offered by the parent company. This could be the reason why Occidental was and still is growing in size and turnover, whereas Toni and Guy is less successful. The story of MIR was also an unsuccessful one and the company director spoke little about the topic. The company closed down in 2007. To date, the owner/manager believes that a hi-tech company such as theirs did not need to be more opportunistic in terms of the IT infrastructure.

Further analyses were conducted to explore what was the most influencing the success of the nine organisations. The following four areas were analysed:

1. Importance of Internet technology versus success was analysed since three out of nine companies stopped trading within the observed period. Attributes 'still trading' and 'failed' were assigned as measure of success to explore the impact of the technology on the business (Figure 7.4).
2. IT budget versus success was analysed for the same reason as the existence of an IT budget was considered as an indication of the utilisation of and commitment to Internet technology (Figure 7.5).
3. Integration (i.e. existence of the Intranet and/or Extranet) versus success was analysed as this was also considered as an indication of the utilisation and commitment to Internet technology (Figure 7.6).
4. Size versus success was analysed to explore whether the number of employees in the company affects the success in a manner similar to the effect of Internet technology (Figure 7.7).

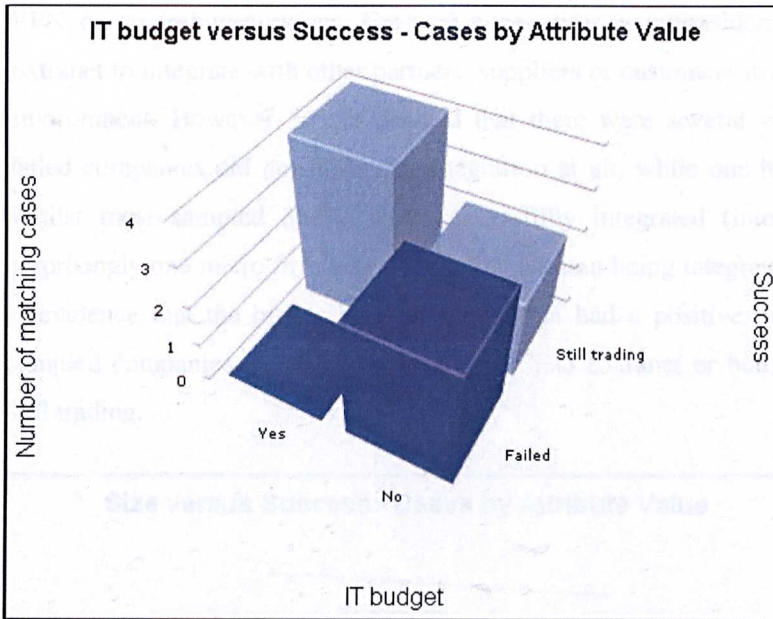
These four areas were seen as most important because they test the propositions listed in Chapter 2 as well as the need for a new e-business model CATE-b proposed in Chapter 5.



**Figure 7.4: Importance of technology versus success**

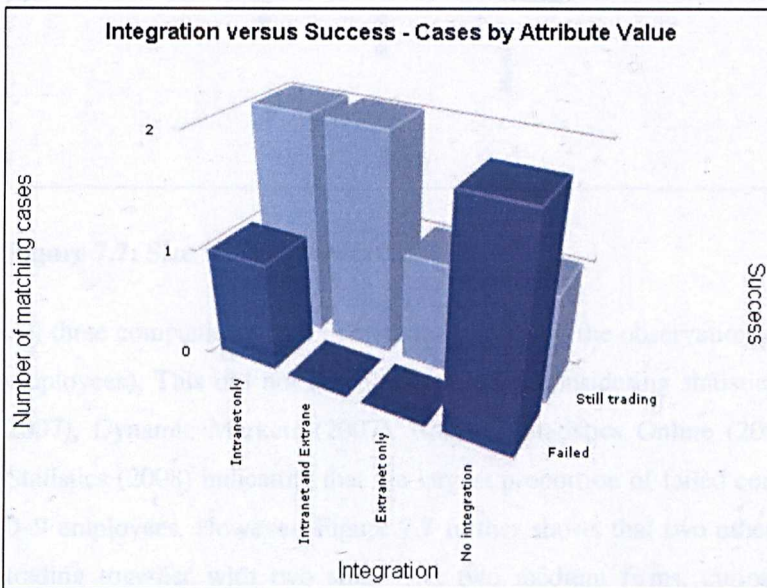
Regarding Figure 7.4, it was interesting to note that six of the organisations still successfully trading were using Internet technology either as an enabler or a driver, and the three firms which ceased trading thought the technology did not matter. In this context, the term ‘enabler’ is reserved for companies which use the technology as a necessity without being particularly enthusiastic about it as opposed to ‘drivers’ that actively encourage and promote the use of the technology. For instance, the owner/manager of SMC said back in 2004 “*We don’t need much of technology; it is too expensive and does not add any value to our business*”. In contrast the owner/manager of Toni and Guy thought “*We could do business without the Internet technology but we would like to get more out of it*”. This positive attitude had been driven by the owner who actively engaged in the Internet advances and is still successfully trading.





**Figure 7.5: IT budget versus success**

Furthermore, Figure 7.5 shows that an IT budget seemed to have varying impacts. For example, companies who had IT budget were more likely to be still trading, while companies who had no IT budget were more likely to fail. However, there were two exceptions to this as two micro companies (Lovebytes and Aleksandria Science) were still trading without having an IT budget.

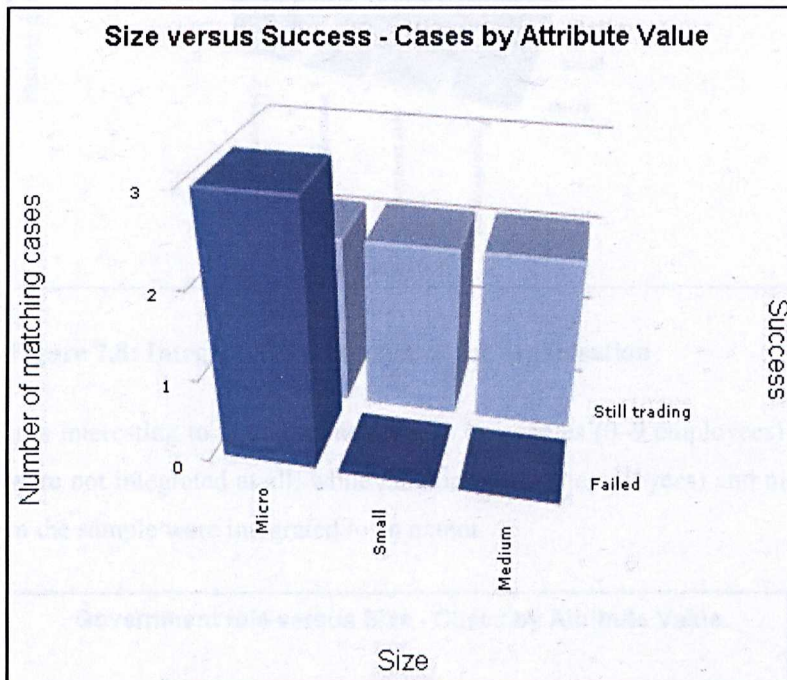


**Figure 7.6: Integration versus success**

Figure 7.6 shows that internal and external integration was also seen as an important factor when considering the success of sampled SMEs. Internal integration was considered as companies were using the Intranet to connect business processes inside the company, using a



VPN or an in-house server. External connection was considered for companies using the Extranet to integrate with other partners, suppliers or customers in a unique password-protected environment. However, it was noticed that there were several variations. For example, two failed companies did not have any integration at all, while one had internal integration only. Whilst most sampled SMEs were successfully integrated (internally, externally or both), surprisingly one micro firm was still trading without being integrated at all. It appears that there is evidence that the higher level of integration had a positive impact on the success of the sampled companies, as all companies which had Extranet or both Extranet and Intranet were still trading.



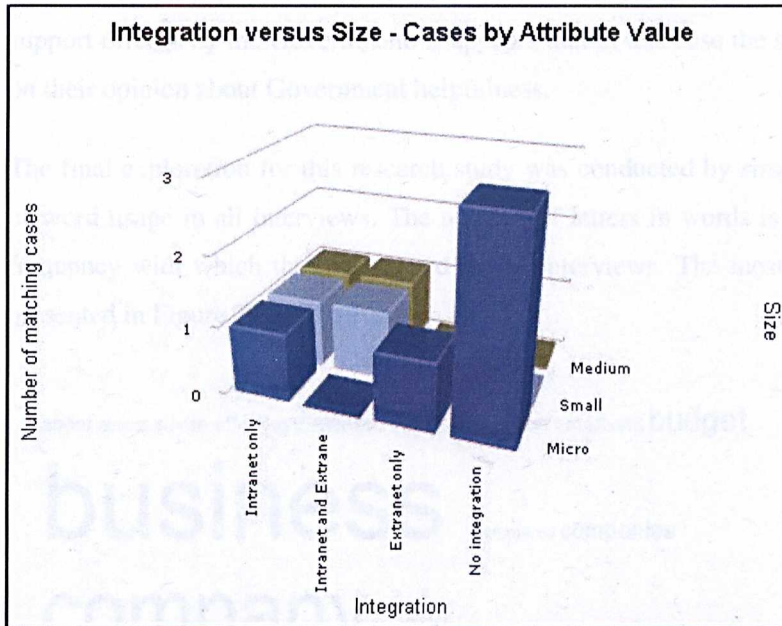
**Figure 7.7: Size versus success**

All three companies which ceased trading during the observation period were micro firms (0–9 employees). This did not come as a surprise considering statistical data from the DTI (2003, 2007), Dynamic Markets (2007), National Statistics Online (2007) and Office for National Statistics (2008) indicating that the largest proportion of failed companies were in the range of 0–9 employees. However, Figure 7.7 further shows that two other micro companies were still trading together with two small and two medium firms, curiously suggesting that on this occasion size does not matter.

In addition to those attributes, size of the organisation was further explored by integration versus size and the government influence versus size. The point of this was to investigate if there was any relationship between the size of organisation and the level of integration. This

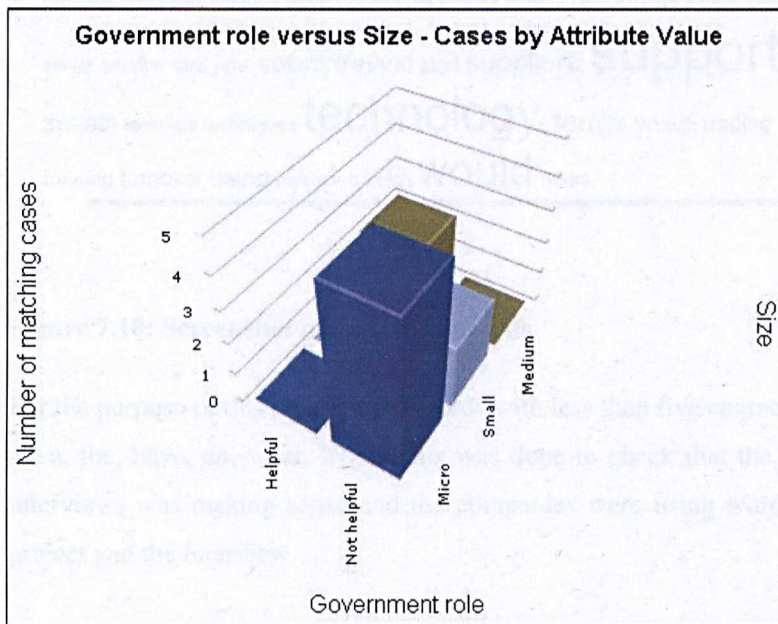


was followed by examining which organisations were more likely to take advantage of government help. These findings are presented in Figure 7.8 and Figure 7.9.



**Figure 7.8: Integration versus size of the organisation**

It is interesting to note that most micro companies (0–9 employees) were amongst those which were not integrated at all, while all small (10–49 employees) and medium companies (50–249) in the sample were integrated to an extent.

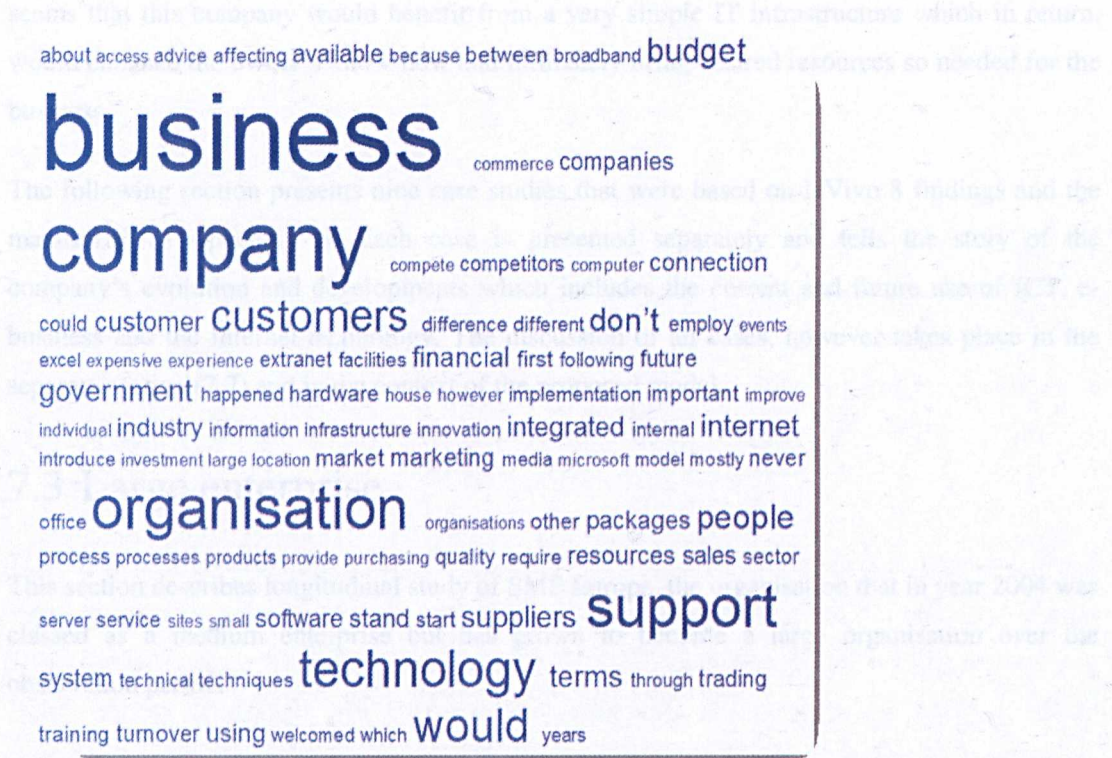


**Figure 7.9: Government role versus size of the organisation**



Figure 7.9 shows a clear polarisation between the sampled companies of varying size generated by the issue of Government helpfulness. All micro and small firms identified Government agencies as unhelpful, whereas both medium-sized companies were taking advantage of the support offered by the Government. It appears that in this case the size of the company impacts on their opinion about Government helpfulness.

The final exploration for this research study was conducted by simply analysing the frequency of word usage in all interviews. The number of letters in words is directly proportional to the frequency with which they were used in the interviews. The most frequently used words are presented in Figure 7.10.



**Figure 7.10: Screenshot of most used words**

For the purpose of this presentation words with less than five characters were not included (such as: a, the, have, an, what, why). This was done to check that the information received in the interviews was making sense and the companies were using words that were relevant to this project and the interview.

In summary, it is interesting to note that two micro companies were still performing despite the lack of IT infrastructure. Sampled SMEs were investigated and the pattern identified shows that one of the micro business (Lovebytes) had reduced in size and became even smaller during the



observation period. However, the company was using the Extranet to connect to the larger organisation (Art Gallery in Sheffield) via their Extranet. This was not by choice but rather the 'push down' strategy imposed by the larger partner. In addition this micro business uses social networking sites to support the business because it comes at no extra cost. Looking at these patterns, it is possible that technology is keeping this micro business trading. As a contrast, Aleksandria Science has been stagnating during the observation period. There was almost no improvement in the annual turnover and the size of company remained with zero employees. It appeared that what keeps this micro business alive was the owner's know-how. The specific scientific knowledge that is at the top of agenda for many governments around the globe and the owner's numerical skills, seem to be the reason for the survival of this business. However, it seems that this company would benefit from a very simple IT infrastructure which in return, would enhance the owner's know-how and ultimately bring desired resources so needed for the business.

The following section presents nine case studies that were based on NVivo 8 findings and the manuscript in Appendix B. Each case is presented separately and tells the story of the company's evolution and developments which includes the current and future use of ICT, e-business and the Internet technology. The discussion of all cases, however takes place in the separate section (7.7) and in the context of the proposed model.

## 7.3 Large enterprise

This section describes longitudinal study of SMP Europe, the organisation that in year 2004 was classed as a medium enterprise but has grown to become a large organisation over the observation period.

### 7.3.1 Case study1: SMP Europe Division

Standard Motor Products Europe Ltd (SMP) was, in 2004 when first interviewed, a Nottinghamshire-based motor vehicle parts manufacturing company. Its origins date back to 1967 when the company started trading. In 2004, SMP Europe Ltd employed 249 people and had an annual sales turnover of £15 million. SMP changed owners in 2007 and became a part of SMP Inc and is now called SMP EU Division. It is now the headquarters, distribution centre and corporate office for the European market.

For many years the company went from strength to strength and expanded gradually. However, in the early 1990s the business started to decline due to fact that the company's main products were copies of original vehicle parts. After that, the company went from winning to losing

rather quickly. The management of the company was poor, with low efficiency and high production costs. This was partially caused by the fact that the company ignored rapid advances in technology and they did not have the ability to generate new value through innovation. What is more, lack of investment in better technology and the declining stage of the industry life cycle (producing copies of original vehicle parts) forced the owner of the company into a joint venture with a firm in the USA called SMP Inc. However in the late 1990s the management of the company took back a controlling interest in the firm. This was because the owner of the company "*realised that their future is in innovation rather than in making copies of original parts*". As a result, the owner/manager made a decision to acquire another organisation, Carol Cable, a manufacturer in Wellingborough, with an innovative marketing approach. In 2002 they invested £1m in a new IT infrastructure, staff training, a new telephone system, a new Enterprise Resource Planning (ERP) system and a new customer database. However, due to a previously poor IT infrastructure and legacy systems, the company took 18 months to come back to where they started from before the upgrade.

In 2004, the company's ICT was much improved and it was successfully using e-mails and the website as means of communication, internally and externally. At that time "*the company's plans for the future were to engage more in e-commerce transactions that could maximise accessibility and speed*". Their ambitions were in e-business applications, with their willingness to learn from their mistakes and "*try to keep up with the rapid advances of the ICT and the Internet*".

Despite their ambitions, the company could not keep up with the technological advances and provide better training to their employees and in 2009 SMP Europe Ltd became SMP Europe Division and it is now a part of American SMP Inc. This is a large and leading independent manufacturer, distributor and marketer of replacement parts for motor vehicles in the automotive aftermarket industry, with an increasing focus on the original equipment and original equipment service market. The company, publicly trading on the New York Stock Exchange since 1977, offered SMP the only option as it became very difficult for managers to manage dichotomy in their business portfolio. For example, SMP was trading in the Middle Eastern market where "*business is completed and contract signed by a handshake while in Scandinavian countries – Denmark in particular – the use of the Internet technology is astonishingly high*".

Since joining American SMP Inc the company's annual turnover grew from £14m in 2004 to £26m in 2006. The company also grew in size since becoming wholly-owned by USA-based firm SMP Inc in 2007. Before the acquisition, and between 2004 and 2007 the company's ICT consisted of e-mails and the website. Investments in marketing and e-commerce were not

considered as necessary. Instead, the company focused their investments on MRP (Material Requirements Planning), EDI (Electronic Data Interchange), ERP (Enterprise Resource Planning) and SAGE database. Unfortunately, the management did not utilise these systems effectively. In addition, the company's management was cautious about investing any more of their financial resources in ICT as their business partners from the Middle East for example, "*considered a fax machine to be a hi-tech technology*". Those business partners and customers who were less demanding in terms of ICT created a barrier to the company in offering a more sophisticated ICT approach to technologically more advanced partners. In the end, although the company had a vision of employing better and more advanced ICT, in reality, they were only communicating via e-mail.

Since its merger with SMP Inc, the company became one of Europe's leading independent manufacturers and distributors of automotive components. With the wealth of new knowledge now shared between and within the company, SMP became uniquely positioned to provide components of the highest quality, designed to meet the high standards of the automotive industry. The company now thrives in the competitive worldwide market by responding quickly to their customers' needs and wants by developing new innovative products tailored to an ever changing market.

SMP has come a long way in the past five years. It grew from the company that in 2006 only used SAGE for production and scheduling with no integration with their business partners at all; to a company that has a complete vertical integration between suppliers and buyers. This is because the company now employs a lean manufacturing method with an absolute focus that eliminates waste to improve quality and keep the costs down. This is achieved by the robust VMI (Vendor Management Inventory) system, in which the logistic teams can see production through with five-day lead time. Thus, SMP is now fully integrated with the Intranet that makes company's communication quicker and more effective.

## 7.4 Medium-sized enterprise

In the initial interviews there were two medium-sized organisations. But, since SMP Europe became a large organisation this section describes longitudinal study of only one medium-sized organisation named Gripple Ltd. This is a successful manufacturing company based in Sheffield.



### 7.4.1 Case study 2: Gripple Ltd

Gripple Ltd is a Sheffield-based manufacturing company that in 2004 employed 147 people and had an annual turnover of £14.6m. Unfortunately, the exact new figures for turnover in 2009 were not available because the representative of the company chose not to participate in the second interview. However, it was possible to track the growth of the company in terms of employees through their website. In 2009 Gripple employs over 200 people and is still within an SME definition. The information that follows was collected through the company's website and was combined with the interview carried out in 2004.

The company seems to be working well and progressing well through these difficult economic times. Since the "Gripple" device was invented in 1988, Gripple Ltd has become a market leader producing wire joiners and tensioners, designed to suit a whole range of applications across the agricultural and construction industry. Right from the beginning, Gripple received numerous accolades for their originality and evolved in a true multi-award winning enterprise.

Since 2004, the company has gone from strength to strength. It is still strategically driven and highly innovative in applying latest manufacturing technology to new products. Over the years, innovation continued to be the foundation of the company's culture and new product development has remained the core of the company's successful operation. The company's growth was enabled by investing a considerable 20% of their revenue to further develop their products during the last three years. To create these innovative products Gripple employs open-minded people who can think outside the box.

Due to strategic and operational positioning, Gripple invested in technology right from the beginning in 1988. Now the company is using ERP, MRP and Just in Time (JIT) systems and has a strong Research and Development (R&D) department. In addition, marketing and customer orientation continue to be very important for developing new products. Overall, investments in the latest technologies, marketing products which solve people's problems and human resources are all reflected in Gripple's ability to become the driving force in the global market.

In 2004 Gripple was proud of its investment in "Loadhog". At the time that was a cutting edge re-usable device for securing boxes to a pallet instead of shrink wrap plastic. This was a direct contribution of collaboration between two business partners Loadhog Ltd and Gripple Ltd. This forward thinking strategy and investment in an overall IT infrastructure opened a wide global market to this company.

Since 2004, Gripple's international business has grown and the company's products were used in many countries around the globe. The company started its international expansion in France some 20 years ago, however, over the years it has started trading in other countries as well. To name a few, the company's devices are now used in the following countries:

1. UK – Swiss Re Tower in London;
2. France – New Airbus A380 in Toulouse and prestigious vineyards from Bordeaux to Languedoc;
3. Italy – Vivai Cooperativi Rauscedo – the biggest vines and rootstock producers in the world who use Gripple devices in its nurseries;
4. USA - New York Yankee Stadium, Dallas Cowboys Stadium, MGM in Las Vegas - the –largest building project in US history, Trump Towers in Chicago – the tallest all-concrete building in the USA;
5. Australia – The Dingo Fence – the world's longest fence and Gripple's biggest export market
6. Montenegro – Plantaze Vineyard in Podgorica
7. Moldova – Milestii Mici in Chisinau – is in the Guinness Book of Records for the largest wine collection in the world – 2m bottles and a network of cellars stretching over 200 km.

Safe transportation of the Gripple's devices is supported electronically by the Global Positioning System (GPS). This system provides reliable positioning, navigation, and timing services in which Gripple is able to track its products while on the move. Since using this free and open GPS signal, Gripple's work became more efficient, economical and accurate.

In terms of ICT, the company is still successfully using e-mails, as an efficient internal and external communication tool, a website, which positions them in the worldwide market, and e-commerce, where they are able to order and pay online and maximise accessibility and speed. Since 2004, Gripple has also expanded its use of ICT to e-business where the company is able to integrate electronically with other parts of its business worldwide by using the Intranet and externally with some suppliers by using an Extranet.

In 2004 the company was disadvantaged in the area of supply chain integration as other supplier companies were lacking the same enthusiasm about ICT investments and were preventing Gripple from full e-business integration. Since then Gripple's suppliers and business partner such as PMS, Morgan Technical Ceramics and Loadhog increased their ICT investments which created successful on-line transactions between firms. However, e-business is still in its infancy

and the company's managers still need to use a telephone and fax machine to make sure that final material orders and deliveries are taking place as planned. This improvement in the use of Extranet resulted in lower percentage of human errors compared with the past. What was previously lacking is now enabling business partners to develop a real appreciation of the power of the Internet. It can be suggested that although Gripple has created a solid foundation for the implementation of e-business the company is continuing to create competitive advantage via innovation. However, the ongoing investments in ICT and constant belief by the owner that the Internet can add to their competitiveness has driven the company into a driving position of creating an e-business platform that is utilised between partners and some suppliers. Only time will tell if the company's e-business strategy was a good investment.

## 7.5 Small-sized enterprises

This section describes longitudinal study of two small-sized organisations. The first case study presents the Toni and Guy franchise hairdresser salon from Sheffield, while the second case study presents Occidental Ltd, private and independent dentist surgery.

### 7.5.1 Case study 3: Toni and Guy

Toni and Guy is a franchised hair salon company from Sheffield. Although it does not fit completely into the definition of SMEs that was provided and explained in detail in Chapter 4, in terms of its size and operation it is run like an SME. Nevertheless, the information received by the owner and the company's development over a period of five years was just as valuable for this study as in other cases.

Parent company Toni and Guy USA is a large international fashion and style organisation whose business model is franchising. The company is constantly evolving artistically and commercially. For more than 45 years, Toni and Guy has combined its reputation for quality with the pursuit of cutting-edge modernity. The company also emphasises education, product development and training, and values the importance of developing and positioning the brand in the broader context of fashion and style. To facilitate this diversity in terms of product and service offer, the company specialises in IT support, salon design, salon supplies and financial services. Heavy investments in IT infrastructure and support enable the company to run the business successfully.

The first franchised Toni and Guy Salon opened in Sheffield in 1996. In 2004, the salon was employing 25 full time staff and had an annual turnover of £700k. Although, as a franchisee, the company has to comply with rules and regulations of the parent company because they are



legally bound to, they also have some freedom to decide how the company should be run and what seems to be an appropriate investment. Since Toni and Guy USA specialises in IT support, the Sheffield's salon had an opportunity to decide how much of that technology they would use as a tool to support their business. Throughout the interview in 2004 it was revealed that the investment in IT was minimal as money was tight. The owner partners at the time bought their first computer in 1999, at the peak of the dot.com hype and technology was developing rapidly. However, despite the business success, the owner's priority was in developing other parts of the business. This decision was based on the owner's belief that the business can run successfully without technology. So, in 2004 the company in Sheffield had a computer with a customer database in its infancy.

Since then, the company invested dramatically in their IT which at the moment consists of e-mail, a website, internal integration with the parent company, stock control and specialised software 'Salon Genius'. In the interview in 2009, the owner (now the sole owner) described how the business in the past five years had become stronger in comparison to other similar businesses in Sheffield. The main reason given for this being the higher usage of IT and the Internet that made the company more efficient, it reduced bureaucracy, impacted on company's marketing strategies and improved customer experience. There were mainly two reasons for the higher IT and Internet usage and investments; one being an enabler and imposed by the parent company, and the other being the driver and stemming from the owner's attitude towards the investment and usefulness of IT and the Internet. In the former case the company's strong IT infrastructure was pushed down on to their franchisees to follow the same path. In the later case the owner of the business realised the potential of the IT and the Internet in terms of their competitors in the same area. However, it is still up to the franchise to what extent the IT and the Internet would be used. The owner is still hesitant due *"to lack of training and knowledge of the IT system the company uses"*. The owner believes that *"building on his own confidence in the use of IT and the Internet would make him invest further into them"*.

Although at the moment Toni and Guy in Sheffield has no plans to invest into a long term e-business strategy their ad-hoc investments in a better e-mail system, an improved website, internal integration with the parent company, stock control, and specialised software 'Salon Genius' has made the difference to their business efficiency. If in the future the company chooses to engage in e-business there is an opportunity for them, for an additional monthly charge, to access the parent company's system. In return, this access provides maintenance, specialised training and any IT assistance the owner may require on a daily basis.

The potential e-business areas in which the owner sees opportunities in the future are online bookings, in-house server, e-mail server and purchasing. In addition, the owner's plan *"is to*

*expand the business to 5 salons in Sheffield and, eventually, sell the business and retire*". For that reason the company is constantly striving to improve the quality in customer relationship which would result in the growth and the expansion of business. Despite clear advantages created by the extensive use of IT and the Internet at the moment and positive changes in the owner's attitude towards technology in the past five years, it is still evident that any further investments in the creation of an e-business environment in the company would be initiated by the demand from customers, the owner's level of IT knowledge, and rules imposed by the parent company.

### 7.5.2 Case study 4: Occidental Ltd

Occidental Ltd is a dental surgery in Sheffield opened in October 2000. In 2004, the company had seven employees and an annual turnover of £250k. At the time of the first interview the business was going from strength to strength. In the early 2000s, dental industry was experiencing changes which were partly initiated by the Government's failure to integrate the National Health Service (NHS) through an advanced IT infrastructure investment (McCue, 2004). Due to this failure the owner believed that *"for the dental industry it was not important to have computers"*. However, the owner personally was much in favour of IT technology because of their own previous experience. Unfortunately, health and hygiene for patients were obstacles for much wider implementation of IT in the practice. This was because *"the staff constantly needed to change and remove protective gloves if they were to switch between their patients and the work required on computers"*. Not only was that expensive but also very impractical. Consequently, at the time of the first interview, Occidental was using computers only to process administration, book appointments, and keep a record of their growing number of patients through a Microsoft Access database. Since the owner of the practice was a strong supporter of IT, she believed that in the future and when the time is right, it would be possible to use more sophisticated technology in the practice. The owner's enthusiasm was stretching as far as to provide an *"opportunity for patients to book their own appointments on-line"* with an underlying interest in growing the practice and seizing opportunities when they come.

It was a great pleasure for the owner to reveal in the second interview that by 2009 much of her aspirations were fulfilled. *"The company grew from one practice to two separate outlets, one for NHS patients and one for private patients at two different locations in Sheffield"*. Furthermore, the company grew in terms of employees, from 7 to 25 full-time members of staff, and reached an annual turnover of £950k representing an increase of £700k over the previous five years. In addition, the company changed location and in 2007 moved into purpose-built premises which enabled the practice to act as a mini hospital in some areas of the business.

The second interview in 2009 also revealed that since 2004 there were two major changes in dental practice contracts. These changes, however, did not improve patient experience but only increased emergency appointments. This consequently impacted on the overall business performance which resulted in a reduced number of patients in the NHS part of the business while increasing the private part of the business. In the previous five years the company also grew its bank of patients and in 2009 the practice held a database with 3,000 patients. The owner, however, *“still maintains that the company is relatively small and employees know all their patients by name”*.

Over the five years the owner of the practice had invested substantially in the IT infrastructure. This was partly because of the owner's positive attitude towards IT, but also to maintain its competitiveness, the quality, efficiency and innovation of the business. The owner initiated *“these investments based on the changes in business environment caused by rapid developments of the Internet technology”*. This resulted in the practice buying software and hardware that costs £250 pcm. *“The system includes all maintenance, staff training, in-house server, e-mail server, wireless connection, Windows application, broadband, intranet and extranet. The company is doing B2B and is partially integrated with the NHS as well as internally connected between two practices. As a result of the company's internal integration, all employees have personal e-mail accounts and the company improved its communication process”*.

Overall, the five years, 2004–2009, have brought to Occidental practice many positive changes in terms of IT usage and performance. Internet technology and IT in general improved efficiency and, consequently, profitability. However, these changes are still seen as a financial burden. It is regarded as very expensive to run and is very demanding on the owner's personal time. This is mainly because of the Government's tentative idea to integrate the entire NHS. The Government's inability to complete the integration impacts on the dental industry in a negative way and affects the company's efficiency and communication, as well as creating more work and expense. Once everything is in place, the owner of the practice aspires to *“have a complete B2B integration with NHS and other practices that would protect patients as well as staff and improve Occidental's overall business performance”*.

## 7.6 Micro organisations

This section describes longitudinal studies of five micro-sized organisations. This includes an event organisation, Lovebytes Ltd from Sheffield, consulting firm Aleksandria Science Ltd based in Sheffield, software developing company Moving Image Research Ltd from Bristol, car dealership Sheffield Motor Company Ltd from Sheffield, and a recording studio Cave Studios Ltd based in Bristol. Each case study is presented separately.



### 7.6.1 Case study 5: Lovebytes Ltd

Lovebytes is a not-for-profit limited company in Sheffield that specialises in digital art and in staging various art festivals. The company works in conjunction with a local council with other partner organisations to deliver a wide range of events and activities. Lovebytes was established in 1994 to explore the creative and cultural potential of digital technologies and to encourage people in Sheffield and the UK to engage with global creative digital culture. Lovebytes has grown to become an important international platform for new work and new ideas. The organisation commissions and promotes experimental and innovative new work by both new and established artists, designers, technologists and creative developers. The core programme of performances, talks and workshops provides a platform for international artists and a meeting place for creative professionals and anyone interested in leading edge digital art and culture.

The first interview took place in 2004 with one of the co-owners. At that time the company was employing two full-time members of staff and had an annual turnover of £200k. The owner's experience of IT was very positive and the plans for the future were *"to take the company to the next level"*. However, as a non-profit organisation the firm was relying heavily on charities and the art and culture budgets run by local government. In 2004 the firm was operated from home and used personal computers. Apart from two full-time employees the company was also relying on outsourcing of both, human resources and equipment as well as any other technical support they may require. Their experience with the Government was of no value to them as they wanted to change their business strategies but did not know how and the information provided by the Government was not particularly useful. For them it would have been helpful if they could have *"some more information from the local council regarding the help to small businesses"*, but their experience was that *"the government never really listen what practitioners need and have to say"*.

During the interview in 2009 the owner of the business revealed that since 2004 the company became smaller. Due to the nature of the business and the general decline of the art industry the company now employs one person and has an annual turnover of £100k, meaning that it halved over the past five years. Although their business became smaller, *"the company is using the Internet technology more than ever"*. Even though the firm had not invested in IT infrastructure in the past five years the company is making most out of what they have, *"mainly using free of charge social networking sites"*. This is used to acquire the feedback from their customers with regard to the events the company stages and as a tool for marketing. In addition, to do this the company differentiates itself from others in the area. The firm provides a high quality service, brings high profile artists to the events and is trying to make Lovebytes a high profile brand name. The company is also highly innovative and experimental in terms of the service it

provides. Usually, the service industry is very customer responsive, but in the case of Lovebytes it is a different story. The company is not asking customers what they want, but instead the company prepare an event, invite the audience and later ask for the feedback. By doing this, the company's aim is to create the brand that people will recognise and want to use again.

People working for Lovebytes are "*all competent users of the Internet technology*". They use e-commerce (PayPal), have an on-line catalogue, website and e-mail, and are partially integrated with suppliers using B2B and Customer Relationship Management (CRM) with art galleries. To facilitate this communication process the company is using an Internet service provider which includes a private work station for the household from which the company operates.

The company's "*survival and future are very much related to the use of an appropriate Internet technology*". Although the owner of the firm is not able to inject new financial resources into the business he is taking the opportunity offered by art galleries which push down use of Extranet. In contrast to Lovebytes, the art galleries are "*very much customer responsive and marketing on line*" is seen as the "*biggest opportunity for this micro organisation*". Adequate and free use of YouTube, Twitter and Flickr could all add another dimension for Lovebytes because the use of such technology is demanded by customers in this industry. However, in order to accept these demands from customers the owner of the company would need to change the business strategy which at the moment is not customer oriented.

## 7.6.2 Case study 6: Aleksandria Science Ltd

Aleksandria Science is a micro organisation in which the owner runs the business as a sole trader. The business opened first time in 1997 and then again in 2002. As a trained nuclear physicist, the owner employed his knowledge and expertise in the business. The owner works as a freelance consultant and the job mainly focuses on providing the expert advice to large Scandinavian institutions with regard to nuclear waste. Since nuclear waste creates many controversies and is on the top of the agenda of many government departments it is surprising that this business has not been more successful. Instead the company has increased its annual turnover from £40k in 2004 to £45–50k in 2009. It is also surprising that the company still does not have a website and IT budget.

All this comes as a surprise because the owner of this company has considerable IT skills and is aware of all technological advances and opportunities the Internet opened for the company in the past five years. However, the owner argues that very limited financial resources are to blame for that. He is not prepared to reinvest any of his profit back into the business because he does not know how that would improve it. His attitude towards unnecessary investments is very pragmatic and he argued that "*one can do the calculations at the back of an envelope not*

*requiring a computer and the Internet for it*". Instead, the owner uses computer only for simple administrative purposes, accounts and research. Consequently, the owner does not seize opportunities to do more business by simply not engaging in opportunities created by the advances in technology and the Internet in the past five years. Therefore, despite the owner's intentions in 2004 to grow the business, the reality in 2009 is that this has not been achieved.

### 7.6.3 Case study 7: Moving Image Research Ltd

Moving Image Research (MIR) was a self-funded company in 2002. Its core business was a new bespoke product development that could save money in the film industry. The company specialised in the development of personalised software packages used to digitalise metres and metres of old films tapes still in archives of the film industry as well as to modernise new recording techniques. The company employed six people and had offices in the UK (Bristol and Windsor) and in the United States (Los Angeles and San Francisco). Moving Image Research was a new hi-tech start-up micro company in which all employees had very high technical skills and knowledge. The company was connected internally using Intranet facilities to enable the fast communication between offices and safe transfer of files. Since the company was self-funded and its strategy was innovation, the company's directors were very interested in funds that would enable them to complete the product they were developing. However, the Government IT funds available for SMEs did not include investments in R&D, but only purchase of computers and personnel's operating skills.

Unfortunately MIR ceased trading in 2007. Although the company owners were responding to changes in the environment in their specific industry, they did not focus enough to changes in IT and the development of Internet technology. The owners also lacked other skills and knowledge such as communication between partners and financial management, which included making investments without any returns. While the company originated from the Silicon Valley, the synonym for technologically successful businesses and the leading high-tech hub for businesses, it was very surprising to hear about its closure.

The highest number ever of employees in the company in 2004 company was 10. However, the company reduced the number of employees to two just before closing down. All the company's skills were concentrated in only one area, computer programming. For that reason the company's marketing and financial policies were overlooked or simply ignored. It is interesting to note that while the technology was the company's key business, the lack of its more generic usage in running the business was also one of the reasons for its failure.



### 7.6.4 Case study 8: Sheffield Motor Company Ltd

Sheffield Motor Company (SMC) was a micro car dealership business which started in 1998. For several years the business premises occupied a prime location in the city centre of Sheffield. When Sheffield city centre was scheduled for regeneration, the business came under the spotlight and was relocated in 2006 to a different and considerably less central part of Sheffield.

In 2004 SMC was a typical micro organisation, employing five people, run as a family business and had a healthy annual turnover of around £1m. At that time the level of IT support was minimal and the firm had two PCs and used Microsoft's Office – Word, Excel spreadsheets and Access database for accounts and administrative purposes. Computer skills of employees were low and the owner/manager was unaware of any Government support available for small businesses. In fact, the owner was not interested in what the Government had to say and in SMC all government-originated leaflets were treated as a junk mail.

Unfortunately, the business closed in 2008. The interview in 2009 revealed that there were mainly two reasons for its closure. Firstly, the recession caused the rapid decline in the demand for cars and therefore affected the business. The second reason for the closure was the lack of investments into the company's IT infrastructure. While the first reason was influenced by the global economic recession, the later was a direct consequence of the owner's inability to realise the importance of the IT and the power of the Internet technology for the business. At the same time the company's competitors were surviving the global economic recession with the effective use of technology. The owner's perception and belief was that these competitors were using the Internet technology to improve efficiency, customer responsiveness and to attract new customers via active marketing, all of which did not exist in SMC. Although it was not possible to distinguish the exact cause of the business's closure, on reflection, the owner was convinced that the lack of investments in the company's IT infrastructure were partly to blame. Yet, the realisation came too late and the business ceased trading in 2008.

### 7.6.5 Case study 9: Cave Studios Ltd

Cave Studios in Bristol first started in 1979 and was a very busy recording studio right up to the end in 1985 when it was forced to close due to a planning dispute related to the building from which the business was run. After several years, the owners were in a situation to re-open a new studio which became the Cave Studios in Bristol in 1989. All of the old and interesting equipment from the Cave came to the new studio along with a very extensive stock of old microphones.

In 2004, the company had two employees and the studio was run as a family business. At the time, it was interesting and quite disappointing to hear that the owner of the company did not want the business to grow. In addition, although the technology was on the rise, the owner's aim for the new studio was not to create a state-of-the-art digital/analogue studio, but one which could recapture many forgotten and time-honoured recording technologies. Over a period of four years the company was rebuilt and extended. The facilities were established as a centre of excellence unsurpassed by any other enterprise of its type in the area.

In the early 2000s, the studio's main income was coming from buying and selling over the Internet as the company was in a position to sell their goods online using e-commerce facilities. However, the owner had no intention of investing any more financial resources in additional IT facilities that would encourage growth of the business. In the interview, the manager mentioned that they were trying to seek some information from Government agencies in Bristol, but were unsuccessful. The Government representatives were both unhelpful and uninformed as their representative did not have the information the owner needed. On the other hand, their experience with on-line business was positive as it allowed them to be more efficient and reach the target markets they would not be able to via traditional channels. To maintain that efficiency and to reach a wider target market from 2004 onwards the speed of business transactions and access to information was the essence of success of the company.

Unfortunately in 2008 the Cave Studios closed down. In an on-line conversation in 2009 the manager revealed that their family owned business closed due to the divorce and the lost interest for the business. E-Bay, the company's main competitor was taking its toll as the owner failed to upgrade the technology behind the website and the company's e-mail capability. Without this technological upgrade the company was unable to compete in the marketplace.

## 7.7 Discussion of case studies

This section discusses the results presented so far in this chapter and aims to synthesise them with the literature reviewed in Chapter 2, exploratory study in Chapter 4 and the survey in Chapter 6. The results of the longitudinal case study are also assessed in conjunction with the propositions outlined in Chapters 1 and 2, P<sub>1a,b,c</sub>, P<sub>2a</sub>, P<sub>4b</sub>, P<sub>5b</sub> and P<sub>6a,b,c,d</sub>. Since this chapter is assessing the qualitative data gathered in interviews the propositions are discussed using assumptions labelled 'true' or 'inconclusive'.

The intention for this longitudinal case study was to test the proposed conceptual e-business model (Chapter 5) named CATE-b (Figure 5.1). To assure the consistency of the argument this chapter follows the same pattern established in Chapter 5. It contains the discussion of three

elements of the proposed conceptual CATE-b model: (1) *Element one*: SMEs internal structure and strategies; (2) *Element two*: SMEs external business environment; and (3) *Element three*: SMEs' e-business model integration. The third element of the conceptual e-business model is further discussed in order of its four stages of proposed integration. *Stage one*: Basic IT infrastructure; *Stage two*: Changing strategies in SMEs; *Stage three*: Internal integration of SMEs; and *Stage four*: External and full integration of SMEs. At the end of the chapter the longitudinal case study summary is provided.

### 7.7.1 Element one: SMEs internal structure and strategies – Traditional approach

The information gathered in interviews with nine companies was analysed in NVivo and classed accordingly (section 7.1) It became apparent that for most sampled SMEs who are still trading it is very important to use IT and the Internet as either driver or enabler. Some of these firms have IT budgets whilst others, have financial difficulties preventing further investment. The companies with these difficulties although very keen to invest in more advanced IT and the Internet are unable to do so. In addition, for companies who are no longer trading, IT and the Internet were also important to an extent but these firms did not have dedicated budgets. Figure 7.5 earlier in this chapter shows that having an IT budget was related to companies' success in such a way that companies which had one were more likely to be still trading. The interviews also identified that shortage of financial resources was to blame. On the whole it is assumed that the lack of these financial resources is impacting on companies' investments into IT and the Internet and therefore affecting firms' superiority ( $P_{1a}$ ). The summary of proposition testing assumptions is presented in Table 7.3.

**Table 7.3: Propositions  $P_1, P_2, P_3$  testing of qualitative data in case study analysis**

<b><math>P_1</math> proposition</b>	<b>Assumption</b>
$P_{1a}$ – Financial resources of owners/managers in SMEs are positively related to purchasing of more advanced and IT and the Internet and as a result is affecting firms' superiority.	<b>True</b>
$P_{1b}$ – Knowledge by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.	<b>True</b>
$P_{1c}$ – Skills of owners/managers are positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.	<b>True</b>
<b><math>P_2</math> proposition</b>	
$P_{2a}$ – Focus on service by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.	<b>Inconclusive</b>
$P_{2b}$ – Information by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.	<b>Inconclusive</b>



<b>P<sub>3</sub> proposition</b>	
<b>P<sub>3a</sub></b> – Perceived benefits related to opportunities inside and outside the organisation by SME owners/managers is positively related to investment in more advanced IT and the Internet.	<b>Inconclusive</b>
<b>P<sub>3b</sub></b> – Focus on large market share is positively related to investment in more advanced IT and the Internet.	<b>Inconclusive</b>

During the interviews it was noted that the lack of knowledge and general skills by owners/managers was impacting on the level of IT and the Internet investment. This corresponds with findings in the survey in which an evidence of association was found between the knowledge at managerial level and doing business online (Table 6.24). For that reason it is assumed that P<sub>1b</sub> and P<sub>1c</sub> were true.

Proposition P<sub>2</sub> and P<sub>3</sub> were inconclusive as not enough evidence was found, neither through the interviews nor in the national survey. However, high correlation in the paired sample t-test was found between the product before and after the introduction of the Internet in sampled SMEs (Table 6.26).

Overall, it can be argued that the IT and the Internet play an important role in sampled SMEs and it is more likely for these firms to be unsuccessful without this technological help. This provides some valuable data for the first element in CATE-b model which proposes that SMEs should keep their traditional business structure at the beginning of their journey. It is believed that there is enough information found in the literature (Chapter 2), survey (Chapter 6) and interviews (Chapters 4 and 7) to advise organisations which have not yet engaged with IT and the Internet to start the implementation gradually.

### 7.7.2 Element two: SMEs' external business environment

For many years it was evident that SMEs did not take advantage of Government initiatives or did not respond to those activities quickly enough (Jones and Tilley, 2003; Curran, 1999; Hankinson et al., 1997; Hankinson et al., 2000; Docherty and Simpson, 2003; DTI, 2003; DTI, 2007). Although Government policies were formulated to promote information technology and communications for all SMEs (DTI, 2003 and DTI, 2007) sadly this longitudinal case study identified that there had been little effect over the past five years on SMEs' perception of Government support. SMEs still have their reservations about Government ambitions and in many cases find Government representatives both unhelpful and uninformed. The following statements were compared between study in 2004 and the study in 2009.

*"I've never heard about UK online for business. Government should find better ways of communicating the information to local businesses, other than leaflets which we consider as junk mail". (Sheffield Motor Company Ltd) 2004*



*"I was never interested in what government had to say. I was proved right when my business got into trouble and I went to enquire about some kind of help. There was no help!" (Sheffield Motor Company Ltd) 2009*

*"Not heard about UK online for business. Government never listen to what practitioners have to say. They do their business we do ours. We would like to change our strategy but don't know how". (Lovebytes Ltd) 2004*

*"With the government we have no relationship! Government has a different agenda from practitioners. (Lovebytes Ltd) 2009*

*"I don't know who UK online for business is. I am unaware of any help promoted by UK government. I would really welcome any Government initiative to help me, mainly financially to set up a web site". (Aleksandria Science Ltd) 2004*

*"I never try to use any of government agencies. My kind of business is not suitable and I am not so tied up with the IT. I can do calculations at the back of book!" (Aleksandria Science Ltd) 2009*

*"We used some government agencies but they are not useful. I tried to find some information about my business and the government representatives were very unhelpful. They send me to find information myself. They don't communicate their ideas and plans to us and they don't talk to us". (Cave Studios Ltd) 2004*

*"I tried to used them long time ago and I was not impressed. Have not tried it since but it is too late now. (Cave Studios Ltd) 2009*

Unfortunately, sample quotes above indicate that the resources offered by the UK Government (DTI, 2003, 2007; BERR, 2008) were not perceived as helpful (Figure 7.9). These comments however come from micro and small organisations only. Larger organisations on the other hand, were more positive and were more likely to take advantage of the offers available. Therefore, the proposition P<sub>5</sub> was classed as inconclusive (Table 7.4).

**Table 7.4: Proposition P<sub>5</sub> testing of qualitative data in case study analysis**

<b>P<sub>5</sub> proposition</b>	<b>Assumption</b>
<b>P<sub>5a</sub></b> – Interest in UK Government initiatives related to support in SMEs is positively related to investment in more advanced IT and Internet technology.	<b>Inconclusive</b>
<b>P<sub>5b</sub></b> – Awareness of the Government initiatives related to e-business advice is positively related to investment in more advanced IT and Internet technology.	<b>Inconclusive</b>
<b>P<sub>5c</sub></b> – Trust when seeking e-business advice or support is positively related to investments in more advanced IT and Internet technology.	<b>Inconclusive</b>

Longitudinal study findings indicate that although there was a general lack of interest in Government initiatives, some sampled SMEs were taking advantage of them. This was followed by the lack of awareness of these initiatives and lack of trust when seeking e-business advice. On the whole, this study points out that both parties involved should be more proactive and that micro organisations in particular should make more effort to seek help necessary for their businesses.



Table 7.5 shows assumptions to proposition  $P_4$  which relate to the Porter's vertical and horizontal competition, the platform which was used to develop the element two of CATE-b model.

**Table 7.5: Proposition  $P_4$  testing of qualitative data in case study analysis**

<b><math>P_4</math> proposition</b>	<b>Assumption</b>
<b><math>P_{4a}</math></b> – Ability of owners/managers to see opportunities arising from the fast development of IT and the Internet when dealing with forces from 'horizontal' competition (threat of substitute products, threat of established rivals, threat of new entries) is positively related to investment in more advanced IT and the Internet.	<b>Inconclusive</b>
<b><math>P_{4b}</math></b> – Ability of owners/managers to see opportunities arising from the fast developments of IT and the Internet when dealing with forces from 'vertical' competition (bargaining power of suppliers and bargaining power of customers) is positively related to investment in more advanced IT and the Internet	<b>Inconclusive</b>

$P_{4a,b}$  coincides to some extent with the sampled SMEs' general lack of perception of opportunities arising from the UK Government ( $P_5$ ). Advantages from the fast developments of IT and the Internet are also not materialising fully. This is because some SME owners/managers do not notice these prospects in either horizontal or vertical competition and therefore  $P_4$  assumption is inconclusive. For example, while companies such as case study 1 (7.3.1), 2 (7.4.1) and case study 4 (7.5.2) do take advantage from their environment, others in the sample show little or no interest.

### 7.7.3 Element three: SMEs' e-business model CATE-b integration

This section is examining the four stages of integration in relation to the longitudinal case studies. These are as follow: (1) *Stage one*: Incorporate IT infrastructure; (2) *Stage two*: Change business approach and strategies; (3) *Stage three*: Internal integration; and (4) *Stage four*: External and full integration. Each stage is also used to present and discuss the assumptions made in proposition  $P_6$ .

#### 7.7.3.1 Stage one: IT infrastructure

The advances in IT and Internet technology were anticipated to affect SMEs. Therefore, implementation of an appropriate IT infrastructure was proposed in CATE-b model as *Stage 1* integration (Chapter 5). This proposition was based firstly on studies of Feller (2000), Porter (2001) and Chaston (2004). Secondly, this proposition was also supported by an earlier exploratory case study in which it was indicated that companies who have high IT capabilities and more skilled employees were more likely to outperform others in terms of profit and growth (Local Futures Group, 2001; Prashantham, 2008; Naldi, 2009). Thirdly, findings from the



national survey confirmed those earlier propositions since all SMEs surveyed have on-line facilities. However, what differentiates SMEs was the level of usage of these facilities (Chapter 6). The survey in conjunction with other studies (Ramsey et al., 2003; Kula et al., 2003; Stone, 2003; Yorkshire Forward, 2006, 2007; DTI, 2003, 2007; UK Online, 2008) confirmed that an appropriate business model that supports the basic IT infrastructure was needed and was likely to improve the business of SMEs who still lag behind.

The findings from the longitudinal case studies were quite remarkable. Not only were the SMEs with an appropriate IT infrastructure more successful (see Figure 7.4), but also it was a matter of survival or closure for some businesses (Case studies 7.6.3, 7.6.4 and 7.6.5). Although interviews with owners/managers have shown no full e-business integration as yet, they have however indicated that companies such as Gripple Ltd, SMP Europe and Occidental were all very advanced in the use of Internet technology. In the exploratory study in 2004 it was indicated that only two SMEs were advanced in using Internet technology. In 2009 this figure changed to six SMEs using various Internet applications very successfully, but the remaining three SMEs were not trading anymore. The reason for their closure was the direct consequence of the lack of investment in advanced Internet technologies (Cave Studios, SMC, and MIR).

The biggest and contrasting surprise however, came from three SMEs, SMP Europe, Cave Studios and MIR. After an initial investment in the technology, SMP Europe was still employing staff with mixed skills and was not planning to integrate either internally nor externally. With suppliers and competition such as Bosch and Ferrari it would have been expected that SMP Europe was more proactive and offered their partners more substantial technology than an e-mail and the website. This lack of awareness and appropriate use of the existing technology in the company resulted in SMP Europe becoming a wholly owned subsidiary of a large, international company SMP Inc USA. Now SMP Europe Division is a very successful organisation which became a part of another large company that was using the advances in Internet technology to its advantage rather than ignoring it. As for Moving Image Research, it was such a disappointment to find out that the high-tech company closed down because of not using the technology to support the business. On one hand, the company was employing highly competent individuals in terms of software and hardware knowledge but on the other, these individuals did not employ their knowledge in a wider sense. They let the marketing, efficiency and customer responsiveness be at the end of the value chain which resulted in the closure of the business. Their investments in the production of specialised software and hardware systems did not have the end users which would keep the business running. Cave Studios had a similar story to MIR. This company also did not respond to the changes in the business environment and let eBay take their consumer market. Although the

core of the business for Cave Studios was Internet technology, the lack of investments and improvements in their website and e-mail system resulted in the business closure.

The case of the MIR and other case studies in this research support the CATE-b model which offered an integration of primary and secondary activities as per Porter's (1985) traditional value chain model (Figure 2.4). This integration has long been supported by other scholars (Venkatraman, 1994; Davidov and Malone, 1992; Brorson, 1998; Durkin and McGowan, 2001a; Fahy and Hooley, 2002) but no one has yet successfully accomplished that ideal. The survey identified that while R&D and new product development were of a mixed value for sampled SMEs, marketing and customer responsiveness were much higher on the agenda. This was not surprising since marketing and customer service have long been recognised as a method of value creation for SMEs (Freel, 2000; Hofman and Novak, 1996; Verity and Hof, 1994; Simpson et al., 2006). What is novel and noticeable in the survey is the high impact the Internet had on these two particular areas. This support also comes from the longitudinal case studies as all cases identified marketing and customer responsiveness to be the most impacted on by the developments of Internet technology.

Overall, the longitudinal case studies support the survey findings, encourage the necessary changes in the traditional value chain, and propose that IT infrastructure moves from being a supporting activity into the primary activity. Since longitudinal case studies and the survey recognised that SMEs' core business was in the area of efficiency, quality, and customer responsiveness it needs, as proposed by Kalakota and Robinson (2004), to come first in the value chain and be supported by Internet technology and not placed at the end.

### 7.7.3.2 Stage two: Changing strategies

The *Stage two* integration proposed in the CATE-b model focuses around changing business strategies and organisational structure, also supported by Kalakota and Robinson (2001). At this point, the company accepts Internet technology to be one of the main ingredients as opposed to a supporting one. Also, at this point, a company's core values are enhanced by Internet technology and the company's investments are equally shared. If the company accepts this change the focus shifts onto the three to five-year business plan as opposed to acting ad-hoc. This is because ICT and the Internet have the potential to dramatically influence coordination and controlling abilities throughout the firm (Grant, 1998) as experienced by MIR and Cave Studios. These long-term plans would consequently improve organisational information flow and reduce bureaucracy (Scott Morton, 1991) as presented in the Occidental and Toni and Guy cases.

These longitudinal case studies revealed that four out of nine companies have an IT budget. Study further disclosed that those SMEs without an IT budget and adequate investment had either ceased trading in the last five years or became smaller and less effective. Therefore, if SMEs are to become more successful in their ICT integration they need to rethink their strategies and invest in IT and Internet technology (Scott Morton, 1991; Kalakota and Robinson, 2001). As demonstrated in the survey and supported by the longitudinal case studies all areas of businesses were ultimately affected. In some cases this resulted in improving the business (Gripple, SMP, Occidental and Tony and Guy) and in some cases it resulted in either lack of investment or simply the attitude of the owner towards Internet technology (Aleksandria Science, MIR, SMC Lovebytes and Cave Studios). Findings in interviews suggest that stage two should be eliminated from the proposed CATE-b model since all necessary changes in organisations should take place during the element two of integration. This will be further examined in Chapter 8.

### 7.7.3.3 Stage three: Internal integration

It was revealed that eight out of nine SMEs use e-mails and seven have an active website. However, it is necessary to highlight that higher integration of SMEs is required (Daniel et al., 2002; Ramsey et al., 2003; Xu et al., 2007). These academic studies together with this research support integration at the internal level. This is also the *Stage three* integration of the CATE-b model. At this stage, organisations must focus on cost reduction and internal efficiency (Cheng et al., 2001). Results from the longitudinal studies and the survey are both in favour of integration and show that SMEs who were able to integrate were more successful and employed skilled and knowledgeable staff (Ghoshal and Barlett, 1988; Grant, 1996a, 1996b; Afuah and Tucci, 2001, 2003; Chaston, 2004; Lynn et al., 1999; Cheng et al., 2001). However, the longitudinal studies also identified that it was not always the case that highly skilled and knowledgeable staff would make organisation more successful. In the case of MIR and Cave Studios it was rather the opposite. This study confirms that apart from skills and knowledge, attitude and the owner's ability to recognise and identify problems play a substantial role. These findings therefore, support theories that embedded skills and tacit knowledge of employees ultimately impact on organisational performance and competence (Hall, 1992; Leonard-Barton, 1995).

### 7.7.3.4 Stage four: External and full integration

CATE-b model proposes the *Stage four* integration to be with external partners, suppliers and customers, and consists of free information flow. The ultimate goal for organisations would be to create competitive advantage via e-business operations (Van Hooft and Stegwee, 2001; DTI,



2000; Lynn et al., 1999; Seybold and Marshak, 1998; Chaston, 2004; Porter, 2001; Venkatraman, 1994; Kalakota and Robinson, 2001; Fahy and Hooley, 2002; Afuah and Tucci, 2003). Although these claims have long been difficult to prove, this longitudinal study together with the survey identified that the most successful organisations were those who have some kind of internal as well as external integration. For instance, in the longitudinal case studies the three most successful organisations were integrated internally and externally to various extents with both suppliers and other industry partners (Gripple, SMP and Occidental), while the less successful were those with partial and one-sided integration (Toni and Guy – internal only, and Lovebytes – external only). In the later case the integration was a ‘pushed-down’ strategy used by the larger organisation and not the choice imposed by the owner of the company. Organisations that were not integrated at all had to close down (Cave Studios and SMC) with the exception of one SME who had an internal integration but nevertheless was closed down (MIR) due to the owner’s attitude towards the business strategies. This study also indicates that micro businesses (0–9) were still the most affected by lack of IT investments and a long way behind larger SMEs (DTI, 2003; Dynamic Markets, 2007; NSO, 2007; ONS, 2008).

Based on the discussion of all four stages of integration proposed in CATE-b model, Table 7.6 presents the result of assumptions made about propositions  $P_{6a,b,c,d}$ .

**Table 7.6: Propositions  $P_6$  testing of qualitative data in case study analysis**

$P_6$ propositions	Assumption
$P_{6a}$ – IT and Internet infrastructure are positively related to a successful e-business strategy.	Inconclusive
$P_{6b}$ – IT and Internet infrastructure are positively related to changing business strategies.	Inconclusive
$P_{6c}$ – IT and Internet infrastructure are positively related to the internal integration of SMEs.	Inconclusive
$P_{6d}$ – IT and Internet infrastructure are positively related to the external integration of SMEs.	Inconclusive

Since all sampled SMEs have a basic IT and the Internet infrastructure,  $P_6$  cannot be supported and the assumption is inconclusive. However, the difference in the levels of this infrastructure does provide an idea to what extent IT and the Internet influence the sampled companies’ success.

## 7.8 Longitudinal case study summary

Due to the overall length of this research study it was seen as advantageous to conduct a longitudinal case studies analysis and revisit the nine SMEs who were originally chosen for an exploratory study at the start of this research project. As such, this study identified several important issues that influence the usage of the Internet technology in SMEs.

Most of all, the longitudinal case study analysis confirmed that Internet technology did indeed make a difference to SMEs. However, companies were affected in different ways. Throughout the literature, various scholars recognised that SMEs could create value to their firms by engaging in ICT (Freel, 2000; DeLone, 1988; Raymond, 1985; Dewett and Jones, 2001; Aral and Weill 2007; Oh and Pinsonneault, 2007; Dibrell et al., 2008). However, their research was focusing on the ways in which SMEs benefit from Internet technology and the reasons preventing them from wider usage rather than what the consequences for SMEs are if they do not engage in advanced Internet availabilities. For that reason, longitudinal studies of this kind are important to gain knowledge and information which is rarely available.

Therefore, this study is very important as it recognised that Internet technology for small businesses means either survival or failure as shown Figure 7.4 and in the specific cases of SMP Europe and Cave Studios. In all, three micro businesses failed due to the lack of technology used whilst the other six cases have all engaged in various levels of on-line transactions. These stages also reflect the level of success in the organisation. The more advanced in the use of the Internet was likely to bring more benefits to firms and vice versa, the lower the engagement with the technology the lower the benefits. This is also in line with other studies (Daniel et al., 2002; Ramsey et al., 2003; and Xu et al., 2007) which identified higher levels of Internet usage in some SMEs. It is possible therefore to make the assumption that companies with more advanced use of Internet technology could potentially make a difference to their business performance (stage two integration of CATE-b model in Chapter 5).

This study further recognised that sampled SMEs were more likely to succeed if they planned their IT investments, in contrast to those who did not have IT budgets. Amongst those SMEs who did not have an IT budget were micro businesses who failed to survive in a business environment. Although some companies managed to stay in business without having an IT budget it was indicative that those SMEs became smaller over the five years and had a smaller annual turnover.

It is also interesting to note that IT integration was playing a significant role in the survival of sampled SMEs. There was a range of integration starting from no integration at all to some using e-business. Surprisingly there was one micro business which did not have any IT infrastructure and did not use e-mail or a website to support the business (stage one CATE-b model). Sadly this business did not survive and as the interview identified it was a direct consequence of the lack of IT engagement. Most of the other organisations in the sample chose to integrate internally (stage three CATE-b model), externally or both while some had the external integration imposed onto them by other larger counterparts (Figure 7.6). Although there is no representative sample of a fully integrated SME in this study (stage four integration in

CATE-b model), two companies indicate they are very close to this position (Gripple and SMP Europe) and are amongst more successful organisations in this sample.

Finally, this longitudinal case study analysis highlighted issues that those SMEs who took advantage of the resources offered by the UK Government (DTI, 2003, 2007; BERR, 2008) and had suitable attitude towards investment in high-level technology were more likely to succeed. These successful organisations see e-business and Internet technology as an integral part of their business as well as a necessity for the future.



# Chapter 8

## 8 Contribution: E-business model CATE-b

Following the completion of both qualitative and quantitative analyses, the CATE-b model was refined and its developments are presented and discussed in this chapter. As a result of findings from the survey (Chapter 2) and interviews (Chapter 7) this chapter discusses the changes made to the conceptual CATE-b model (Chapter 5) over a period of five years. It broadly covers three areas:

1. A general overview of the conceptual model and its evolution to a new CATE-b e-business model. Here the new CATE-b e-business model is presented.
2. The elements of the new CATE-b e-business model which include a discussion of the three stages of integration.
3. Summary of the CATE-b e-business model.

### 8.1 The evolution of the CATE-b e-business model

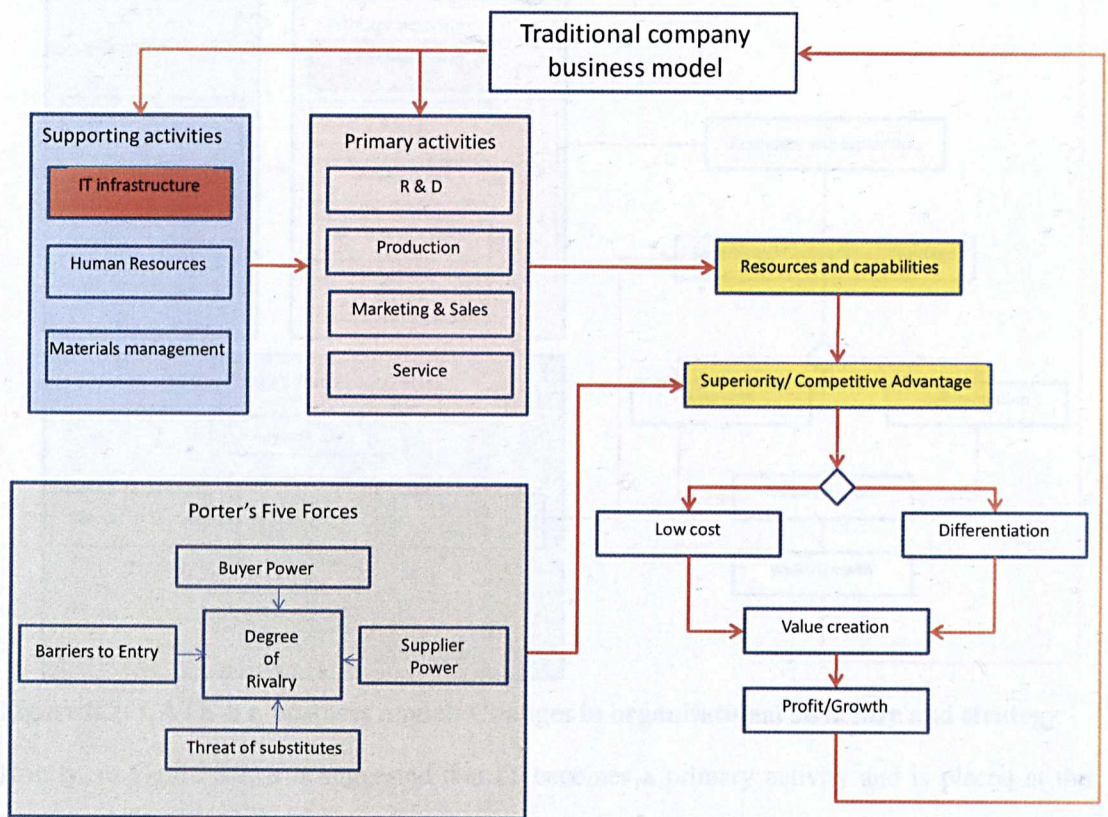
A conceptual e-business model named '*Competitive Advantage Through E-business*' (CATE-b) was created in 2004 (Chapter 5). It was based on a comprehensive literature review (Chapter 2) and nine exploratory case studies (Chapter 4). The findings from these studies identified that SMEs needed to create and implement a plan allowing them to make the transition from an 'old' system to a 'new' one and to forward-looking e-business oriented organisations. The proposed model presented a way to manage this transition period. However, the conceptual model was based on limited evidence and required further development, refinement and verification. This was later achieved via a regional and national survey of 135 SMEs between 2005–2007 (Chapter 6) and analyses of nine longitudinal case studies in 2009 (Chapter 7).

The new CATE-b model is novel and regarded as an adaptable solution where a company with an old legacy system uses existing IT applications and builds upon them incrementally. This way companies with or without external financial support (e.g. provided by the Government) can minimise the risks associated with developing a vast IT enterprise that requires expensive planning and investment with uncertain returns. Based on the overall study this solution was considered suitable for SMEs with a traditional business structure. The new CATE-b model follows the same strategy outlined in Chapter 5 and consists of the same three elements: (1) *Element one*: Traditional company business model that includes SMEs' internal structure and

strategies; (2) *Element two*: Changes in organisational structure and strategy, (3) *Element three*: CATE-b e-business model: Three stages of integration.

**(1) *Element one – Traditional company business model: SMEs’ internal structure and strategies***

This includes a traditional approach to creating competitive advantage based on Porter’s generic strategy approach (Porter, 1979, 1980, 1985); SMEs distinctive features through resources and capabilities; SMEs core business based on product; and theoretical framework based on Porter’s traditional value chain (Porter, 1980; Kalakota and Robinson, 2001). This first element of the new and revised business model CATE-b is presented in Figure 8.1.



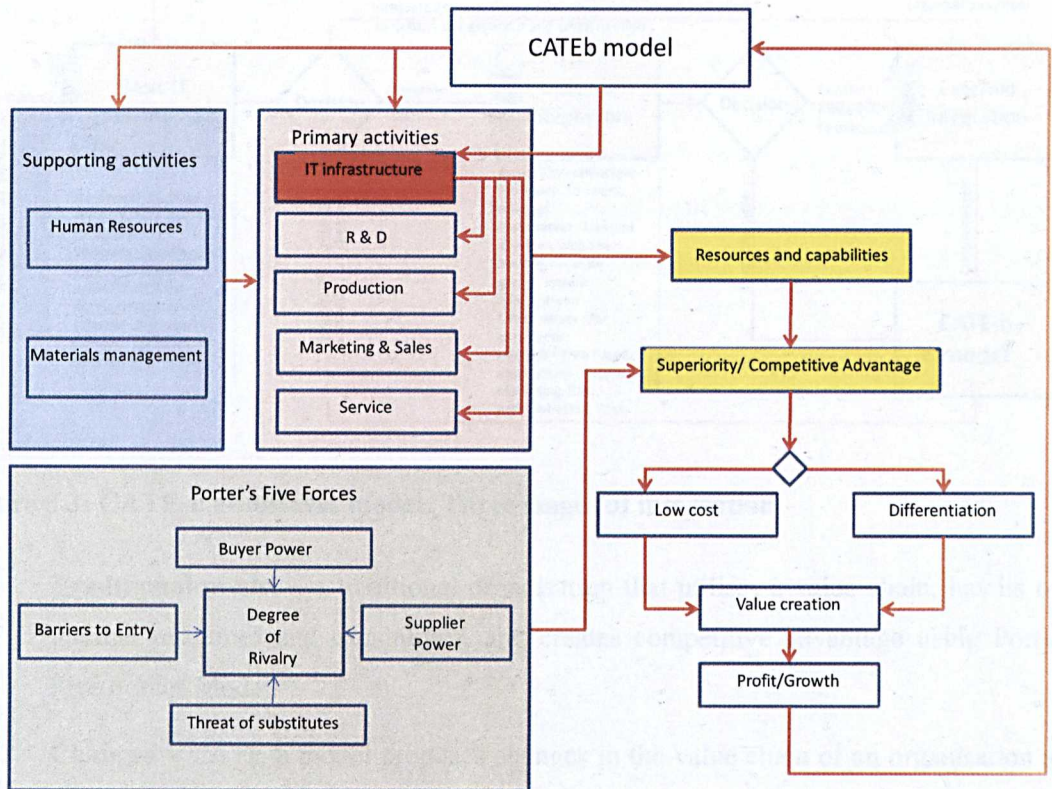
**Figure 8.1: Traditional company business model**

Figure 8.1 identifies that the changes which occurred in this element are related more to the design of the model than to the content. This was influenced by the realisation of researcher that what constitutes the traditional business model was not clearly presented. These changes also impacted on the subsequent two elements in the model in terms of its design and presentation.



**(2) *Element two – Changes in traditional value chain influenced by SMEs’ external business environment***

This element is theoretically underpinned by SMEs external business environment at the micro level. It includes Porter’s Five Forces Model (Porter, 1979, 1980) in which ‘vertical’ and ‘horizontal’ competition is acknowledged (Blili and Raymond, 1993). In addition, this element also covers the involvement of the UK Government and the development of IT and the Internet. The *Element two* of the CATE-b model identifies the changes required in the traditional structures of SMEs and their strategy, as presented in Figure 8.2.



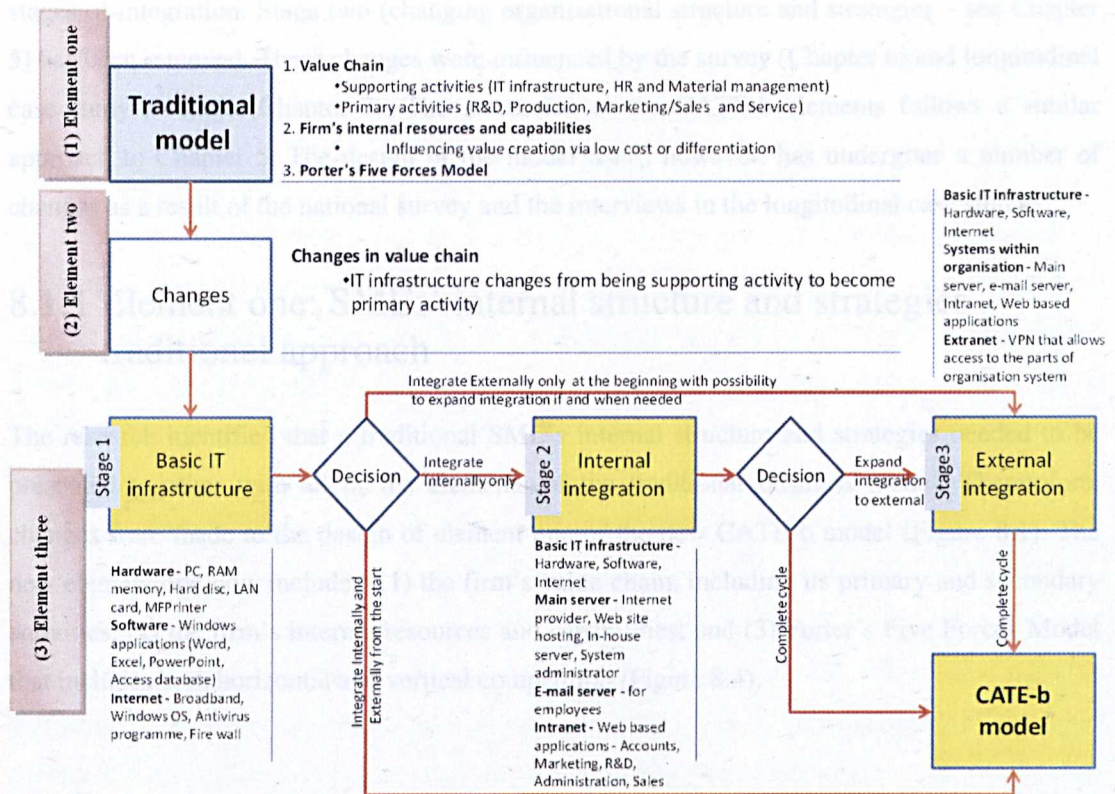
**Figure 8.2: CATE-b e-business model: Changes in organisational structure and strategy**

Briefly, in Figure 8.2, it is suggested that IT becomes a primary activity and is placed at the forefront in the value chain.

**(3) *Element three: CATE-b e-business model: Three stages of integration***

The third element of the model takes into consideration the first two elements and builds upon them. This final element of the CATE-b model is discussed in the order of the three stages of its implementation: *Stage one*: Basic IT infrastructure, *Stage two*: Internal integration of SMEs and *Stage three*: External and full integration of SMEs (Figure 8.3).





**Figure 8.3: CATE-b e-business model: Three stages of integration**

1. **Traditional model** – a traditional organisation that utilises a value chain, has its own internal resources and capabilities, and creates competitive advantage using Porter’s Five Forces Model.
2. **Changes** – CATE-b model proposes changes in the value chain of an organisation and recommends that IT infrastructure moves from being a supporting activity to becoming a primary activity of an SME.
3. **CATE-b model** – Once changes are in place a basic IT infrastructure is required to be implemented as a long-term strategy in an organisation. Based on this new strategy an owner/manager should decide:
  - To integrate internally and externally – go straight to CATE-b model
  - or
  - To integrate internally with only a possibility of integrating externally at a later stage
  - or
  - To integrate externally with the possibility of expanding integration if or when required.



Overall, this final element (Figure 8.3) has undergone changes in its originally proposed four stages of integration: Stage two (changing organisational structure and strategies – see Chapter 5) has been removed. These changes were influenced by the survey (Chapter 6) and longitudinal case study findings (Chapter 7). The discussion of the CATE-b elements follows a similar approach to Chapter 5. The design of the model itself, however, has undergone a number of changes as a result of the national survey and the interviews in the longitudinal case studies

### 8.1.1 Element one: SMEs’ internal structure and strategies – traditional approach

The research identified that a traditional SME’s internal structure and strategies needed to be presented together with all of the elements of the traditional business model. Therefore, changes were made to the design of element one of the new CATE-b model (Figure 8.1). The new element one now includes: (1) the firm’s value chain, including its primary and secondary activities; (2) the firm’s internal resources and capabilities; and (3) Porter’s Five Forces Model that includes both horizontal and vertical competition (Figure 8.4).

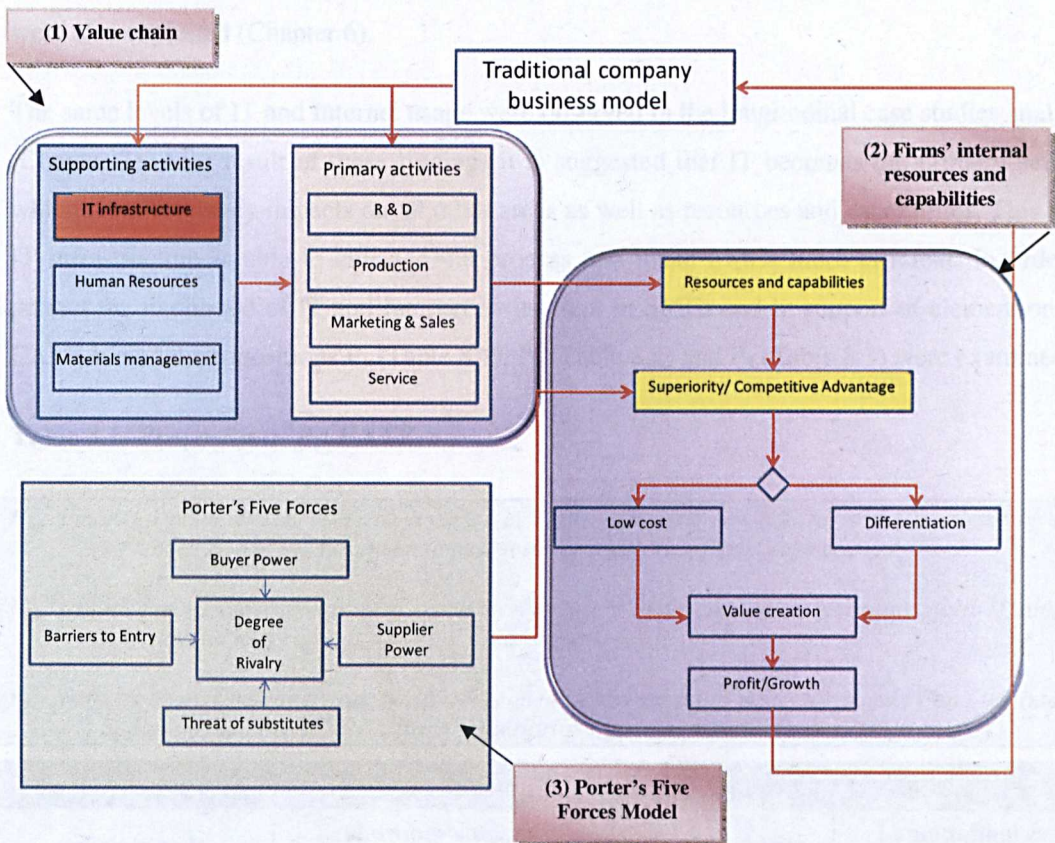


Figure 8.4: Element one: Changes in the CATE-b model



As Porter argues (1985), traditional companies first and foremost consist of a value chain. This ‘chain’ is at the heart of the primary and secondary activities of the company, which not only influence its resources and capabilities, but ultimately position it in the marketplace by leveraging its strengths. These, in the end, fall into the categories of either cost advantage or differentiation.

At the same time, an organisation is influenced by its industry’s environment which enables identification of opportunities and threats confronting a company (Porter, 1979). To meet these demands it was believed that a traditional organisation needed to use Porter’s Five Forces framework to assist managers in this analysis. Organisations then create value which is reflected in higher profit or growth. This enables a company to invest its profits back into the organisation and this framework was used in construction of the new CATE-b model. In relation to the companies’ internal resources and capabilities which ultimately lead to their superiority, the national survey identified that the sampled SMEs focus their core competence on quality, customer responsiveness and efficiency. Furthermore, with no exception, sampled firms support their resources and capabilities with various levels of IT and Internet infrastructure which they achieve through supporting activities in the value chain. The survey identified e-mails and websites as preferential ways of communication. However, other levels were also exploited (Chapter 6).

The same levels of IT and Internet usage were observed in the longitudinal case studies analyses (Chapter 7). As a result of these findings it is suggested that IT becomes the primary activity which simultaneously impacts on all other areas as well as resources and capabilities. This way, IT infrastructure is able to enhance the process and make SMEs more efficient. In order to predict the likelihood of IT and Internet investment in SMEs and in support of element one of CATE-b model, propositions P<sub>1</sub> (Table 8.1), P<sub>2</sub> (Table 8.2) and P<sub>3</sub> (Table 8.3) were examined.

**Table 8.1: Propositions P<sub>1</sub>: CATE-b**

<i>P<sub>1a</sub>. Financial resources of owners/managers in SMEs are positively related to the purchase of more advanced IT and the Internet and as a result are affecting firms’ superiority.</i>
<i>P<sub>1b</sub>. Knowledge by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms’ superiority.</i>
<i>P<sub>1c</sub>. Skills by owners/managers are positively related to investment in more advanced IT and the Internet and as a result are affecting firms’ superiority.</i>

Results			
Proposition P <sub>1</sub>	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
P <sub>1a</sub>	8/9 SMEs identified lack of financial resources affecting investment in IT	96/119 SMEs identified lack of financial resources affecting investment in IT	7/9 SMEs identified lack of financial resources affecting investment in IT



Results			
Proposition P <sub>1</sub>	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
P <sub>1b</sub>	9/9 SMEs identified lack of knowledge at managerial level affecting the investment in IT	92/111 SMEs identified lack of knowledge at managerial level affecting investment in IT	5/9 SMEs identified lack of knowledge at managerial level affecting investment in IT
P <sub>1c</sub>	9/9 SMEs identified lack of skills affecting investment in IT	92/111 identified lack of skills affecting investment in IT	5/9 SMEs identified lack of skills affecting investment in IT

Firstly, companies' resources and capabilities were examined via proposition P<sub>1</sub>. As a starting point, the likelihood of IT and Internet investment was examined (P<sub>1a</sub>). This was followed by investigation of knowledge and skills at managerial level (P<sub>1b</sub> and P<sub>1c</sub>). As a general overview of this study, Table 8.1 identified that most sampled SMEs are affected by lack of financial resources and human capabilities which reflect on knowledge and skills at managerial level. The lack of these resources and capabilities are affecting companies' investments in more advanced IT and the Internet and ultimately their superiority. However, changes have been noticed in the longitudinal case study analysis. Some sampled SMEs noticed improvements in this particular area and in interviews these companies acknowledged that they have become more successful in the past five years as a result of a higher level of IT and the Internet usage.

**Table 8.2: Proposition P<sub>2</sub>: CATE-b**

<i>P<sub>2a</sub>. Focus on service by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.</i>
<i>P<sub>2b</sub>. Information by owners/managers is positively related to investment in more advanced IT and the Internet and as a result is affecting firms' superiority.</i>

Results			
Proposition P <sub>2</sub>	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
P <sub>2a</sub>	8/9 SMEs identified lack of focus on service affecting investment in IT	Not tested	5/9 SMEs identified lack of focus on service affecting investment in IT
P <sub>2b</sub>	9/9 SMEs identified lack of information affecting investment in IT	Not tested	5/9 SMEs identified lack of information affecting investment in IT

Table 8.2 further presents findings related to P<sub>2a,b</sub>. Similar to findings in Table 8.1 most SMEs in 2004 identified a lack of focus on service and a lack of information as the most influential in relation to companies' investment in IT and the Internet. Five years later, changes were evident in subsequent interviews with the same companies. Owners/managers realised the importance of IT and the Internet development over the years and adapted their internal strategies to reflect these developments. Unfortunately, it was not possible to statistically test P<sub>2</sub> in the survey because of the nature of the questionnaire used.



**Table 8.3: Proposition P<sub>3</sub>: CATE-b**

Results			
Proposition P <sub>3</sub>	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
P <sub>3a</sub>	8/9 SMEs identified lack of perceived benefits affecting investment in IT	Not tested	3/9 SMEs identified lack of perceived benefits affecting investment in IT
P <sub>3b</sub>	5/9 SMEs identified lack of focus on larger market share affecting investment in IT	Not tested	5/9 SMEs identified lack of focus on large market share affecting investment in IT

Following on from P<sub>1</sub> and P<sub>2</sub>, P<sub>3a,b</sub> was examined. In the first interviews in 2004 the lack of perceived benefits and focus on a larger market share were identified as affecting companies' investments in more advanced IT and the Internet (Table 8.3). However, five years later a number of changes were evident specifically in the area of the perceived benefits of IT and the Internet (P<sub>3a</sub>). In this instance, 3/9 interviewed owners/managers acknowledged the Internet as a positive change in their organisation. However, no changes were noticed in P<sub>3b</sub>. Similarly to P<sub>2</sub>, P<sub>3b</sub> was not included in the survey.

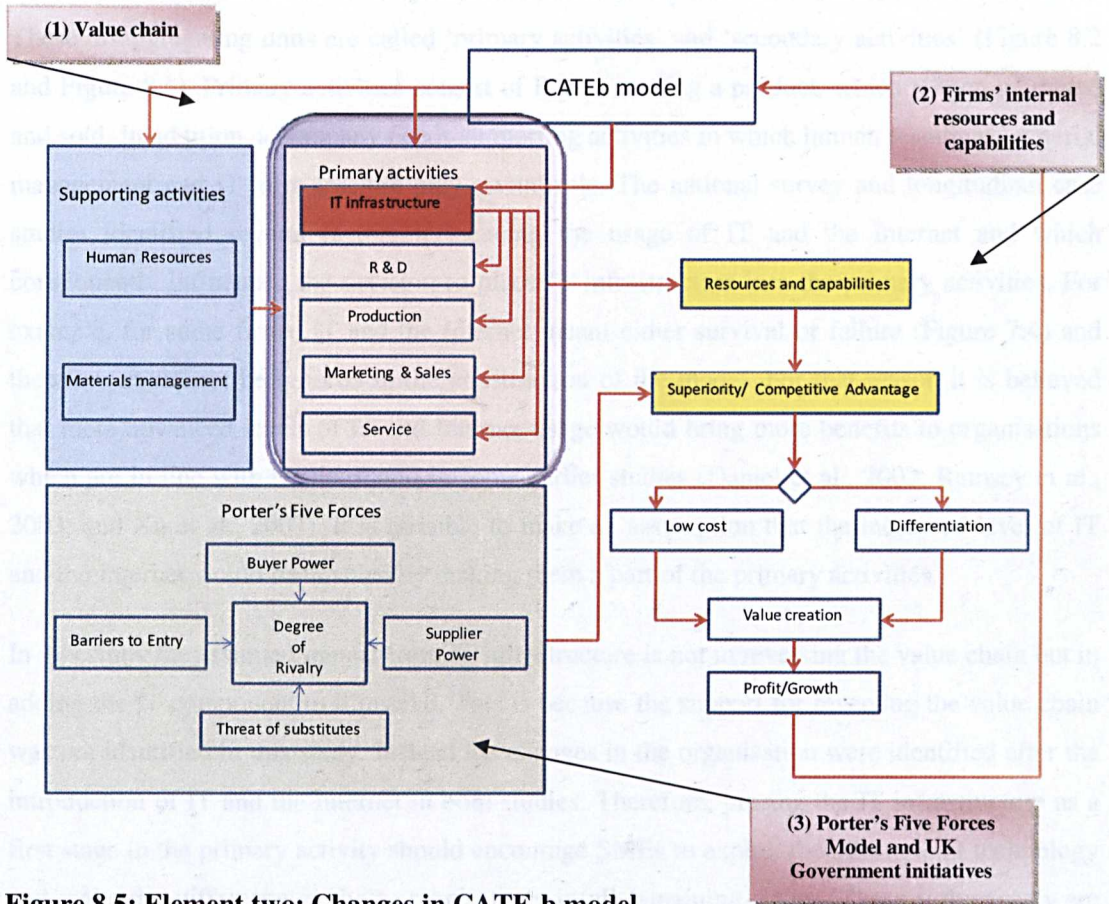
Overall, in support of the first element, interviews with owners/managers established that their superiority comes from their traditional approach to creating competitive advantage and is influenced by internal structure and strategies derived from companies' resources and capabilities. In the first interview 7/9 SMEs were willing to change and adapt their strategies as IT and the Internet developed further. Five years later and in addition to their original statements, four firms acknowledged changes in a positive way, two firms are still stagnating and three firms stopped trading as a result of not investing further in IT and the Internet (see Chapter 7).

### 8.1.2 Element two: SMEs' external business environment

The second proposed element addresses both theory and practice and their influence on the construction of the CATE-b model, as presented in Figure 8.5. The second element has the same three characteristics as element one: (1) value chain; (2) resources and capabilities; and (3) Porter's Five Forces Model. However, this element in particular emphasises the SMEs' environment so the main discussion takes place around Porter's Five Forces framework and the UK Government's initiatives (Figure 8.5). As changes were made to the model and this



element, the value chain is also discussed. These are combined with the survey and longitudinal case studies in which propositions P<sub>4</sub>, P<sub>5</sub> and P<sub>6</sub> are addressed.



**Figure 8.5: Element two: Changes in CATE-b model**

The CATE-b model as originally proposed in 2004 (Figure 5.1), included e-business as a core competence. However, in this new model the term ‘e-business’ has been replaced with ‘IT infrastructure’ – this is derived from Porter’s value-chain-supporting activities. Since Porter (1985) argued that the concept of value creation lies at the heart of competitive advantage, in this new design of the CATE-b model it was necessary to place IT infrastructure into the primary activities in which the firm would invest their profits. This process started in the first element and is now demonstrated in the second element. This is because IT infrastructure underpins all e-business strategies without which e-business cannot be integrated into organisations. This is in line with the conceptual model proposed in Figure 5.3 in which e-business is identified as part of the core competence. In this element, Porter’s value system was seen as the main component in which the change of a firm became most apparent. This was because for Porter, firms are not the source of competitiveness but instead, firms derive their competitive advantage from their home-based environment, i.e. from within the firms’ resources and capabilities. Furthermore, companies’ internal environment is very much affected by the



external influences of Porter’s Five Forces and UK Government initiatives. Best (2001) argued that companies shape their internal environment from determinants of the Five Forces. This is manifested by disaggregating the firm into its relevant units so that managers are able to understand the nature of costs and potential sources of differentiation (Jones and Tilley, 2003). These disaggregating units are called ‘primary activities’ and ‘secondary activities’ (Figure 8.2 and Figure 8.5). Primary activities consist of R&D, creating a product, which is then marketed and sold. In addition, a company needs supporting activities in which human resources, material management and IT infrastructure play a vital role. The national survey and longitudinal case studies identified several factors influencing the usage of IT and the Internet and which consequently influenced the decision to place IT infrastructure into the primary activities. For example, for some firms, IT and the Internet meant either survival or failure (Figure 7.4) and therefore could not be ignored in the construction of the model. For that reason it is believed that more advanced levels of IT and Internet usage would bring more benefits to organisations which are in line with results found in some earlier studies (Daniel et al., 2002; Ramsey et al., 2003; and Xu et al., 2007). It is possible to make an assumption that the increased level of IT and the Internet would be enabled by making them a part of the primary activities.

In this study the assumed impact from IT infrastructure is not in reversing the value chain but in adding the IT component to it instead. This is because the support for reversing the value chain was not identified in this study. Instead the changes in the organisation were identified after the introduction of IT and the Internet in both studies. Therefore, placing the IT infrastructure as a first stage in the primary activity should encourage SMEs to exploit the advances of technology and make the difference in their organisations in all remaining stages. These influences were examined via P<sub>4</sub> and P<sub>5</sub> in support of element two and the new CATE-b model (Table 8.4).

**Table 8.4: Proposition P<sub>4a,b</sub>: CATE-b**

*P<sub>4a</sub>* Ability of owners/managers to see opportunities arising from the fast development of IT and the Internet when dealing with forces from ‘horizontal’ competition (threat of substitute products, threat of established rivals, and threat of new entries) is positively related to investment in more advanced IT and the Internet.

*P<sub>4b</sub>* Ability of owners/managers to see opportunities arising from the fast developments of IT and the Internet when dealing with forces from ‘vertical’ competition (bargaining power of suppliers, bargaining power of customers) is positively related to investment in more advanced IT and the Internet.

Results			
Proposition P <sub>1</sub>	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
P <sub>4a</sub>	7/9 SMEs identified not seeking the opportunities arising from IT when dealing with horizontal competition	Not tested	5/9 SMEs identified not seeking the opportunities arising from IT when dealing with horizontal competition



Results			
Proposition P <sub>1</sub>	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
P <sub>4b</sub>	7/9 SMEs identified not seeking the opportunities arising from IT when dealing with vertical competition	Most SMEs identified seeking the opportunities arising from IT when dealing with vertical competition (suppliers only)	5/9 SMEs identified not seeking the opportunities arising from IT when dealing with vertical competition

Table 8.4 shows changes in SMEs’ behaviour as a result of IT and the Internet developments over the past five years. In interviews in 2004 only one manufacturing company was thriving as a result of opportunities created by the rapid developments of IT and the Internet while the other eight SMEs were lagging behind. Five years later three more companies have realised these opportunities and three which did not are no longer trading. Very positive findings were identified in the survey in which some small improvements were established in relation to suppliers only. No relationship was found in the area of customers and no tests were performed in regards to horizontal competition.

In addition to Porters Five Forces Model, UK Government initiatives were also investigated as in the early 2000s. However, not many SMEs took advantage of these initiatives. For that reason proposition P<sub>5</sub> was examined and its findings between 2004 and 2009 are presented in Table 8.5.

**Table 8.5: Proposition P<sub>5a,b,c</sub>: CATE-b**

*P<sub>5a</sub>. Interest in UK Government initiatives related to support in SMEs is positively related to investment in more advanced IT and the Internet technology.*

*P<sub>5b</sub>. Awareness of the Government initiatives related to the e-business advice is positively related to investment in more advanced IT and the Internet technology.*

*P<sub>5c</sub>. Trust when seeking e-business advice or support is positively related to investments in more advanced IT and the Internet technology.*

Results			
Proposition P <sub>5</sub>	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
P <sub>5a</sub>	7/9 SMEs not interested in Government initiatives	44% not using Government initiatives	7/9 not interested in Government initiatives
P <sub>5b</sub>	7/9 not aware of Government initiatives	80/135 not aware of Government initiatives	7/9 not aware of Government initiatives
P <sub>5c</sub>	8/9 had no trust in Government initiatives	Not tested	7/9 did not trust Government initiatives

Table 8.5 clearly shows that UK Government initiatives were not very well utilised by the sampled SMEs; only two organisations were aware of the offers available and took advantage of



them. Others were not aware but also not interested in further developments. It became clear from the interviews that the previous experience of managers/owners was not a positive one and consequently negatively influenced their judgements about these new initiatives.

The findings from the survey and the interviews show that the current IT infrastructure in SMEs offers a better and more suitable system as required for their business, so long as a company accepts Internet technology becoming an integral part of their IT infrastructure. This is seen as an important element of sustaining value creation by firms in the future because organisations need an integrated and coordinated approach towards knowledge, technology and relationship management (Walters et al., 2002a; 2002b). Companies which refuse to change and adapt to the new environment, when necessary, experience many difficulties (Whittington et al., 1999; Grant, 1998; Whittington, 1999; Spanos and Spyros, 2001), as confirmed by the closure of the originally interviewed SMEs.

The survey and longitudinal case studies were combined with the theoretical underpinning in which  $P_{6b}$  was addressed (Table 8.6). The  $P_{6b}$  was discussed here because of the changes in the model.

**Table 8.6: Proposition  $P_{6b}$ : CATE-b**

<i>H<sub>6b</sub>. IT and Internet infrastructure are positively related to changing business strategies.</i>			
Results			
Proposition $P_6$	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
$P_{6b}$	n/a	Not tested	5/9 SMEs identified not seeking the opportunities arising from IT when dealing with horizontal competition

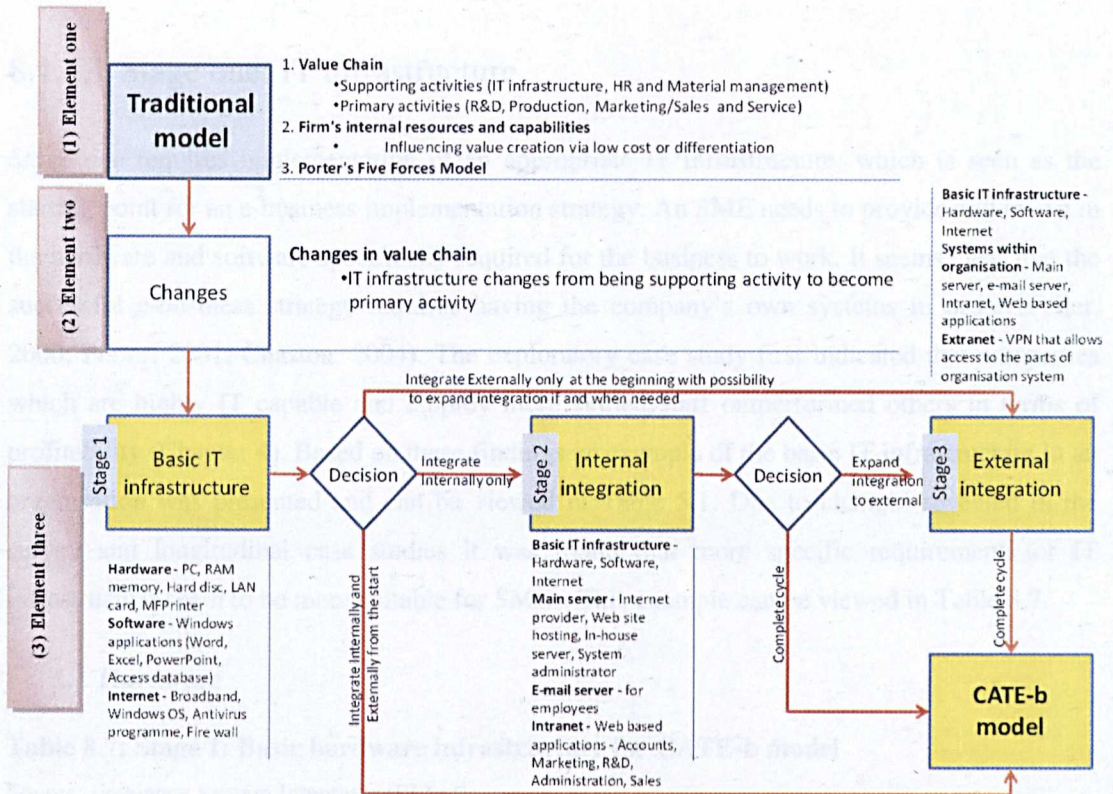
Although the survey identified many areas which are influential when looking at firms' strategies, no evidence of association was found in relation to changing business strategies and IT and the Internet infrastructure. For that reason  $P_{6b}$  was not rejected. However, the survey suggests that the sampled SMEs should increase their IT and e-business budgets in order to create an environment where the skills and knowledge of the employees can continue to improve.

Element two of the new CATE-b model was examined in this section. Although both the survey and interviews with owners/managers demonstrated the advantages related to IT and the Internet infrastructure, the impact of Government initiatives was not salient due to the low take up.



### 8.1.3 Element three: SMEs' e-business model CATE-b integration

The third and final element of the CATE-b model is discussed in this section. Its final stage was first presented in Figure 5.4 and its evolution and changes over the period of five years can be viewed in Figure 8.6.



**Figure 8.6: Element three: Changes in the CATE-b model**

Figure 8.6 shows that the third element of the CATE-b model has only three stages of e-business integration. Originally Figure 5.4, in 2004, outlined four stages of integration: (1) *Stage one*: Incorporate IT infrastructure; (2) *Stage two*: Change business approach and strategies; (3) *Stage three*: Internal integration; and (4) *Stage four*: External and full integration. This was based on the literature review and a limited exploratory study. These elements were not seen as a linear process but rather as the ‘building blocks’ of various factors helping SMEs to take one step at a time and when ready. However, the survey and longitudinal case study analyses revealed that all sampled SMEs already had IT and the Internet, albeit with different levels of usage. It also became evident later that element two of the CATE-b integration already



included the necessary changes an organisation requires to begin the journey towards becoming an e-business organisation. The revised element three thus consists of three stages of integration: (1) *Stage one*: Change business approach and strategies; (2) *Stage two*: Internal integration; and (3) *Stage three*: External and full integration. As originally conceived, these building stages of integration are seen as key enablers of a full e-organisational integration that will allow the free flow of information between suppliers, the organisation and customers. This can be expected to create profitable growth that provides a customer tailored product and service, and add superior value to the firm.

### 8.1.3.1 Stage one: IT infrastructure

*Stage one* requires implementation of an appropriate IT infrastructure, which is seen as the starting point for an e-business implementation strategy. An SME needs to provide and invest in the hardware and software specifically required for the business to work. It seems clear that the successful e-business strategy requires having the company's own systems in order (Feller, 2000; Porter, 2001; Chaston, 2004). The exploratory case study first indicated that companies which are highly IT capable and employ more skilled staff outperformed others in terms of profitability (Chapter 4). Based on these findings an example of the basic IT infrastructure in an organisation was presented and can be viewed in Table 5.1. Due to changes revealed in the survey and longitudinal case studies it was found that more specific requirements of IT infrastructure seem to be more suitable for SMEs. This example can be viewed in Table 8.7.

#### 1. Hardware

**Table 8.7: Stage 1: Basic hardware infrastructure for CATE-b model**

Source: Freelance System Integrator (SI Ltd)

Item	Specification 1	Specification 2
Computer case		
Motherboard	Gigabyte MB GA-G31-ES2L	LGA1156 H55 MSI H55M-E33, PCIe/DDR3/SATA2/GLAN/7.1
Processor	Intel, model DualCore E3300	
Processor description	Two CPU Speed : 2.50GHz Bus Speed : 800MHz L2Cache size : 1 MB TD Power : 65W Technology : 45nm	Speed:2.93 GHz
RAM memory	1x2GB DDR2 800MHz	DDR3 2 x 2GB 1600MHz Patriot
Graphic card	VGA Integrated 256MB	VGA GeForce GT220 Leadtek 1GB/DDR2,/DVI/VGA/HDMI/128bit
Hard drive	320GB SATA II 7200 rpm	SATA2 500GB 16MB 7200 rpm
Optical device	DVD-RW	DVD-RW
Housing	ATX Midi Tower	ATX Midi Tower
Power	450W	450W



Item	Specification 1	Specification 2
Sound card	5.1 Ch Sound Blaster OnBoard	Integrated 7.1
Other	Printer MFPrinter all in one multi function, Scanner, Fax machine, Monitor, Keyboard, Mouse	

For example, Specification 1 gives a typical configuration which should be used for accounting and stock management while a creative graphical design department would find Specification 2 more suitable. In addition, for SMEs' management mobility a laptop, such as Toshiba Satellite L500-1XU, and portable data projector Dell 1209S would be a reasonable option. For all computer configurations normal add-ons are a keyboard, mouse and TFT/LCD/LED, typically 19", monitor. In addition, a LAN router with wireless access to the local network and the Internet is expected in an SME of up to about 30 employees (Appendix C).

## 2. Software

Two general categories of software, the operating systems (OS) and applications, are needed.

**Table 8.8: An example of a Windows operating system and its application software for SMEs**

Source: Freelance System Integrator (SI Ltd)

Operating system	Applications (Microsoft Office)
Windows	Word
	Excel
	PowerPoint
	Access database
	Other specialised software

The OS is the basic program which supports installation of other application software. There are open-source free operating systems, such as Unix and Linux, and commercial ones like the omnipresent Windows. Normally, the compatibility of application software with operating systems will dictate which OS is installed. Also, before buying an OS, it is necessary to check the compatibility of the PC hardware (Appendix C).

Similar to hardware, application software also depends on the nature of the SME's business. For example, finance departments and accountants will normally need specialised accounting/book keeping software, whereas a design bureau will need one or more Computer Aided Design (CAD) applications. However, generic types of software, which almost inevitably appear nowadays, are suites, such as Microsoft Office or Open Office. A separate but important category of applications includes various antivirus, antispyware and firewall programs as well



as programmes for compressing data, like WinZip or WinRar. The IT budget dictates what type and how many items of software will be put to use by an SME c. Software licences are usually paid for annually (Appendix C).

### 3. Internet

The third requirement for basic IT infrastructure in SMEs is an Internet connection. This specification is listed in Table 8.9.

**Table 8.9: An example of the Internet specification**

Source: Freelance System Integrator (SI Ltd)

Item	Specification
Internet	Broadband connection
	Windows operating system (Windows OS)
	Antivirus program
	Firewall, which can be integrated in Windows OS or bought separately – companies providing it include: AVG, Kaspersky or SET-nod
	Wireless router – the connection between two or more PCs if required for more employees. Can connect at least 4 PCs via cable and up to 10 PCs wirelessly.
	E-commerce and B2C– via web-based catalogues

The overall basic IT infrastructure and requirements for a generic SME need to be assessed on the basis of companies’ individual needs and the modes of operation of different departments. Because of this only a few examples of different configurations are presented. The expenditure is also affected by a management decision to commission an IT consultant to set up the system initially, and, maybe, continue to manage and maintain it. Constant maintenance and upgrade of the IT infrastructure is practically inevitable and is very important considering the rapid development in t IT during the last 20 or so years. Apart from the technical nature of basic stage one integration, this study also combines theory and practice in which the survey and interview feedback were used to address proposition P<sub>6a</sub> (Table 8.10).

**Table 8.10: Proposition P<sub>6a</sub>: CATE-b**

<i>P<sub>6a</sub>. IT and Internet infrastructure are positively related to a successful e-business strategy.</i>			
Results			
Proposition P <sub>6a</sub>	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
H <sub>6a</sub>	7/9 do not have appropriate IT and Internet infrastructure	Hypothesis failed to be rejected – no evidence of association	5/9 do not have appropriate IT and Internet infrastructure



As Table 8.10 shows, the statistical evidence for association for  $P_{6a}$  was not found. However, the interviews revealed that, although all companies have some IT and an Internet connection, they require a better infrastructure that will ultimately support their e-business strategy. This is possible by integrating some of the specified items outlined in Appendix C. The findings from the survey and longitudinal case studies further impacted on the development of the CATE-b model and additional changes were made to the stages of IT integration. The research identified that sampled SMEs did not necessarily need to integrate internally first. After investing in an appropriate IT infrastructure which would be suitable for SMEs' individual needs, owners/managers need to make a decision as to whether to integrate internally, externally or both. The interviews revealed (section 7.6.1) that for some firms integrating internally is not suitable but instead, externally only. Other SMEs wished to implement both strategies while some would stay integrated only internally. These changes to the CATE-b model can be seen in Figure 8.3 and Figure 8.6. Clearly, after stage one integration companies can choose the best strategy for their business: integrate internally only, externally only or both. In that respect the following stages two and three should not be seen as a compulsory chain of events but a firm's choice of strategy.

### 8.1.3.2 Stage two: Internal integration

If a company decides to integrate internally, the business goal is to focus on cost reduction and internal efficiency (Cheng et al., 2001), as found in this study. More specifically, SMEs which are able to integrate internally are more successful and employ more skilled and knowledgeable staff (Ghoshal and Bartlett, 1988; Grant, 1996a, 1996b; Afuah and Tucci, 2001, 2003; Chaston, 2004; Lynn et al., 1999; Cheng et al., 2001). In order to integrate internally, SMEs need to invest in an appropriate infrastructure. The basic example of this infrastructure was first provided in Table 5.2. This is now followed by examples of SMEs' IT requirements for internal integration: (1) a main server; (2) an e-mail server; (3) Intranet; and (4) web-based applications. These four are needed in order to support their internal integration (Table 8.11).

**Table 8.11: Stage 2 – An example of internal integration for CATE-b model**

Source: Freelance System Integrator (SI Ltd)

Item	Specification
<b>Main Server</b>	The main server is a machine which is used by a group of people ('clients'), typically company employees via some kind of computer network. The most widely used computer networking model is the client-server model. Many software applications used by businesses are written for this kind of network organisation model. For computers to communicate between themselves, some kind of communication protocol is also required. The most popular protocols are internet protocols like HTTP, SMTP, Telnet and DNS. In essence, this communication model can be explained as a



Item	Specification
	<p>cooperation of various computer programs in one software. This means that a server provides some kind of service for one or more clients which send requests for such service.</p> <p>The most widely known example of this is an Internet search engine, like Internet Explorer or Google Chrome, residing on a client's computer which can have access to information which is on the Internet web server. Depending on the type of service it provides to clients, there are several types of server such as the mentioned web server, but also ftp server, application server, database server, name server, (e)mail server, file server and print server. Also, the majority of web services are provided by some kind of server.</p> <p>Apart from the hardware, a server requires its own operating system which is different than those used by client computers. Most widely used are Windows- and Unix-based server operating systems. More expensive options would involve high-end servers developed by some of the leading companies, such as Cisco, which come with their own operating systems and client server applications. Whatever operating system is used, the most important thing is to have a well matching combination of hardware and software which will be stable most of the time and would be able to cope with overloading caused by increased client requests. If an important company server becomes unstable and crashes for whatever reason this may yield large financial losses, so procedures must be in place to minimise both the probability of occurrence and negative effects of this.</p>
<b>E-mail Server</b>	<p>The exact hardware configuration of a server depends on the type of service the server provides. For a typical SME, e-mail server is an important part of its internal and external communication. That server should be able to provide the following services: web-based mail or simply webmail, which enables the reading e-mails via an HTTP protocol Internet browser, and also POP3 and IMAP protocols for reading e-mails in various programs, such as Microsoft Outlook.</p> <p>The existence of an e-mail server enables fast communication within and outside the company, and it requires only a very modest and relatively inexpensive hardware configuration. A typical e-mail server configuration would be Dell model PowerEdge 2600, with 512MB of RAM and a single 36Gb hard drive.</p> <p>Considering that this is an e-mail server, a 730W redundant power supply would be needed to provide continual service in the case of power loss. Typical examples of mail server software are MDAemon Email Server and Microsoft Exchange Server.</p>
<b>Intranet</b>	<p>To help SMEs manage their IT infrastructure securely owners/managers need a Virtual Private Network (VPN). VPN is any private network of computers which has been mapped onto a public network of computers and which uses some of the security protocols. VPN is a link between computers through local and broadband network with some kind of protected access and data. VPN can be imagined as a pipe within a pipe, whereby the inner pipe has a wall which does not allow access from within the outer pipe.</p> <p>There are various examples of software which can be used to form a VPN: The most widely used are Cisco Systems VPN Client, Microsoft Intelligent Application Gateway and Open VPN. Also, there are various protocols which can be used to protect a VPN: The most widely known are: SSTP, IPsec, Layer 2 Tunnelling Protocol, Point-to-point tunnelling protocol and Split tunnelling.</p> <p>As the Internet became more and widely used, companies started increasingly using it as the way to expand their existing computer networks. Nowadays, many companies are investing in the development of their own VPN to satisfy the needs for remote access to their company networks.</p> <p>To develop a VPN, a server with an appropriate hardware configuration is required. Then, the following are also needed:</p>



Item	Specification
	<ul style="list-style-type: none"> <li>• <i>User access:</i> i.e. selection of users who would be able to access the VPN</li> <li>• <i>Internet Protocol (IP) configuration:</i> a VPN server needs to have its own static IP address and a range of IP addresses which will be used by VPN clients. Also, for a VPN server, a DNS and WINS server addresses must be configured which will be given to the clients during their connection to the VPN.</li> <li>• <i>Data encryption.</i> All data must be protected in such way that clients who are not authorised cannot read them.</li> <li>• <i>Firewall ports.</i> If the VPN is behind a firewall, there must be open an IP protocol and TCP port for the VPN server.</li> </ul> <p>The advantage of VPN is remote and perfectly safe access to the company's network from anywhere in the world enabling literally the same conditions as somebody physically present in the networked company office has.</p>
<b>Web-based applications</b>	Accounts Marketing R&D Administration Sales

In addition to the technical information provided that supports the CATE-b model, the theoretical underpinning was also used which addresses  $P_{6c}$  (Table 8.12).

**Table 8.12: Proposition  $P_{6c}$ : CATE-b**

<i>H6c. IT and Internet infrastructure are positively related to the internal integration of SMEs.</i>			
Results			
Proposition $P_{6c}$	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
$H_{6c}$	6/9 do not have appropriate IT and the Internet infrastructure that would support internal integration	Hypothesis failed to reject – no evidence of association	5/9 do not have appropriate IT and the Internet infrastructure that would support internal integration

$P_{6c}$  proposition was investigated in terms of companies' turnover since stage two and three demonstrated that internal integration requires higher investments in hardware and software resources (Appendix C). The survey backed up this proposition as most SMEs experienced an increase in turnover after the introduction of the Internet (Table 6.8). This was also confirmed by the Mann–Whitney U test (Table 6.19). However, as supporting statistical evidence was not found, the hypothesis was not rejected (Table 6.34).

The overall statistical evidence shows that SMEs are still in their infancy with regards to internal integration. However, 30% of internally integrated SMEs provided a glimmer of hope, suggesting as they do that most SMEs experienced noticeable improvements in their efficiency.



On the other hand, the interviews in 2004 revealed that only three sampled SMEs had appropriate IT and Internet infrastructure to support internal integration. Between 2004 and 2009 one more company started using Intranet for business.

### 8.1.3.3 Stage three: External and full integration

Full integration can be seen as the only choice based on the company's strategic vision or, alternatively, as a natural progression from internal integration. If a company decides to pursue external or full integration, a B2B or B2C business model is required, calling for investment in quality web-based services. This would require the engagement of a specialist consultant to advise, configure, set up and perhaps maintain the web-based service. Usually, this requires either the renting of some kind of web-hosting services from one of many commercial companies, or commissioning of the company's own web server. There are many advantages of the B2B and B2C business models, such as fast searching of the company's services/products, efficient ordering of the company's products and/or services, and efficient on-line payment. In essence, this is the way to serve a business client without them visiting or phoning the company. Efficiency gains and savings are obvious for all parties involved. This is presented in Table 8.13

**Table 8.13: Stage 3 – An example of external integration for CATE-b model**

Source: Freelance System Integrator (SI Ltd)

Item	Specification
Motherboard	Intel Xeon Quad core E5506
Processor speed	2.13 GHz
Hard drives	Smart array P410i/256MB (RAID 0/1/1+0/5/5+0) SAS 2x146GB, 10,000rpm
Optical device	DVD+/-RW
Housing	ATX Midi Tower
Power	460W
LAN card	2x10/100/1000 Ethernet

The usual LAN speed needed nowadays to provide this kind of service is 1Gbit/s and it should not be forgotten that any external visibility of the company usually requires a firewall, along with antivirus and antispyware protection of the applications and data from outside hacker 'attacks'. This protection needs to be installed on all the company's computers. Normally, computers should be networked using LAN as well as the Internet, in particular if the company has its own B2B and B2C services. If necessary, a networked server can be installed to serve as a file repository, data searching and access to the Internet and other specialist services developed for that particular SME, depending on the nature of its business. A typical server configuration nowadays is given in the following table for HP Server Proliant ML 350G6 106 (Appendix C).



Intranets are internal networks featuring, typically web-based, applications and are used only within a company (Callaghan, 2002). Extranets are a private network with limited access given to external parties such as suppliers, buyers, business partners and general customers outside the company (Wilkinson, 2005). Extranets use publicly available Internet protocols such as telephone, cable and wireless-based broadband communications. Extranets can comprise of several VPNs which physically exist at different locations. In principle, there are two types of Extranet: those where all collaborating companies allow access to their Intranet to other business partners, and those whereby one company allows access to its Intranet to all of its business partners (Appendix C). For the Extranet to function properly, it is necessary to invest in its security. This means having some kind of firewall server management, digital certificates or similar ways for verifying the users as well as encryption of data and use of VPNs tunnelling through public networks (Applegate, 1999; Fellensteinand-Wood, 2000; London and Traver, 2007). An Extranet is mostly used for:

- Exchange of large volumes of data through Electronic Data Interchange (EDI);
- Exchange of on-line product catalogues;
- Collaboration between companies when developing new technologies;
- Training programs with other companies;
- Access to various services which one company provides to others, such as on-line banking;
- Exchange of information which is of mutual interest to all parties.

The downside of an Extranet is the high cost of integration and maintenance in one organisation, including, hardware and software and the staff training needed to keep the system running (Appendix C). The sampled SMEs in this study have a very limited external integration, as this would suggest. An attempt to gain some measurable evidence to support  $P_{6d}$  was made in Chapter 6, Table 6.35. The overall findings are presented in Table 8.14.

**Table 8.14: Proposition  $P_{6d}$ : CATE-b**

<i><math>P_{6d}</math>: IT and Internet infrastructure are positively related to the external integration of SMEs.</i>			
Results			
Proposition $P_6$	Exploratory study 2004	Survey 2005–2007	Longitudinal case studies 2009
$P_{6d}$	5/9 do not have appropriate IT and the Internet infrastructure that would support external integration	Hypothesis failed to reject – no evidence of association	5/9 do not have appropriate IT and the Internet infrastructure that would support external integration



Although evidence of no association was acknowledged in the  $P_{6d}$  this survey identified that, although approximately 50% of SMEs use e-commerce for sales and purchasing, only around 30% use e-business for partial integration with suppliers (B2B) and customers (B2C), as shown in Table 6.6 and Table 6.7. Since this survey identified high improvements in SMEs' business process (i.e. improved efficiency, increased turnover, improved quality, improved marketing and relationship with suppliers) it provides a good base to claim that e-business has the potential to create competitive advantage in SMEs, but more robust tests would need to be performed to be conclusive.

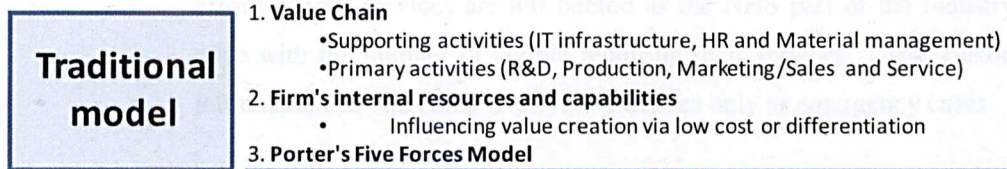
If SMEs decide to integrate both externally and internally they are likely to achieve free information flow between suppliers, organisation and customers. This is the final and full integration where the business goal is to create market value and competitive advantage by using Internet technology for e-business purposes. In addition, this stage enables supply chain integration and more effective in-sourcing and outsourcing. It also allows for sophisticated online business to interrelate internally as well as externally. Many scholars support full integration (Van Hooft and Stegwee, 2001; DTI, 2000; Lynn et al., 1999; Seybold and Marshak, 1998; Chaston, 2004; Porter, 2001; Venkatraman, 1994; Fahy and Hooley, 2002; Afuah and Tucci, 2003). However, this study demonstrated that only a small number of sampled SMEs are integrated either internally or externally. No SME was found to be integrated fully.

## 8.2 Simulation of CATE-b model application: Occidental Ltd

To illustrate the application of the CATE-b model a simulation was applied on Occidental Ltd (a dental practice) which is one of the longitudinal case studies (section 7.5.2). The simulation of the CATE-b model is organised in the following way: (1) The traditional organisation is explained in which the value chain, resources and capabilities, and Porter's Five Forces Model, are applied; (2) The changes recommended in the value chain are presented; and (3) the CATE-b model is applied through its three stages.

Occidental Ltd is a traditional SME (sections 4.3.5 and 7.5.2) which opened in the year 2000.

1. **Value chain** – In order to provide a competitive advantage for the firm the owner was looking into improving the company's support activities in terms of IT infrastructure because of the fast development in technology. However, due to the Government's inability to integrate the NHS through an advanced IT infrastructure the technology was deemed as not very important for this firm and IT continued to be used as a support activity to process administration, book appointments and keep records of patients in the practice.



**Figure 8.7: CATE-b theoretical application of a traditional model on Occidental Ltd**

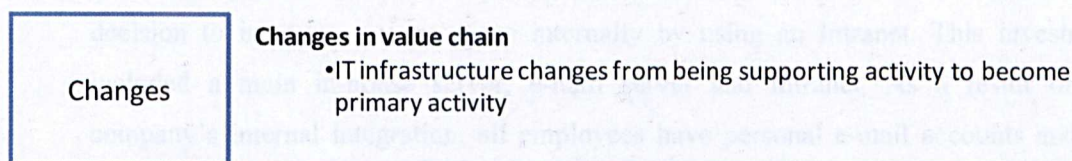
2. **Firm's internal resources and capabilities** – As a result of rapid IT developments in the early 2000s, Occidental decided to review its internal strengths and weaknesses as well as to examine external opportunities and threats. Although the owner was personally in favour of IT, the question of the health and hygiene of patients was the obstacles to a much wider implementation of IT in the practice. The staff constantly needed to change and remove protective gloves if they were to switch between their patients and their work on computers. This was expensive and impractical for the firm. As a result the firm concentrated on its internal strengths of maintaining quality, efficiency and innovation. Although the owner was concentrating on internal strengths, Occidental's business environment was influenced by many changes externally, one of which was initiated by the Government's failure to integrate the NHS through an advanced IT infrastructure investment. This new environment modified Occidental's position in the business environment forcing the firm to adapt and consequently shaping the firm's competitive strategy in a different direction. The owner of the company was faced with an analysis of competitive forces in the dental industry and identified opportunities and threats confronting the company. Due to the Government failure, Occidental's owner assumed that computers were not very important for the practice. However, the owner's personal belief was much more in favour of IT. Consequently, her long-term strategic positioning of the practice in the years to come was to implement an IT infrastructure and make IT the practice's primary activity that underpinned the core of the business.
3. **Porter's Five Forces Model** – Occidental was able to exploit its uniqueness in terms of core competency through efficiency, quality and innovation to achieve a profit above the industry average (Appendix B).
  - a. **Threat of new entries** – The threat of new entries is very low in the dental industry. Small private practices are expensive to start and require substantial knowledge, high qualifications and highly skilled staff.
  - b. **Rivalry within the industry** – The rivalry within the industry is high and everyone wants to attract a proportion of customers who are financially able to use dental practices on a regular basis. However, many customers who cannot



afford private services are left behind as the NHS part of the industry cannot cope with the number of people requiring their services. These customers are left unattended and come to private practices only as emergency cases.

- c. **Threat of substitutes** – The threat of substitutes is low since there are only NHS practices that are overcrowded and leave people with low income or no income at all to deal with their teeth themselves.
- d. **Bargaining power of customer** – The bargaining power of the customer is very low due to the limited number of dental practices available and the high financial requirements for treatment.
- e. **Bargaining power of suppliers** – The bargaining power of the suppliers is high since there are many opportunities offered on the market but the buying power of dental practices is very low.

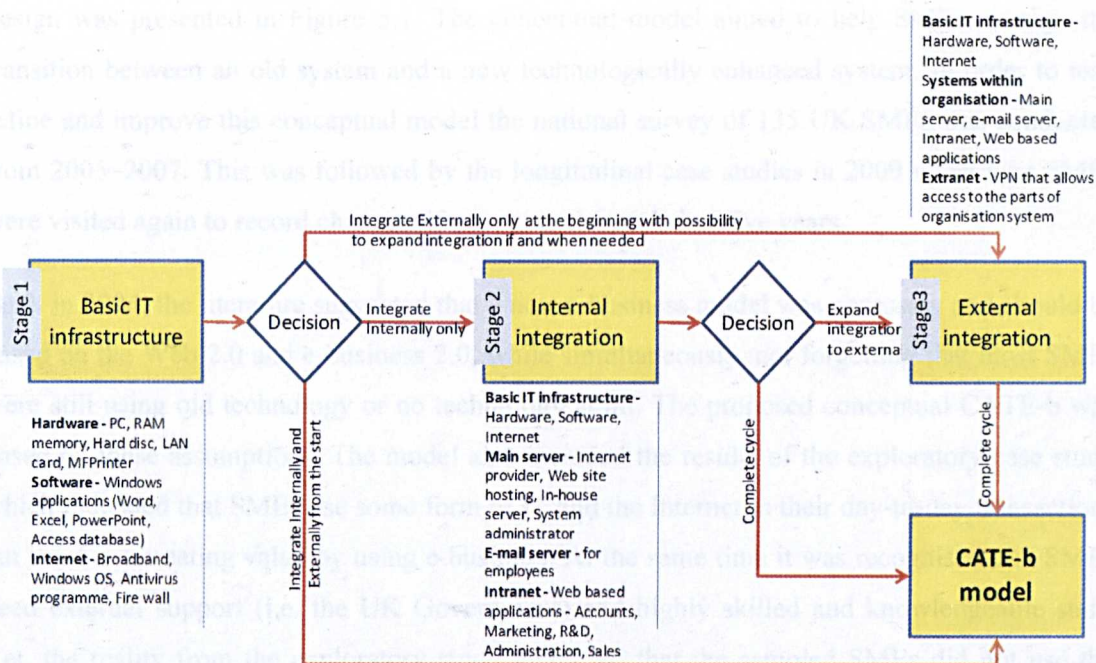
In response to the Five Forces assessment the owner of Occidental recognised a number of new opportunities in the business environment and formulated a long-term strategy for the firm. The company's new strategy was to invest in IT infrastructure (Figure 8.8) which in return would help the firm maintain its efficiency, quality and innovation.



**Figure 8.8: CATE-b theoretical application of changes in value chain**

The firm's long-term strategy included planned investment in hardware and software. The company opted for outsourcing these services for £250 pcm. The system includes maintenance, staff training, in-house server, e-mail server, wireless connection, Windows application, broadband, Intranet and Extranet. This decision transformed the company's IT infrastructure from being simply a support activity into a primary activity running alongside the firm's primary activities. The owner realised that without an appropriate IT infrastructure and long-term planned investment the firm would not be able to expand at the speed it wanted. The company's long-term strategy for IT development is analysed in Figure 8.9.





**Figure 8.9: CATE-b model**

1. **Basic IT infrastructure** – Hardware, software and the Internet (see also Table 8.7). Here the owner made the decision to integrate internally and externally.
2. **Internal integration** – After investing in a basic IT infrastructure the owner made a decision to integrate two practices internally by using an Intranet. This investment included a main in-house server, e-mail server and Intranet. As a result of the company's internal integration, all employees have personal e-mail accounts and the company has improved its communication process (see also Table 8.11).
3. **External integration** – the company integrated externally, albeit only partially, and is doing B2B with the NHS with the possibility of integrating fully once the Government puts the NHS IT infrastructure in place (see also Table 8.13).

Overall, Occidental has used developments in IT and the Internet to their advantage which has reflected positively on the company's performance. In the future, the owner of the practice is aspiring to integrate fully with the NHS and other practices in order to improve Occidental's overall business performance.

### 8.3 Summary of e-business model CATE-b

The literature review (Chapter 2) and an exploratory case study (Chapter 4) recognised that SMEs needed a strategic plan that would create grounds for e-business integration. Based on these initial findings, a conceptual CATE-b e-business model was proposed in Chapter 5 and its



design was presented in Figure 5.1. The conceptual model aimed to help SMEs manage the transition between an old system and a new technologically enhanced system. In order to test, refine and improve this conceptual model the national survey of 135 UK SMEs was conducted from 2005–2007. This was followed by the longitudinal case studies in 2009 when nine SMEs were visited again to record changes, if any, over the period of five years.

Back in 2004, the literature suggested that a new e-business model was necessary and should be based on the Web 2.0 and e-business 2.0, while simultaneously, not forgetting that most SMEs were still using old technology or no technology at all. The proposed conceptual CATE-b was based on these assumptions. The model also included the results of the exploratory case study which indicated that SMEs use some form of IT and the Internet in their day-to-day transactions but were not creating value by using e-business. At the same time it was recognised that SMEs need external support (i.e. the UK Government) and highly skilled and knowledgeable staff. Yet, the reality from the exploratory study identified that the sampled SMEs did not use the external support offered by the Government and did not employ skilled and knowledgeable staff.

Over the past five years the technology developed rapidly and it is now suggested that new e-business models should be based on Web 3.0 and e-business 3.0. Following on from the exploratory study in 2004, the national survey in 2007, longitudinal case studies in 2009, and these technological developments, a new CATE-b model was constructed and presented in this chapter.

The original model was refined and developed in line with these changes and now CATE-b consists of three elements that translate into an enterprise that is both efficient and flexible, allowing the company to adapt, change, grow, and innovate. This model takes into consideration that some companies will use the Internet only for communication and will never trade online but will instead communicate and exchange data using e-business mechanisms which connect firms internally and/or externally via the Internet. To simulate the application of CATE-b model one of the longitudinal case studies, 'Occidental Ltd', was introduced.

Finally, this chapter highlighted a number of issues, most importantly, that SMEs which take advantage of the resources offered by the UK Government (DTI, 2003, DTI, 2007; BERR, 2008) and have an appropriate attitude towards investment in high-level technology are more likely to succeed than others, as presented in the case of Occidental's. This finding suggests that, while market forces can encourage SMEs to build successful organisational structures through exploiting IT as an integral part of their business, the role of the government has proven significant in encouraging SMEs to make a step change in deployment of IT.

# Chapter 9

## 9 Conclusions and recommendations

Following the completion of this study, this chapter summarises the key findings and recommendations arising from them in the following four sections: (1) Discussion of the research design and research questions identified in Chapter 1 and an overview of the research as a whole; (2) An overview of the results, their implications, contribution to knowledge and practitioners; (3) Limitations of the research; (4) Recommendations for future research.

### 9.1 Research design

This research was designed to assess the possibility of creating competitive advantage in UK SMEs through the use of e-business. The aim of the research was to evaluate the need for e-business applications in SMEs, the implications for the owners/managers and the creation of a new e-business model. While prior empirical studies indicated that SMEs do not recognise or acknowledge the technological changes taking place in their business environment, there has not yet been research undertaken that creates and implements a plan that would allow them to make a transition from an old system to a new, forward looking, e-business organisation.

In order to develop an efficient way to progress this study and develop a new model, this research sought answers to the following research questions:

1. Identifying the e-business benefits to the organisation;
2. Addressing the issues specifically related to competitive advantage, strategic management, e-business applications, and e-business elements such as the Internet, Intranets and Extranet ;
3. Creating an e-business model that will enable the integration of the Internet as a core competence.

In addition, this research examined the implications for SMEs when implementing e-business applications. The e-business model produced as a part of this study aimed at achieving organisational success and improving organisational effectiveness within an e-business environment.



### 9.1.1 Overview of the research

In order to address the research questions and establish a framework for development of the model, a comprehensive literature review was undertaken in Chapter 2. Given that many SMEs in the UK are renowned for their slow acceptance of e-business, this chapter established the foundation of the present research by emphasising the classical and traditional approach to the creation of competitive advantage with the application of Porter's Five Forces Model and value chain. However, in reviewing the literature it became apparent that companies' resources and capabilities as well as the value chain's supporting activities could be important in creating a new model – but what appeared to be lacking was an appropriate plan for SMEs that would allow their transformation from an old system to a new e-business oriented company.

Although many studies have reported a range of business models, there has not yet been any research undertaken to investigate which (1) factors influence the adaptation and implementation of a new strategy; and (2) which factors would enable SMEs to understand how to create a competitive advantage through e-business. Therefore, to enable this transition, six propositions were put forward as the basis for the creation of a new e-business model. The ultimate aim was to use this model as a base for developing an appropriate IT infrastructure in SMEs that would enable the owners/managers to change their strategies and progress towards internal and/or external integration with the possibility of creating competitive advantage at each stage of integration.

For the purpose of this research, three primary research studies were undertaken in which both research paradigms were used, namely qualitative and quantitative in line with the 'mixed approach' method. Chapter 3 discussed the justification for the research design, the questionnaire development and the method of data collection. An exploratory case study was first used to confirm the research methodology's robustness and to gather initial data which would be later used for the development of a conceptual model. The findings from this initial study were reported in Chapter 4 and the creation of a conceptual model was evaluated in Chapter 5. Statistical analyses based on national surveys were carried out and discussed in Chapter 6. The longitudinal case studies were analysed using NVivo 8 and its findings were reported in Chapter 7. With the support of propositions testing and results of the findings a new CATE-b model was developed, presented and discussed in Chapter 8.

## 9.2 Research results and implications

Based on the empirical work presented earlier, this research identified that SMEs focus their core business on quality, efficiency and customer responsiveness but not on exploiting their

small size to adapt quickly to market changes. While some SMEs reported low levels of importance of e-business, most preferred e-mails and websites in order to communicate in carrying out their business activities. However, some SMEs reported higher levels of e-business use through internal and/or external integration with business partners. The main reason for using e-business was to be more competitive, to improve relationships with customers, reduce costs and become more efficient. Here all SMEs reported high levels of change after using e-business applications. This clearly implies that it is possible to create competitive advantage in SMEs by using e-business technology. The overall results also highlighted that those SMEs which took advantage of the resources offered by the external environment (i.e. the UK Government) and had a positive attitude towards investment in high-level technology were those likely to be equipped with tools to maintain a competitive advantage in the 21<sup>st</sup> century. One perhaps surprising yet crucial finding of this study is that the role of the UK Government with regard to information technology is more vital than even the SMEs probably realise. Without the assistance arising from the IT initiatives implemented by the UK Government, SMEs would have lacked the resources (financial and/or technical) to implement any significant IT improvement. In the initial exploratory study, one owner/manager of an SME encapsulated a common sentiment found among SMEs; namely, that the distribution of these Government initiatives was nothing more than junk mail, highlighting that the communication of these initiatives was at best, sub-standard. Further study showed that only a few SMEs had utilised any of this funding or assistance.

On the whole, this research points out that while, on the one hand, SMEs use IT and the Internet to enhance their business competitiveness; on the other hand, the attitude of the owners and the knowledge at managerial levels was often the very obstacle to using the Internet. This gap between the existence of Internet technology and the absence of the appropriate attitude and knowledge pose a number of challenges for SMEs in the creation, development and maintenance of the competitive advantage gained through e-business.

### 9.2.1 Novelty and contribution

To overcome these challenges the findings were used to develop an e-business “Competitive Advantage Through E-business” (CATE-b) that would not only make a contribution to knowledge but also potentially solve the practical problems faced by small businesses in the UK. CATE-b model was first proposed in Chapter 5 and later verified and adapted through survey and longitudinal case studies. The final model was presented and discussed in Chapter 8. CATE-b consists of three elements that translate into an enterprise that is both efficient and flexible, allowing the company to adapt, change, grow, and innovate. This model takes into consideration that some companies will use the Internet only for communication and will never



trade online but will instead communicate and exchange data using e-business mechanisms which connects firms internally and/or externally via the Internet. This model is meant to serve the heuristic purpose of acting as a guide to help SMEs to comprehend an e-business vision, formulate strategy, identify e-business application areas, put together a portfolio, and design a plan for e-business implementation. In short, the long-term goal of this study is to help SMEs to enhance their local, national or global competitiveness through applying the CATE-b model, with the hope that new technology can become a force for creating competitive advantage.

The achievements of this study provide a clearer and more in-depth understanding of SMEs, their heterogeneous nature and complexity including owners/managers and their employees' attitudes towards e-business. Without the plan, it would be difficult for SMEs to succeed and create competitive advantage in this new virtual environment in which businesses operate today.

### 9.3 Limitations of the research

Although the initial aim of this study to identify if SMEs could create competitive advantage by using e-business was achieved, the study identified some limitations. Despite a number of useful findings from the initial exploratory case study, the sample was found to be too small and did not reflect the true nature of the UK business population. The findings, however, provided the basis to initiate the creation of the CATE-b model. Still, it proved less successful than expected as further studies identified its limitations, as outlined in Chapter 8. The model was further developed by using the survey technique, but still the sample proved to be relatively small due to the generally weak response rate to the questionnaire. Thus, although the e-questionnaire was regarded initially as a good method for reaching technologically able SMEs, in the end it did not materialise as planned as, for instance only 135/3000 responses were received from UK SMEs. In addition, the questionnaire was initially developed as a tool to test propositions and the potentials of the model. However, the statistical analysis revealed that many SMEs have a different understanding of one of the key questions related to the use of online business, namely "Do you do business online" (Q15). Consequently, not all planned analysis could be carried out. Chapter 8 provided a new solution for SMEs via the amended CATE-b model. Although the results of both the surveys and longitudinal case studies proved satisfactory in terms of the analysis performed, the model could only work fully if it was based on a much larger statistical data analysis, more rigorous analytical tests and more in-depth and longitudinal case studies analysis.

## 9.4 Recommendations for further research

The CATE-b model was developed based on a very small sample of UK SMEs. This model has identified that firms require a strategic plan that will allow them to make the transition from an old system to a new forward-looking e-business organisation. Although this study has provided an initial set of data showing that many businesses are using various IT and Internet applications to support their businesses, more robust studies are called for in order to confirm these findings. Therefore, the proposed model should be tested further in more rigorous studies using both qualitative and quantitative methodologies. While survey techniques would prove invaluable for collecting much-needed statistical evidence with regard to the uptake of e-business in UK SMEs, qualitative studies should not be disregarded; as such independent studies would enable this model to be tested in its natural business environment.

## 9.5 Concluding remarks

British managers have a lot to learn. Chandler (1990) attributes Britain's long-term decline to the persistence of 'personal management', based upon family ownership, traditional methods and cautious growth. As a consequence, *"Britain suffers from a legacy of shambolic, amateurish managerial elites incapable of competing in the modern world. British managers' lack rigour which reinforces an ad hoc short-term orientation to business"* (Chandler, 1990:34). Indeed, according to Storey and Sisson (1990:63), *"Few British managers have had the opportunity to be exposed, in any serious and sustained way, to the actuality of formal planning processes. In the British context, planning, for too many managers, simply means budgeting"*.

A good many of Britain's economic problems, including the one at the heart of this study, of not accepting e-business quickly enough as an underlining philosophy, would be solved if only managers were taught to plan as the classical textbooks advise them. This, however, requires much greater investment in management training and education. Without developing plans to realise such an aim, it will remain difficult for SMEs to succeed and create a competitive advantage in this new virtual environment in which businesses operate today.



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# 11 Appendices

## 11.1 Appendix A

### Survey questionnaire and corresponding material

#### 11.1.1 E-questionnaire

#### 11.1.2 Corresponding letter

#### 11.1.3 An example e-mail

## 11.1.1 Questionnaire

THE UNIVERSITY OF SHEFFIELD Management School

The use of e-business to create a competitive advantage in SMEs

### QUESTIONNAIRE

This information will be kept confidential and only aggregated results will be presented in the research. Please complete the following questionnaire accurately.

#### 1 Please fill in your company details.

Your name:

Position in the company:

Name of the company

Address:

Town/City

County

Post Code

e-mail

#### 2 What is your industry sector?

1. Automotive

2. Manufacturing

3. Electronics, IT, Computing

4. Agriculture, Food, Fishery

5. Engineering, Construction

6. Service

7. Leisure, Hospitality, Travel, Tourism

8. Dealers

9. Other,  please specify

#### 3 How many people do you employ?

1. 1-9

2. 10-49

3. 50-249

4. 250+

**4 What was your sales turnover in the last financial year?****5 What year did your organisation begin trading?**Year **6 Who are your main competitors? (You can tick more than one option).**1. Micro organisations (0 - 9 employees) 2. Small organisations (10 - 49 employees) 3. Medium organisations (50 - 249 employees) 4. Larger organisations (250+ employees) 5. Other  (please specify) **7 Who are your main suppliers? (You can select more than one option).**1. Micro organisations (0 - 9 employees) 2. Small organisations (10 - 49 employees) 3. Medium organisations (50 - 249 employees) 4. Larger organisations (250+ employees) 5. Other  (please specify) **8 Who are your main customers? (You can select more than one option).**1. Micro organisations (0 - 9 employees) 2. Small organisations (10 - 49 employees) 3. Medium organisations (50 - 249 employees) 4. Larger organisations (250+ employees) 5. Other  (please specify) **9 What is the core of your business? (You can select more than one option)**1. Innovation 2. Quality 3. Efficiency 4. Customer responsiveness 5. Internet Technology 6. Low Cost 7. Differentiation 8. Other  please specify **10 Do you have an IT budget in your organisation?**1. Yes 2. No 3. Don't know **11 Do you have an e-business budget in your organisation?**



1. Yes

2. No

3. Don't know

**12 Does your organisation need advice or training in using IT to support business processes?**

1. Yes

2. No

3. Don't know

**13 In what areas of business process do you require IT technical support? (You can select more than one option)**

1. Processing customer orders

2. Working with suppliers and other associates

3. Managing stock control and production

4. Managing the relationship with your customer

5. Finance and accounts

6. Other areas  please specify

**14. Do you have any of the following internal IT resources? (You can select more than one option)**

1. An IT enthusiast

2. An IT department

3. A dedicated IT role/person

4. None

5. Other  please specify

**15 Do you do business on-line?**

1. Yes

2. No

3. Don't know

If no please go to question 27

**16 Which of the following on-line activities (i.e. using the Internet) does your organisation use? (You can select more than one option)**

1. Email

2. Web page

3. Sales

4. Marketing

5. Order quotation

6. Invoicing

7. Stock control

8. Purchasing

9. Logistics planning

10. Production and scheduling

11. Partially integrated with customers

12. Partially integrated with suppliers

13. Fully integrated with customers

14. Fully integrated with suppliers

15. Other  please specify

**17 Which of the following software packages/systems do you use to support your on-line business? (You can select more than one option)**

1. Access Database

2. Excel

3. ERP (Enterprise resource planning)

4. MRP (Material Requirements Planning)

5. MRP II (Manufacturing Resource Planning)

6. EDI (Electronic Data Interchange)

7. CRM (Customer Relationship Management)

8. B2B (Business to Business)

9. B2C (Business to Consumers)

10. SCM (Supply Chain Management)

11. SRM (Supply Relationship Management)

12. RFID (Radio Frequency Identification)

13. Other  (please specify)

**18 Which of the following hardware/network do you use to support your on-line business? (You can select more than one option)**

1. WAN (Wide-area Network)

2. LAN (Local-area Network)

3. POP (Point of Presence)

4. In-house managed server

5. Independent/outsourcing ISP (Internet Service Provider)

6. Other  (please specify)

**19 What connection techniques do you use to support your on-line business? (You can select more than one option)**

1. Dial-up

2. ISDN (Integrated Services Digital Network)

3. ADSL (Asymmetric Digital Subscriber Line)

4. DSL (Digital Subscriber Line)

- 5. SDSL (Symmetric Digital Subscriber Line)
- 6. Cable Modem
- 7. Wireless network connection (WNC)
- 8. Other  (please specify)

**20 To what extent are you integrated (using e-business applications) with your suppliers?**

- 1. Not at all
- 2. A little
- 3. Moderately
- 4. To a great extent
- 5. Fully

**21 To what extent are you integrated (using on-line activities) with your customers?**

- 1. Not at all
- 2. A little
- 3. Moderately
- 4. To a great extent
- 5. Fully

**22 When did you first introduce Internet technology in your organisation? (Please specify year)**

**23 How important are each of the following factors in the decision to introduce the Internet technology in your organisation? (You can select more than one option)**

- 1. Trend (everybody does it)
 

Not at all  A little  Moderately  Very much  Extremely important
- 2. To be more competitive
 

Not at all  A little  Moderately  Very much  Extremely important
- 3. To provide a better service to customers
 

Not at all  A little  Moderately  Very much  Extremely important
- 4. To improve relationship with suppliers
 

Not at all  A little  Moderately  Very much  Extremely important
- 5. To reduce cost
 

Not at all  A little  Moderately  Very much  Extremely important
- 6. To reduce bureaucracy
 

Not at all  A little  Moderately  Very much  Extremely important
- 7. To streamline information flow
 

Not at all  A little  Moderately  Very much  Extremely important
- 8. To be more efficient
 

Not at all  A little  Moderately  Very much  Extremely important



9. To increase turnover

Not at all  A little  Moderately  Very much  Extremely important

10. To improve quality

Not at all  A little  Moderately  Very much  Extremely important

11. Other

(please specify)

Not at all  A little  Moderately  Very much  Extremely important

**24 What changes did you notice in your organisation after you introduced the Internet technology?**

1. None

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

2. The organisation became more competitive

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

3. Improved customer service

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

4. Improved relationship with Suppliers

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

5. Reduced cost

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

6. Reduced bureaucracy

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

7. Streamlined information flow

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

8. Became more efficient

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

9. Increased turnover

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

10. Increased quality

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

11. Other,

(please specify)

Strongly disagree  Disagree  Neutral  Agree  Strongly agree

**25 Can you indicate how important were the following in your organisation before the Internet introduction? (1 - the least important, 5 - the most important.)**

1. Research and development (R&D)

1  2  3  4  5

2. Product

1  2  3  4  5

3. Marketing/sales

1  2  3  4  5

4. Service/Customers

1  2  3  4  5

5. Company's Information and Communication Technology (ICT)

1  2  3  4  5

6. Human resources

1  2  3  4  5

**26 Can you indicate how important are the following in your organisation *after* you introduced Internet technology? (1 - not at all important, 5 - extremely important)**

1. Research and development (R&D)

1  2  3  4  5

2. Production

1  2  3  4  5

3. Marketing/sales

1  2  3  4  5

4. Service/Customers

1  2  3  4  5

5. Company's Information and Communication Technology (ICT)

1  2  3  4  5

6. Human resources

1  2  3  4  5

Please feel free to add any comments you may have in relation to the changes that your organisation has experienced after introducing the Internet technology.

▲
■
▼
◀
▶

**27 Do you use any of the following Government/Non Government agencies to seek e-business advice or support? (You can select more then one option)**

- 1. Department of Trade and Industry (DTI)
- 2. Business Link (BL)
- 3. UK online for business
- 4. Federation of Small Businesses (FSB)
- 5. Not used at all
- 6. Other,  please specify

**28 How helpful do you find Government/Non Government agencies in your area of business and in terms of on-line support they offer to organisations?**

- 1. Not at all
- 2. A little
- 3. Moderately
- 4. Very much
- 5. Extremely helpful

**29 Are you aware of new Government initiatives related to the e-business advice or support in Small and Medium-sized enterprises?**

- 1. Yes
- 2. No
- 3. Don't know

If yes, please give an example

**30 Can you indicate how the following factors are affecting implementation of the Internet technology in your organisation?**

- 1. Lack of skilled human resources  
 Not at all affecting  A little  Moderately  Very much affecting  Extremely affecting
- 2. Lack of knowledge at managerial level  
 Not at all affecting  A little  Moderately  Very much affecting  Extremely affecting
- 3. Lack of financial resources  
 Not at all affecting  A little  Moderately  Very much affecting  Extremely affecting
- 4. Poor security  
 Not at all affecting  A little  Moderately  Very much affecting  Extremely affecting
- 5. High cost of technology  
 Not at all affecting  A little  Moderately  Very much affecting  Extremely affecting
- 6. Lack of trust  
 Not at all affecting  A little  Moderately  Very much affecting  Extremely affecting



7. Other,

please specify

Not at all affecting  A little  Moderately  Very much affecting  Extremely affecting

Please feel free to add any additional comments you may have in relation to the factors affecting implementation of the Internet technology in your organisation.

**31. What advice or support is most welcomed by your organisation?** (You can select more than one option)

- 1. Sector specific events
- 2. On-line training
- 3. Face-to-face meetings
- 4. Locally based training events
- 5. Other  (please specify)

**32 Do you use any of the following private networks (Intranet) within your organisation?** (You can tick more than one option).

- 1. Company uses only e-mail to communicate with other members of staff
- 2. Company uses Intranet to manage projects
- 3. Company uses Internet to provide information to employees
- 4. Company uses Intranet to distribute data and information internally
- 5. Other  (please specify)

**33 If you would like to add more information or comment on any question please use the space below:**

**34 If you would like to receive results of this research please select the box below.**

## 11.1.2 Questionnaire corresponding letter

### **The Creation of Competitive Advantage in SMEs Through E-Business**

The University of Sheffield Management School is carrying out research on how e-business can create a competitive advantage in Small and Medium-sized Enterprises (SMEs). This is because open markets have created competitive pressures on the UK's SMEs. Therefore there is a need for improved understanding of the practice of e-Business. Research has shown that although SMEs are rapidly adopting the Internet they are slow to adopt e-business as the basis for business communications and transactions. There is a general concern that the limitations of appropriate technological resources and inadequate knowledge may inhibit SMEs operational efficiency and innovation and limit the competitive advantage that e-business could bring to their businesses.

This research aims at a better understanding of e-business and its role in SMEs. However, SMEs face considerable difficulties and problems in the area of e-business. Many SMEs are not equipped with, and supported by, appropriate guidelines and models to allow them to take advantage of the developing information economy and the e-business era. The lack of this kind of support makes it difficult for SMEs to use e-business to gain a competitive advantage.

Many SMEs' business customers and suppliers are moving towards the e-business era, with Business-to-Business (B2B) and Business-to-Consumer (B2C) transactions online. The use of traditional business practices prevents SMEs developing strategic customer-supplier partnerships. It also hinders effective customer relationship management.

The overall aim of this project is to find ways of enhancing SMEs' business competitiveness via the use of e-business. The objectives of this project are to provide the SMEs community with a new and better e-business model that will facilitate changeover from traditional business practices to e-business practices. Such a model would help SMEs to manage the transition period from an old system to a new integrated organisation. It is hoped that SMEs will be able to exploit this new model to gain a competitive advantage through the use of e-business.

To help us study practical e-business implications for SMEs we would like to involve practitioners by asking them to share their experience with us by completing the electronic questionnaire (see below). We would also like to talk to anyone interested in this topic and willing to contribute to the development of the best way of implementing e-business. We are therefore very interested in talking to IT professionals in SMEs, owner-mangers of SMEs and

anyone with experience of the use and implementation of e-business in small and medium sized enterprises.

<http://www.shef.ac.uk/spavic/>

Thank you

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### 11.1.3 An example of e-mail

**Fwd: Research at the University of Sheffield**  
Suzana Pavic [ecr03sp@sheffield.ac.uk]  
**Sent:** 19 May 2010 09:40  
**To:** s.pavic@shu.ac.uk

**Attachments:** [Open as Web Page]

---

----- Forwarded message from Suzana Pavic <ecr03sp@sheffield.ac.uk> -----  
Date: Tue, 31 Jan 2006 20:43:22 -0000  
From: Suzana Pavic <ecr03sp@sheffield.ac.uk>  
Reply-To: ecr03sp@sheffield.ac.uk  
Subject: Research at the University of Sheffield  
To: tcm@becconsallsafe.plus.com

Dear Sir/Madam,

The University of Sheffield, Management School is carrying out research on how e-business can create a competitive advantage in SMEs. To help us study e-business implications on SMEs we would like to involve practitioners by asking them to share their experience via completing an electronic questionnaire. We would greatly appreciate if you could spare some of your very precious time and complete this questionnaire, which link is provided below. I also attach an article about my research that gives some additional information. In addition I would be happy to supply you with a final report about my findings once I finish with my research.

Thank you very much

Suzana Pavic

<http://www.shef.ac.uk/spavic/>

## 11.2 Appendix B

### Case study interview transcripts

#### 11.2.1 Case study 1 – Lovebytes Ltd

17 July 2009; 10:30am-11:30am – Cream café – Broomhill – Sheffield – Interview with Janet Jennings

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Q1 Company name?

Lovebytes

Q2 What happened between 2004 and 2009 in your organisation?

We are smaller comp now than before in 2004, only two people working. Big difference. We still have laptop each, printer and scanner. We have multi function but without fax , We never ever use fax. Old technology

Q3 What is your industry sector?

We belong to Art and media, art and events (nearest would be leisure industry) industry

Q4 How many people do you employ

One person. It is only John who is the director and myself.

Q5 What was your sales turnover in the last financial year?

Turnover in 2008 was 100,000 on top of my head. I would need to check that though.

Q6 What year did your organisation start trading?

1994

Q7 Who are your main competitors

We compete with other similar companies for lottery money for same funds. We also compete with other audience – we want them to come to us not them, We need to check dates and get them right. We also compete on price – we are cheaper

Q8 Who are your main suppliers?

Art Galleries. We also buy stationery and sometimes cameras and projectors if we need them.

Q9 Who are your main customers?

Our customers are mainly individuals, students

Q10 What is the core of your business?

We differentiate ourselves – high quality, new people of high profile, experimental (innovation) – thing people been before so come again, enjoy our brand. Brand responsiveness – evaluation. We do what we do and then we ask them what – old style R&D and give to customers instead of asking them what they want.

Q11 Do you have an IT budget in your organisation?

No, we don't have IT budget

Q12 Do you have an e-business budget in your organisation?

No, we don't have e-business budget

Q13 Does your organisation need advice or training in using IT to support business processes?

No, we can use technology to the extent we need it for the business. However, John is more technologically brave then me.

Q14 In what area of business process do you require IT technical support?

We use technology for marketing – This area is the most advanced in technology. We would welcome help in that area.

Q15 Do you have any of the following internal IT resources?

No, we are both competent users, and it is only a small company so we provide the technological support as and when needed.

Q16 Do you do business on-line?

Yes

Q17 What on-line facilities does your organisation use?

e-mail, we, sales, marketing, invoicing via e-mail, – have positive experience with payments on line, we are partially integrated with supplier – in infancy – through art gallery and larger organisations. Use Excel for accounts.

Have e-commerce – PayPal – they have on-line catalogue – set up catalogue – through catalogue you open PayPal – PayPal has percentage of the sale. PayPal service provider. Sell CDs and some other material – very little though

Q18 What software packages does your company use to support your on-line business?

We use a new style e-commerce – not old one with EDI. We do B2B – not B2C. We also use CRM with art galleries

Q19 What hardware packages does your company use to support your on-line business?

We have Internet service provider with Ask4 and have private work station – provide Internet for work station, broadband for the house.

Q20 What connection techniques do you use to support your on-line business?

Wireless connection – have router

Q21 Do you have Extranet?

Our suppliers (Art Galleries) have blogs available and we have external access to those. NING (blog) private network between some organisation. We use Extranet with those organisations.

Using blogs to discuss things (mainly other organisations) not using wikis (John started to use – in infancy)

Q22 Are you integrated with your customers?

No we are not integrated. At the moment we don't have discussion boards for our customers – because we are not customer responsive. We do what we do and give that experience to our customers. After our events we ask our customers what they think about it. That is what customers like. We do however do the research and offer our customers what they would be interested in.

As for the customer feedback we use Twitter – ask information from other people. John twitter personally as well as through the company. Research through Twitter – anyone knows new i-iphone? What is new?

Q23 When did you first introduce the Internet technology?

Company started with technology

Q24 What is your stand in terms of technology your company uses?

In terms of Technology we are looking what others are doing . We work in partnership with other art organisations. We use computers at home but at events we outsource technology required for that type of event. It is expensive to buy all of it only they buy some (cameras, projectors)

Q25 What is the most important are in your business in which the Internet technology can make a difference?

Marketing is the biggest thing. Artist push that technology. YouTube, Twitter, Flickr (can put photographs on) – lot has happen and big companies are pushing that onto smaller companies and customers want that relationship and connection

Q27 What is your stand in terms of the Government support?

With the Government we have no relationship – they want to use digital media – want to show case digital work – not for the business itself Only digital media and marketing not how businesses work and use technology themselves.

Company never enquired what government offers. Company know there are some conferences where government tell companies what is new and what they can use.

Q28 What is affecting the implementation of more IT in your organisation?

What is affecting implementation of larger amount of technology would be financial resources. People are highly skilled and can use technology competently. If only they have more money!

Security is fine and we have no problem with it because we did not experience any.

Q29 Future – What support would be mostly welcomed by your organisation?

We would welcome support in sector specific events and locally based training events. We are looking at IT developments and see our future in that direction. However, we are not initiating that change we are followers of big companies. The big players impose on us the higher level of use of IT.

## 11.2.2 Case study 2 – Movig Image Research Ltd (MIR)

10 July 2009; 4:30pm-5:30pm – Home – Sheffield – Interview with Andrea Barbieri

Q1 Company name?

Moving Image Research

Q2 What happened between 2004 and 2009 in your organisation?

2002 after previous company (UBUT Ubiquity media) closed due to very bad period with funding following .com failure in 2001 – people who were supposed to provide funds could not do that. We were very affected and could not continue with development of product. Company closed down in 2007.

Self funded company to respond to market for media producers. Wanted to minimize cost – achieve cheaper solution – in film industry. They wanted to develop more aggressive and agile technology for product development. They were responded to changes in the environment.

UBQ location:



UK – Bristol, Windsor

USA - Los Angeles and Hollywood/Los Altos Silicon valley – close to san Francisco

Q3 What is your industry sector?

Industry sector is – computer services and applications Target market media sector

Q4 How many people do you employ

In 2004 we had 6 employees. The highest number we had 10 employees and went down to 2 before closing down

Q5 What was your sales turnover in the last financial year?

In terms of the turnover I don't know, I was not involved in financial part of company – Turnover was never keeping company alive, the company was self funded.

Q6 What year did your organisation start trading?

2002

Q7 Who are your main competitors

We were competing with big players but we were trying to get different solutions from them.

We were trying to provide hi Tec solution for companies with small income and could not afford more expensive solutions.

Q8 Who are your main suppliers?

Our suppliers were computer hardware companies. We had many choices to source from – especially from Silicon Valley – we had access to hardware from silicon valley. Supplier was Intel

Q9 Who are your main customers?

Our customers were up to medium companies but it is very difficult to explain and measure their size. Universities for example are large companies but their budgets are small. Customers was media entertainment industry – from micro to potentially large organisations

Q10 What is the core of your business?

Core of business was quality, innovation, low cost, new product development – new way of solving problems that customers were experiencing – customer responsive

Q11 Do you have an IT budget in your organisation?

We did not have IT budget. The company was relying heavily on technological infrastructure and was also the core of the business

Q12 Do you have an e-business budget in your organisation?

We did not have e-business budget.

Q13 Does your organisation need advice or training in using IT to support business processes?

No

Q14 In what area of business process do you require IT technical support?

None, all employees highly competent IT users. IT support was not required, all highly skilled and competent users in the company, staff mainly computer programmers

Q15 Do you have any of the following internal IT resources?

All employees hi-Tec

Q16 Do you do business on-line?

Yes

Q17 What on-line facilities does your organisation use?

Company used e-mail, web page, marketing, purchasing

Q18 What software packages does your company use to support your on-line business?

In terms of software we used financial (spread sheet for day-to-day financial records – were start up – so processed business as they needed. Business needed developed-first

Our company also developed own software applications to fit the business

Q19 What hardware packages does your company use to support your on-line business?

In terms of hardware we had broadband. The company was using on-line technology to support geographically disperse parts of company.

Q20 What connection techniques do you use to support your on-line business?

The company used local lines, VPN for Intranet and "In the clouds" Amazon's model

VPN – for internal connection between different locations.

Company had Cable modem

The company was integrated inside not outside of company, used Intranet.

Q21 Do you have extranet?

No. Integration with suppliers was not required. Company was driven by people working for company. Company was requesting things as they needed.

Q22 Are you integrated with your customers?

We had to physically engage with potential customers, we could not sell our products on web site. We had to have proper physical interaction with customers in order to understand their needs and what solution the company could provide for them.

Q23 When did you first introduce the Internet technology?

Technology key ingredients – nature of the game – for them they could not start without technology – essential for business they were in – not having them it would be a failure from the beginning.

Q24 What is your stand in terms of technology your company uses?

Motivation for use of technology - Important to be competitive, provided better quality to customer, silicon valley location was very important as supplier – cost reduction, streamline operation, high level of efficiency and quality

We used marketing but it was not driven through normal channels. We market our company at different events where potential customers would attend. In marketing the company had web presents but never interaction with potential customers.

Electronic transaction was done for purchasing (used e-commerce) in silicon vale that's normal sales

Q25 What is the most important area in your business in which the Internet technology can make a difference?

We programme software, for us technology is what we do.

Q27 What is your stand in terms of the Government support?

Government – never sought any help from the government – government did not have any knowledge how to approach that level of complexity – they wanted to have funding to support research (R&D funding) rather than technological funding. They tried to get some funding but many strings were attached to that they did not want that help in that manner.

Q28 What is affecting the implementation of more IT in your organisation?

Nothing, we implement technology when and if we need it.

Q29 Future - What support would be mostly welcomed by your organisation?

The company stopped trading in 2007

Since 2005 – Media entertainment market experienced bad time – did not have funds and resources to improve their businesses. It was niche market that did not materialised.

Model – Important to have IT and R&D infrastructure from the beginning – model would not be useful as they were not going through the transition. They would be further transformations in the future if they were successful. It would be a natural transformation how business performed but they never got to that point.

Amazon model – computing in the cloud – having companies to invest in their own IT infrastructure – but having service provided by others –

This is not for everybody but some more and more require these services.

If you have natural connectivity to the service – major shift – Office applications – not selling them but providing them as a service. Amazon was a first one to commercialise service – based on excess of resources in their on-line business – they have a big infrastructure and decided to rent it out to others and earn money from it. Now Microsoft and IBM are providing the same – services in the cloud.

### 11.2.3 Case study 3 – Gripple Ltd

No interview

Unfortunately, after several interventions with various people at Gripple, they decided they did not want to participate in the interview. The person who was originally involved was not interested anymore. However the company seems to be working well and progressing through these difficult times in trading business.

### 11.2.4 Case study 4 – SMP Europe

10 July 2007; 10am-11am – SMP Europe – Nottingham

Q1 Company name?

SMP Europe

Q2 What happened between 2004 and 2009 in your organisation?

Q3 What is your industry sector?

Automotive industry

Q4 How many people do you employ

250

Q5 What was your sales turnover in the last financial year?

Turnover – for the group 26m wholly owned by USA company competitors range from small to large, global customers, Bosch – making components for the system's of Bosch. They are customer as well as competitor.

Q6 What year did your organisation start trading?

1967 and then again 1996 as it is now

Q7 Who are your main competitors

Q8 Who are your main suppliers?

Q9 Who are your main customers?

Large customers – 57 different locations – if you don't have a solution to solve that you are in trouble. It has to make sense to and SMEs in terms of business pressure – if you don't find solution to customers demands you lose business.

Big customer – Ferrari – use lots of electronic sources. Have a huge logistics and infrastructure that SMP cannot manage that. UK market is a very traditional and it would net work at the moment for SMP to change their strategies.

Q10 What is the core of your business?

Customer responsiveness, Quality, product range, services. Core of future are switches and sensors (original equipments). Creating a business model that is their com adv – not innovation

Q11 Do you have an IT budget in your organisation?

Yes, have IT budget

Q12 Do you have an e-business budget in your organisation?

No e-business budget – all tied up in IT budget

Q13 Does your organisation need advice or training in using IT to support business processes?

Q14 In what area of business process do you require IT technical support?

Q15 Do you have any of the following internal IT resources?

Dedicated IT team. Have IT department – have maintenance as well and support

Skills – Have a IT department, mixture of IT skills between other members of staff. Some people embarrassed because they don't have skills.

Q16 Do you do business on-line?

Yes

Q17 What on-line facilities does your organisation use?

e-mail, web, no sales, no marketing (marketing department uses sales personnel to market their products, have them in different locations around the world. Some orders on-line – but lots of paper work, stock control is done on-site – purchasing with MRP on site, Production planning – logistics to deliver to customers.

Currently pay for service but only receive orders – send acknowledgement electronically – invoices

Q18 What software packages does your company use to support your on-line business?

EDI use with number of customers, Microsoft Office - Access, Excel. EDI – limited with customers (Would like to do more as reduced the errors but customers not interested yet), SAGE database – in particular – was part of decision making process. He personally would not have chose it because it was too expensive. But to change it now would be even more expensive so they have to stick with it and make most of it. However there has been tremendous improvements. Made a different in data – more roast, previous system was old and un useful. New system very distinctive improvement.

Q19 What hardware packages does your company use to support your on-line business?

Purchasing with MRP and MRP II on site

Q20 What connection techniques do you use to support your on-line business?

Hardware – wide area network (WAN) in house server, wireless connection to individual users, IBSL and dial up connection.

Q21 Do you have extranet?

Suppliers – no business with suppliers electronically. Business is a mixture of 50% manufactory products and 50% they buy from other manufacturers. Tricky to use electronic means with suppliers. MRP daily – not good in translating those – system installed in 2005 but not utilising system effectively, just beginning to use it more.

Q22 Are you integrated with your customers?



Production and scheduling by SAGE. Not integrated with suppliers not customers at all. Not using intranet at all. Communicate only via e-mails.

Q23 When did you first introduce the Internet technology?

First introduced Internet 1997 first when everybody was talking about it. They did not notice any change between 1999 and 2001 before and after .com failure.

Primary driver – file sharing, server based software system to create account. This led to computers, internet ext. Initially was introduced to improve communication – quicker and simpler think e-mail is not utilised properly. Very powerful communication tool but some people overuse it. Send e-mails instead of using the phone for communication.

Q24 What is your stand in terms of technology your company uses?

Some very good practices but not used much. Fundamentally it does create com adv, customer loyalty, reduces cost – you don't have to process all the data. Not reduced staffing level as a result but it does not increase the staff level. Some cost saving.

Q25 What is the most important area in your business in which the Internet technology can make a difference?

Model – as a tool – operate mixture of traditional and e-business – because of market demand – Just-in-time – manufacture to schedule deliver on daily bases. Middle East countries – even fax machine is hi-tech technology – this would not allow them to take over all e-business organisation

Diverse market , very global

Respond to changes in environment – some customers will demand hi-Tec some not

Marketing

E-commerce important for winning a new business. I want be able to order on-line (customer perspective)

Q27 What is your stand in terms of the Government support?

Government – use only chamber of commerce, some government sites are very good. Very helpful. Not aware of any initiatives.

Q28 What is affecting the implementation of more IT in your organisation?

Degree of security for customers. Big company in small niche market so keep security of brand name for customers. Have contracts with two or three groups (Distributors to garages) that sell their products. Contract for several years 2-3.

Not trying to cut out the middle man – they cannot supply directly – don't have logistics in place.

Strategy is to use distributors to deliver product to target market – Use of e-business is important element but will never replace completely the strategy they do business. Because their business are all micro to large organisations and they operate differently.

Mixture of different parts to create comp adv. Efficiency is root to market for SMP Word leader in market on that basis. The more diver you are the less efficient you are. So different part of company will have different strategies to fit best their way of doing business.

Trying to make low cost manufacturing techniques and factory overheads.

Q29 Future - What support would be mostly welcomed by your organisation?

Marketing - using web site to see who is looking at what products and try to target particular group of customers to match their products

Very customer oriented

No R&D plans.

Plans for improving we sites.

They think of gradually improving and investing in technology and will continue to be customer responsive. So next step would be e-commerce for distributors rather than the consumer

Model – useful tool but would not create the core of their business strategy.

Middle East – hand shake and business is completed, contract signed

Scandinavian countries (Denmark in particular) – astonishingly very high tech.

### 11.2.5 Case study 5 – Aleksandria Science Ltd

19 July 2009; 2:30pm-3:30pm – Aleksandria Science Ltd premises – Sheffield

Q1 Company name?

Aleksandria Science Ltd

Q2 What happened between 2004 and 2009 in your organisation?

The company had a steady increase in activities

First of all there is more freedom, more flexibility and more profit working like this. Here everything is profit, all comes to me.

No I am a physicist not a nuclear physicist and my job is "Nuclear waste management, modelling and assessment of the impact of releases from radiological waste disposal facilities into the near surface environment".

I hope you got all that.

My business is with Scandinavian countries, in particular Sweden. This is because they are more advanced than anybody else. So, They need to do more, they need to do more in detail. The closer they get to the licence application for permission to build geological depository for nuclear waste the more they need to know about the sites. The more they know about the sites the more detailed modelling it needs to be in the assessment of risk.

Q3 What is your industry sector?

The nearest industry I belong to would be a service. Because I provide the consultancy to the Swedish Radiation Protection Authority. They are funded by "Levion" company that is that is funded by Swedish electricity users.

Q4 How many people do you employ

I work on my own, just me in the company. I would like my children to go into business when they become more numerate.

Q5 What was your sales turnover in the last financial year?

Last financial year turnover was £45–50,000

Q6 What year did your organisation start trading?

Initially, I started my company in 1997 and again in 2002.

Q7 Who are your main competitors

My competitors are big companies such as universities. They would do this business.

What I do is radiological protection, while other people do description of geology. What I do is how this potentially affect human's health.

Q8 Who are your main suppliers?

Amazon is my main supplier for books.

Q9 Who are your main customers?

I work for the Swedish regulators, in particular Swedish company called "Watch Dog" to make sure that nothing is overlooked in the assessment.

Q10 What is the core of your business?

My core business is differentiation and sometime innovation

Q11 Do you have an IT budget in your organisation?

No IT budget

Q12 Do you have an e-business budget in your organisation?

No e-business budget

Q13 Does your organisation need advice or training in using IT to support business processes?

I don't need any advice how to use IT.

Q14 In what area of business process do you require IT technical support?

Q15 Do you have any of the following internal IT resources?

No, I do everything in my company

Q16 Do you do business on-line?

No

Q17 What on-line facilities does your organisation use?

I set up the website myself but it never went alive. I don't have enough knowledge to set it properly and keep its maintenance. Definitely don't have enough financial resources for it. I never sent it alive to the Internet.

I don't use anything else. I don't buy or sell on line. Only buy things from Amazon when needed.

I only use e-mail to support my business.

Q18 What software packages does your company use to support your on-line business?

Microsoft office – Excel, I use Excel, some graphic software, I use office, some superb mapping software, very cheap of the Internet.

Q19 What hardware packages does your company use to support your on-line business?

Broadband

Q20 What connection techniques do you use to support your on-line business?

I have broadband and wireless network, it is very useful.

Q21 Do you have extranet?

No, and no connection with suppliers. Only a very small company, no need for it. I would welcome integration with universities. That would be a great source of research information for me and my business.

Q22 Are you integrated with your customers?

I am not integrated to suppliers nor customers, and have no intention to do so.

Q23 When did you first introduce the Internet technology?

I started my company in 1997 with "Dial up". It was interesting it, but it didn't present the problem at the time but you couldn't possibly go back to that speed, could you?! Comparing to that time I am very advanced now.

Q24 What is your stand in terms of technology your company uses?

The Internet is a viable source of quality information. One thing that is missing is literature in my field. It is not much of a problem, I make it as I go but I would like some databases available.

The technology is just there. I don't think a lot about it.

Q25 What is the most important area in your business in which the Internet technology can make a difference?

Research area. Universities or some other companies that could provide an on-line access to certain databases that would be useful in my field of consultancy.

Q27 What is your stand in terms of the Government support?

I never tried to use any of government agencies. My kind of business is not suitable. I am not so tied up with the IT. I can do calculations at the back of the book.

Q28 What is affecting the implementation of more IT in your organisation?

Lack of financial resources. Would like to be on-line and have web presence

Q29 Future – What support would be mostly welcomed by your organisation?

The Internet is a viable source of quality information. One thing that is missing is literature in my field. It is not much of a problem, I make it as I go but I would like some databases available.

I don't know anything about outsourcing the IT and would not be interested.

I don't use social networking sites. I may look at these possibilities in the future.

### 11.2.6 Case study 6 – Tony and Guy

19 July 2009; 2:30pm-3:30pm – Tony and Guy – Sheffield Interview with Chris

Q1 Company name?

Tony and Guy

Q2 What happened between 2004 and 2009 in your organisation?

We have grown in the past 5 years and became stronger in our field of business in Sheffield. We also use technology lot more than in the past. Although it was imposed by our mother company it is up to me if I am going to use it. I have to pay for it so it is better to use it. If the market for it is there I would definitely use it to improve my efficiency and customer experience. We now have two salons in Sheffield.

Q3 What is your industry sector?

Service industry

Q4 How many people do you employ

24 - I grow my business to two salons. I employ 12–13 people here and 10 in the other one.

Q5 What was your sales turnover in the last financial year?

£660,000

Q6 What year did your organisation start trading?

1996

Q7 Who are your main competitors

We have competition in the area but they are all smaller companies. We are the biggest.

Q8 Who are your main suppliers?

Suppliers are also coming through franchised business.

Q9 Who are your main customers?

Individual customers



Q10 What is the core of your business?

The core of business is quality, and customer responsiveness

Q11 Do you have an IT budget in your organisation?

Yes, we have a budget for IT

Q12 Do you have an e-business budget in your organisation?

No specific e-business budget. All part of IT budget

Q13 Does your organisation need advice or training in using IT to support business processes?

Yes

Q14 In what area of business process do you require IT technical support?

I need to have more training. I don't know what the system does and how it can help my business. I would like to have more training.

Q15 Do you have any of the following internal IT resources?

We have IT manager.

Q16 Do you do business on-line?

Very little, but would like to start with on-line booking

Q17 What on-line facilities does your organisation use?

E-mail and web page. We have a Web site, we don't do transactions on-line (buying, selling) we order by phone, our stock control is done on the computer we don't do online invoicing.

Q18 What software packages does your company use to support your on-line business?

Microsoft office - Excel

We have a very good system but it is still not utilised properly. We have a freedom of deciding what we want to do with the system. System also give us the spending pattern so we can plan carefully.

We also have IT trainings available especially for "Salon genius", courses available. It is only last week we got Salon genius 9. They came and installed it.

Q19 What hardware packages does your company use to support your on-line business?

We have a broadband, don't have in-house server, have cable connection, internet service provider – don't know. They only buy the system. Tony and Guy have access to their computer and can help with problems.

Q20 What connection techniques do you use to support your on-line business?

ADSL

Q21 Do you have extranet?

No, in terms of suppliers we are not integrated but we use technology for stock control. We put everything on to the system, but ordering we do, via e-mail, phone or fax. We only use E-mail but we are integrated with the mother company that used Intranet.

Q22 Are you integrated with your customers?

No

Q23 When did you first introduce the Internet technology?

1996

Q24 What is your stand in terms of technology your company uses?

We noticed changes over the past 5 years in the use of technology. It is lot easier, marketing is easier. We can do things like improve customer experience. We stay in touch with the customer, improving our quality in customer relationship.

Booking on-line is available to us but I am not sure if it is viable to us yet. The online booking is only available via e-mail at the moment. However, more and more people are enquiring about it.

The mother company is pushing certain things a lot. We need to use advertising in a certain way. They have tight model we need to comply with.

We use IT a lot, we have a system that is provided by them but we need to buy it. We are not using the IT available to its full potential.

Q25 What is the most important are in your business in which the Internet technology can make a difference?

Marketing and booking on-line

Q27 What is your stand in terms of the Government support?

No I don't use government sources. Business Link is lot of rubbish. I wanted to have young people apprenticeship help but did not get anything.

Could not get any help for IT infrastructure. My computer system cost me an arm and a leg. Government don't even offer any tax reduction. Not that I am aware of. Government send Leaflets or radio programme. I normally have to go myself and enquire about it.

Q28 What is affecting the implementation of more IT in your organisation?

Lack of my personal knowledge and financial resources

Q29 Future - What support would be mostly welcomed by your organisation?

We don't have an in-house server. I am the only one with the mother company's e-mail. Other staff have their own personal ones.

I am thinking about the in-house server as a next step. I see my business grow in both ways, salon expansion and employing more people. Would like to have 5 salons and when the time is right sell the business and retire.

### 11.2.7 Case study 7 – Occidental Ltd

19 July 2009; 2:30pm-3:30pm – Occidental – Sheffield Interview with Michelle Nike

Q1 Company name?

Occidental Ltd

Q2 What happened between 2004 and 2009 in your organisation?

I have grown my practice substantially over the past 5 years. We also changed the location and we are now in purposely built business premises that suit our business. We also act as a mini hospital in some areas of my practice. In addition, I run a purely NHS part of the practice that is on different location.

Since 2004 there were two major changes in dental practice contracts. These changes did not improve patient experience as people go to dentist only when there is an emergency. Fortunately, my private practices has grown but my NHS practise has not.

We have 3,000 patients and we still know all their names.

Q3 What is your industry sector?

Dentistry

Q4 How many people do you employ

We now employ around 25 people.

Q5 What was your sales turnover in the last financial year?

In the last financial year our turnover was £950,000

Q6 What year did your organisation start trading?

1997

Q7 Who are your main competitors

Our nearest competitor is 500 yards away. They were here before me. I am there competition. Another one is in Broomhill, an hospital. Some are the same size as us, some smaller and hospital is large company.

Q8 Who are your main suppliers?

Suppliers – are small, local companies., sometimes we use large once as well.

Q9 Who are your main customers?

Individual people

Q10 What is the core of your business?

Our core business is Efficiency, quality, innovation – offer mini hospital service. Innovation was initiated by me. I assessed that the environment and so the opportunity for the business.

Q11 Do you have an IT budget in your organisation?

Yes, we do have IT budget

Q12 Do you have an e-business budget in your organisation?

No, we don't specifically have an e-business budget. It is all part of one pot.

Q13 Does your organisation need advice or training in using IT to support business processes?

No

Q14 In what area of business process do you require IT technical support?

In all parts of my business

Q15 Do you have any of the following internal IT resources?

IT manager

Q16 Do you do business on-line?

Yes

Q17 What on-line facilities does your organisation use?

We do purchasing on-line but we don't do sales.

Q18 What software packages does your company use to support your on-line business?

Company that we bought the system from offers training as well. It costs £250 pcm and everything is included. For accounting we use DOSH

Q19 What hardware packages does your company use to support your on-line business?

We have an in-house server as well as e-mail server. All staff has e-mails. We have a manager who is responsible for IT and investments. I ask for information then I make a decision on investment based on that availability and what it can do for business.

Q20 What connection techniques do you use to support your on-line business?

We have a wireless connection, windows application, office, broadband, intranet and extranet (partially integrated with NHS).

Q21 Do you have extranet?

We do B2B and we are integrated externally. Partially integrated with NHS.

Q22 Are you integrated with your customers?

No

Q23 When did you first introduce the Internet technology?

1997

Q24 What is your stand in terms of technology your company uses?

IT improves our business but it does not bring any more money, just additional cost. My experience with the advances in technology has been very good. Communication has been improved. But it has also increased my work at home after I finish my work in practice and also increased expenditure because I need computer at home as well.

Q25 What is the most important are in your business in which the Internet technology can make a difference?

It helps to improve efficiency and consequently saves money.

Q27 What is your stand in terms of the Government support?

I would welcome Government's help in letting us know what is available, how it could be used. Visit in person would be good or some training or informative sessions would be nice. I do attend some conferences but would welcome publications more freely available so we can keep track on what is going on.

Q28 What is affecting the implementation of more IT in your organisation?

Financial resources. It is very expensive and it is very demanding on my time as well. The more I invest in the business the more I need to buy for home as well. The IT requires integration and time.

Q29 Future - What support would be mostly welcomed by your organisation?

The NHS big IT investment is still an issue. We still have an infection problem and that has not been tackled in terms of physical IT equipments. Solutions we clean with, everything must be within 2 meters from the patients so if it is too far away it is difficult to use it.

NHS big IT investment has not been completed yet and dentistry is not connected on it yet. It would be nice to have a history of the patients available to us. This would protect us as well as patients. Unfortunately it is not available yet.

We don't use any social networking sites but that is may be our next step.

## 11.2.8 Case study 8 – Sheffield Motor Company (SMC)

Interview with Sheffield Motor Company

Q1 Company name?

Sheffield Motor Company

Q2 What happened between 2004 and 2009 in your organisation?

This company is not trading anymore. One of the reason for it is recession as it has affected the automobile industry to the great extent and consequently it affected the car dealers as well. The company changed the location in 2006 and that location was never good for the trade. Now I run business from home. Company officially was closed in 2008.

Q3 What is your industry sector?

Car dealers

Q4 How many people do you employ



Was 5, but now only working from home with my father and wife.

Q5 What was your sales turnover in the last financial year?

Very low so could not continue with business. Cost of renting the working space was too expensive.

Q6 What year did your organisation start trading?

Started in 1998 and stopped trading in 2008

Q7 Who are your main competitors

Other second hand car dealers and in recent years franchised dealers. Competition has increased in the past several years and made a business lot harder

Q8 Who are your main suppliers?

None any more. It used to be individual people and companies of all sizes

Q9 Who are your main customers?

Individual people

Q10 What is the core of your business?

Customer responsiveness

Q11 Do you have an IT budget in your organisation?

No

Q12 Do you have an e-business budget in your organisation?

No

Q13 Does your organisation need advice or training in using IT to support business processes?

Yes

Q14 In what area of business process do you require IT technical support?

All areas of business. We have no knowledge

Q15 Do you have any of the following internal IT resources?

No. We all use computers to store customer data and send e-mails. Very basic and low tech

Q16 Do you do business on-line?

No

Q17 What on-line facilities does your organisation use?

None. We don't communicate via e-mail. Use telephone and fax

Q18 What software packages does your company use to support your on-line business?

Microsoft office – Excel for accounts and Access database

Q19 What hardware packages does your company use to support your on-line business?

ISP.

Q20 What connection techniques do you use to support your on-line business?

Was Dial up. Now from home I use broadband

Q21 Do you have extranet?

No

Q22 Are you integrated with your customers?

No

Q23 When did you first introduce the Internet technology?

2001

Q24 What is your stand in terms of technology your company uses?

The company never had any technology except for PC's in the office to keep track of the clients (customer database) and excel for accounts. Company did not have web site nor official e-mail.

Very low tech company

Q25 What is the most important are in your business in which the Internet technology can make a difference?

Marketing, on-line presents

Q27 What is your stand in terms of the Government support?

No support from Government. Used to receive leaflets but never responded to them

Q28 What is affecting the implementation of more IT in your organisation?

Knowledge, skills and financial resources

Q29 Future – What support would be mostly welcomed by your organisation?

Business closed in 2008. Now it is run from home. Hoping to get back into business in the future.

### 11.2.9 Case study 9 – Cave Studio Ltd

Cave studio – Interview with Alison Alan

Q1 Company name?

Cave studios

Q2 What happened between 2004 and 2009 in your organisation?

This company stopped trading in 2008. The business was not going well for some time and eventually company closed down. The reason being of private matter combined with the lack of IT investment in the company.

Q3 What is your industry sector?

Music – Service broker

Q4 How many people do you employ

Was 2 people, reduced to 1 person in last few years of trading and now none

Q5 What was your sales turnover in the last financial year?

Was £350k in 2004 but new figures were not available.

Q6 What year did your organisation start trading?

1979

Q7 Who are your main competitors

e-bay

Q8 Who are your main suppliers?

Individual people and some companies of various sizes

Q9 Who are your main customers?

Individual people. Niche market

Q10 What is the core of your business?

Customer responsiveness and on-line technology

Q11 Do you have an IT budget in your organisation?

No

Q12 Do you have an e-business budget in your organisation?

No

Q13 Does your organisation need advice or training in using IT to support business processes?

No

Q14 In what area of business process do you require IT technical support?

None, both of us were very capable of using IT but my business partner was never interested in growing business, he was happy as it was. The arrival of e-bay made our business suffer. We did not have the technology that would enable us to compete with the giant.

Q15 Do you have any of the following internal IT resources?

IT enthusiast

Q16 Do you do business on-line?

Yes

Q17 What on-line facilities does your organisation use?

e-mail, website, sales, marketing, orders, purchasing

Q18 What software packages does your company use to support your on-line business?

Microsoft office – Excel

Q19 What hardware packages does your company use to support your on-line business?

Broadband

Q20 What connection techniques do you use to support your on-line business?

ADSL

Q21 Do you have extranet?

No

Q22 Are you integrated with your customers?

No

Q23 When did you first introduce the Internet technology?

1985

Q24 What is your stand in terms of technology your company uses?

Due to the lack of investment in the company's IT infrastructure company could no longer compete with the major competition e-bay. We did not invest in more sophisticated e-mail system since the core of their business was on-line technology and customer responsiveness

Q25 What is the most important are in your business in which the Internet technology can make a difference?

More sophisticated e-mail system that would enable company to compete with players such as e-bay. Further investment in our IT infrastructure would also enable marketing and use of social networking sites. I had a great ideas and planes but divorce and lack of interest from my ex-husband did not allow this to take place. I did not have any choice.

Q27 What is your stand in terms of the Government support?

On several occasions I tried to get some help from our local government but was unsuccessful. I don't have a good opinion about the government involvement and available help through initiatives. I am not aware and never have been about IT initiatives.

Q28 What is affecting the implementation of more IT in your organisation?

Financial resources, lack of interest

Q29 Future - What support would be mostly welcomed by your organisation?

We don't need any support any more. May be I'll open my own company sometime in the future



## 11.3 Appendix C

### Interview transcript: Freelance System Integrator (SI Ltd)

#### 11.3.1 Stage 1 – IT Infrastructure

For a generic SME, its IT needs should in principle be assessed on the basis of the needs and modes of operation of different departments. Not all departments will have the same needs. For example, at the time of writing these lines (second quarter of 2010) the following table gives a typical configuration which should be used for accounting and stock management.

Item	Specification
Motherboard	Gigabyte MB GA-G31-ES2L
Processor	Intel, model DualCore E3300
Processor description	Two CPU Speed : 2.50GHz Bus Speed : 800MHz L2Cache size : 1 MB TD Power : 65W Technology : 45nm
Graphics card	VGA Integrated 256MB
Memory	1x2GB DDR2 800MHz
Hard drive	320GB SATA II 7200 rpm
Optical device	DVD-RW
Housing	ATX Midi Tower
Power	400W
Sound card	5.1 Ch Sound Blaster OnBoard

For a possible creative graphical design department the following configuration would be suitable.

For a generic SME, its IT needs should in principle be assessed on the basis of the needs and modes of operation of different departments. Not all departments will have the same needs. For example, at the time of writing these lines (second quarter of 2010) the following table gives a typical configuration which should be used for accounting and stock management.

Item	Specification
Motherboard	LGA1156 H55 MSI H55M-E33, PCIe/DDR3/SATA2/GLAN/7.1
Processor speed	2.93 GHz
Graphics card	VGA GeForce GT220 Leadtek 1GB/DDR2/DVI/VGA/HDMI/128bit
Memory	DDR3 2 x 2GB 1600MHz Patriot
Hard drive	SATA2 500GB 16MB 7200 rpm
Optical device	DVD-RW
Housing	ATX Midi Tower
Power	450W
Sound card	Integrated 7.1

For SME's management mobility is important so a laptop, such as Toshiba Satellite L500-1XU, and portable data projector Dell 1209S would be a reasonable option. The data projector characteristics are as follows.

Item	Specification
Brightness	2000 ANSI Lumens
Contrast	2100:1
Lamp life	2,500h
Resolution	SVGA (800x600) with autosync up to SXGA+(1400x1050)
Colours	16.7 million
Input	1xD-sub, 1xComposite Video RCA, 1xRGB/component and 2xS-video, 1xUSB, RS-232
Audio	Speaker power 2 W

Normally, computers should be networked using LAN as well as the Internet, in particular if the company has its own B2B and B2C services. If necessary, a networked server can be installed to serve as file repository, data searching and access to the Internet and other specialist services developed for that particular SME, depending on its nature of business. A typical server configuration nowadays is given in the following table for HP Server Proliant ML 350G6 106.

Item	Specification
Motherboard	Intel Xeon Quad core E5506

Processor speed	2.13 GHz
Hard drives	Smart array P410i/256MB (RAID 0/1/1+0/5/5+0) SAS 2x146GB, 10,000rpm
Optical device	DVD+/-RW
Housing	ATX Midi Tower
Power	460W
LAN card	2x10/100/1000 Ethernet

For all computer configurations normal add-ons are a keyboard, mouse and TFT/LCD/LED, typically 19", monitor. A LAN router with wireless access to the local network and the Internet is also what is expected in an SME of up to about 30 employees.

As far as the software is concerned, there are two general categories of it: operating systems (OS) and applications.

The OS is the basic program which supports installation of other application software. There are open-source free operating systems, such as Unix and Linux, and commercial ones like the omnipresent Windows. Normally, compatibility of application software with operating systems will dictate which OS is installed. Also, before buying OS, it is necessary to check if the PC hardware is compatible with the chose OS.

Application software, or applications, depend on the nature of the SME's business. For example, finance departments and accountants will normally need specialised accounting book keeping software whereas a design bureau will need one or more Computer Aided Design (CAD) applications. However, generic types of software which almost inevitably appear nowadays are suites of Microsoft Office or Open Office programs. A separate but important category of applications are various antivirus, antispyware and firewall programs as well as programs for compressing data ,like WinZip or WinRAR. IT budget dictates what type and how many of these software an SME can have. Software licences are usually paid annually.

The expenditure is also affected by a management decision to commission an IT consultant to set up the system initially, and, maybe, continue to manage and maintain it. Constant maintenance and upgrade of the IT infrastructure is practically inevitable and is very important considering the rapid developments in the IT is the last 20 or so years.

### 11.3.2 Stage 2 Intranet integration

The main server is a machine which is used by a group of people ('clients'), typically company employees via some kind of computer network. The most widely used computer networking model is the client-server model. Many software applications used by businesses are written for this kind of network organisation model. For computers to communicate between themselves, some kind of communication protocol is required. The most popular protocols are internet protocols like HTTP, SMTP, Telnet and DNS. In essence, this communication model can be explained as a cooperation of various computer programmes in one software. This means that a server provides some kind of service for one or more clients which send requests for such service. The most widely known example of this is an Internet search engine, like Internet Explorer or Google Chrome, residing on a client's computer which can have access to information on an Internet web server. Depending on the type of service it provides to clients, there are several types of server such as the mentioned web server, but also ftp server, application server, database server, name server, (e)mail server, file server and print server. Also, majority of web services are provided by some kind of server.

The exact hardware configuration of a server depends on the type of service it provides. For a typical SME nowadays, mail server is an important part of its internal and external communication. That server should be able to provide the following services: web-based mail or simply webmail, which enables reading e-mails via HTTP protocol internet browser, and also POP3 and IMAP protocols for reading e-mail in various programs for reading electronic mail, such as Microsoft Outlook. The existence of a mail server enables fast communication within the company and outside of it, and it requires only a very modest and relatively inexpensive hardware configuration. A typical e-mail server configuration would be Dell model PowerEdge 2600, with 512MB of RAM and a single 36Gb hard drive. Considering that this is an e-mail server, a 730W redundant power supply would be needed to provide continual service the case of power loss. Typical examples of mail server software are MDaemon Email Server and Microsoft Exchange Server.

Apart from the hardware, a server requires its own operating system which is different than those used by client computers. Most widely used are Windows- and Unix-based server operating systems. More expensive options would involve high-end servers developed by some of the leading companies, such as Cisco, which come with their own operating systems and client server

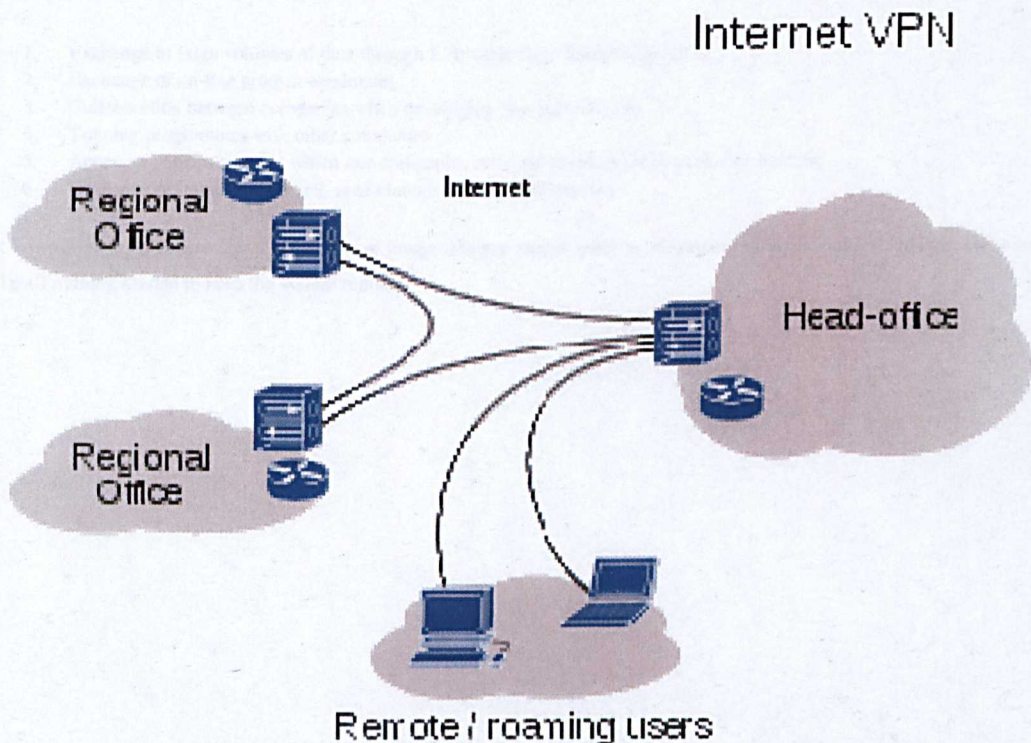
applications. Whatever is done, the most important thing is to have a well matching combination of hardware and software which will be stable most of the time and would be able to cope with overloading caused by increased client requests. If an important company server becomes unstable and crashes for whatever reason this may yield large financial losses, so procedures must be in place to minimise both the probability of occurrence and negative effects of this.

If a company decides to pursue a B2B or B2C business model, then it is crucial to invest in quality web-based services. This would require an engagement of a specialist consultant to advise, configure, set up and, maybe, maintain the web-based service. Usually, this require either renting of some kind of web-hosting services from many commercial companies which provide this nowadays, or commissioning the company's own web server. There are many advantages of the B2B and B2C business models, such as fast searching of company services/products, efficient ordering of company's products and/or services, and efficient on-line payment. In essence, this is the way to serve a business client without them visiting or phoning the company. Efficiency gains and savings are obvious for all parties involved.

Usual LAN speed needed nowadays to provide this kind of service is 1Gbit/s and it should not be forgotten that any external visibility of the company usually requires firewall, antivirus and antispyware protection of the applications and data from outside hacker attacks. This protection should installed on all computers within a company.

### 11.3.3 Stage 3 – Extranet

Virtual Private Network (VPN) is any private network of computers which has been mapped onto a public network of computers and which uses some of the security protocols. VPN is a link between to computers through local and broadband network with some kind of protected access and data. VPN can be imagines as a pipe within a pipe, whereby the inner pipe has a wall which does not allow access from within the outer pipe.



There is various software which can be used to form VPN, and most widely used are Cisco Systems VPN Client, Microsoft Intelligent Application Gateway and Open VPN. Also, there are various protocols which can be used to protect VPN, most widely known being: SSTP, IPsec, Layer 2 Tunnelling Protocol, Point-to-point tunnelling protocol and Split tunnelling.



As the Internet was becoming more and more widely used, companies were increasingly using it as the way to expand their existing computer networks. Nowadays, many companies are investing in the development of their own VPN to satisfy the needs for remote access to their company networks.

To develop a VPN, a server with an appropriate hardware configuration is required. Then, the following are also needed:

- User access: i.e. selection of users who would be able to access VPN
- Internet Protocol (IP) configuration: VPN server needs to have its own static IP address and a range of IP addresses which will be used by VPN clients. Also, for a VPN server a DNS and WINS server addresses must be configured which will be given to the clients during their connection to the VPN.
- Data encryption: All data must be protected in such way so that clients who are not authorised cannot read them.
- Firewall ports: If VPN is behind a firewall, there must be open an IP protocol and TCP port for VPN server.

The advantage of VPN is remote and perfectly safe access to the company's network from anywhere in the world enabling literally the same conditions as those available to somebody who is physically present in the networked company office.

Intranets are internal networks featuring, typically web-based, applications which are used only within a company. Extranets are a private network with limited access given to external parties such as suppliers, buyers, business partners and general customers outside the company. Extranets use internet protocols and publicly available such as telephone-, cable- and wireless-based broadband communications. Extranets can comprise several VPNs which physically exist at different locations. In principle, there are two types of Extranet: those where all collaborating companies allow access to their Intranet to other business partners, and those whereby one company allows access to its Intranet to all of its business partners.

For the Extranet to function properly, it is necessary to invest in its security. This means having some kind of firewall server management, digital certificates or similar way for verifying the users as well as encryption of data and use of VPNs tunnelling through public networks. Extranet is mostly used for:

1. Exchange of large volumes of data through Electronic Data Interchange (EDI)
2. Exchange of on-line product catalogues
3. Collaboration between companies when developing new technologies
4. Training programmes with other companies
5. Access to various services which one companies provides to others, such as on-line banking
6. Exchange of information which is of mutual interest for all parties

The downside of the Extranet are the high cost of integration and maintenance in one organisation, including, hardware, software and staff training needed to keep the system running.